



REVISED WORKING PLAN OF KEONJHAR DIVISION

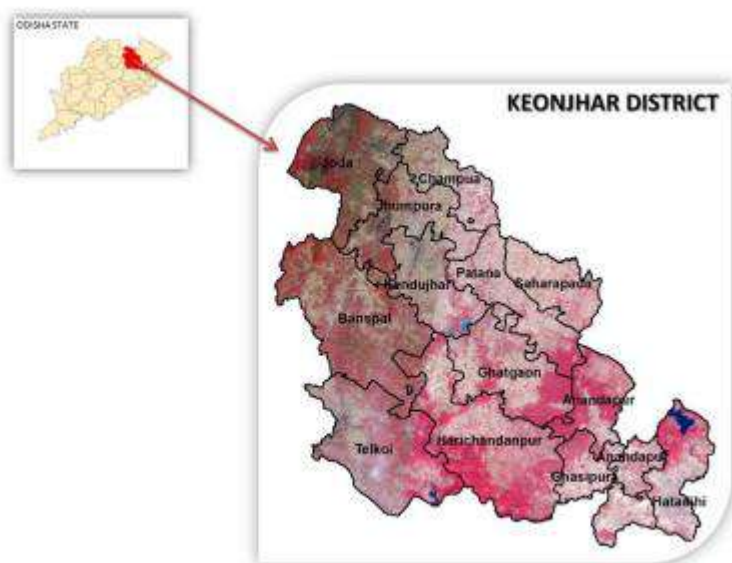


FOR THE PERIOD 2022-23 TO 2031- 32

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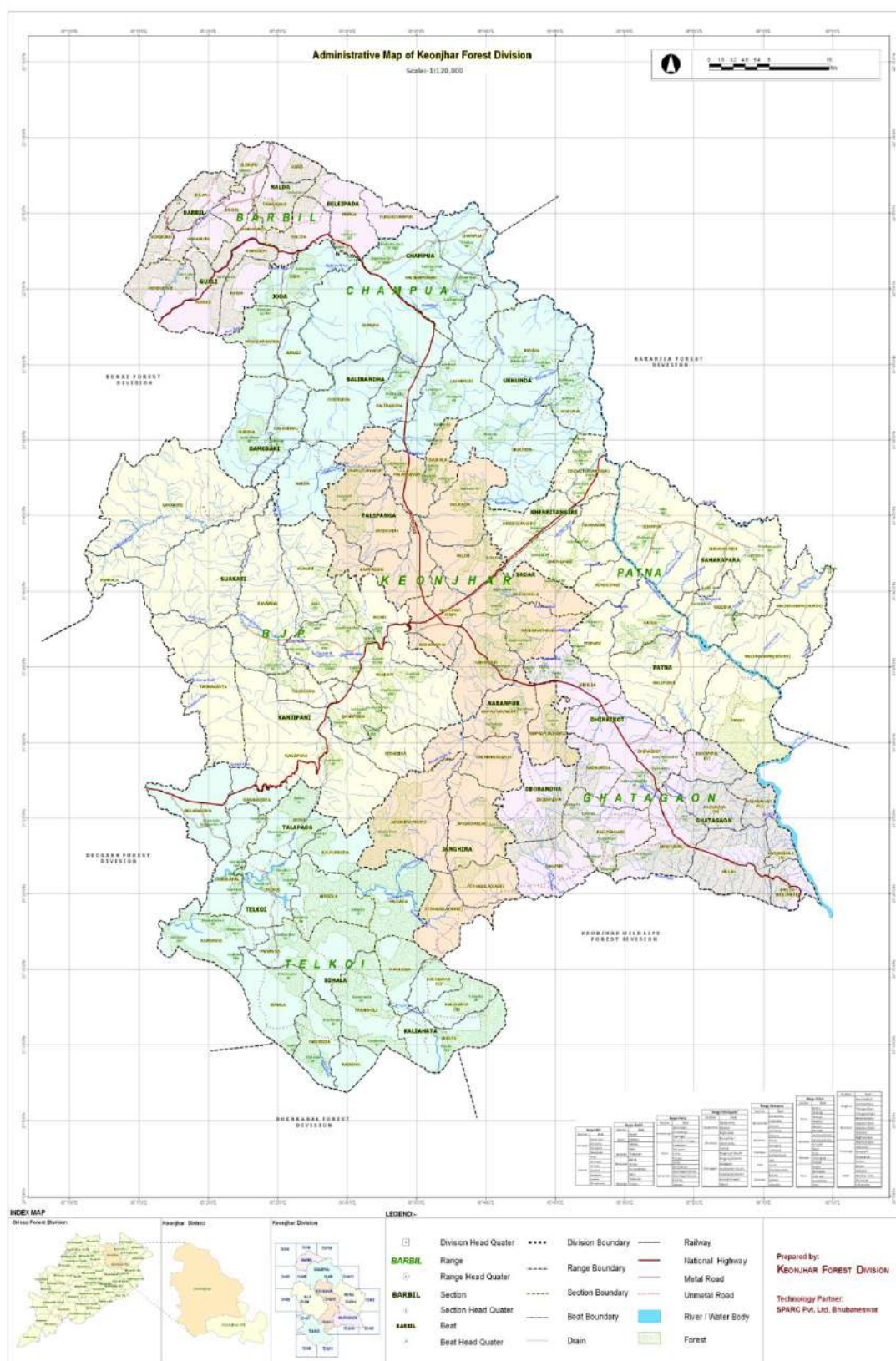
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Location Map of Keonjhar District







AUTHORS' PREFACE

The present revised working plan of Keonjhar Forest Division covers all the Reserved Forests, Proposed Reserved Forest, Demarcated Protected Forest, Protected Forest and Village forests as planted up during Social Forestry Project and natural vegetation near to village and declared as Village forest under Odisha Forest Act, 1972 excluding the jurisdictional forest area under Wildlife Division, Anandapur. Out of the total geographical area 8303 sq. km of Keonjhar district, the geographical area of Keonjhar Division is 6273 Sq. Km and that of Wild life Division, Keonjhar is 2030 Sq. km. The total forest area proposed for management is 1616.21 sq. km which is about 25.76 % of the total Geographical area of Keonjhar Division.

This is the third revision plan in a row for Keonjhar Division after approval of 1st revision (1984-85 to 1993-94). The 2nd revision (2007-08 to 2016-17) could not get approval for certain reason. The current revision of working plan contains all forest areas under departmental administration. The forests under consideration are passing through a crucial stage where the crop is at young stage and few matured trees are available to be managed as seed bearers to sustain a high forest system. Further participatory forest management is gaining momentum all over the division matching with the footsteps in the State.

The present plan for the period 2022-23 to 2031-32 is prepared by utilizing the benefits of Modern techniques, Satellite imagery interpretation, GIS facilities of Forest Head quarters with the support of many individuals, organizations directly or indirectly. It is a great privilege and opportunity on my part to write the first working plan of this Division after its reorganization basing on the National Working Plan Code 2014. The ORSAC and the NRSC, Hyderabad have played a crucial & vital role using the Remote sensing techniques for selecting sample points, collections of primary data from sample points and its analysis for calculating the growing stock and preparation of Maps. Due to their extensive help and co-operation, it could be possible to write the plan within a small span of time.

Finally, the author ventures to record that planning of any sort would be meaningless unless it is meticulously implemented at all levels by all concerned with sincerity and devotion. The author will feel amply rewarded for his labour if the recommendations and various prescriptions made in this working plan are given care and consideration it deserves.

The author gratefully acknowledges the timely guidance, help, encouragement and valuable suggestion of Sri Sandeep Kumar Tripathy, IFS, Ex-Principal Chief Conservator of



Forests & HoFF, Odisha and Sri AK Jaiswal, IFS, Ex-Conservator Forest (Working Plan). I am also very much thankful to Dr Sisir Kumar Ratho, IFS, Principal Chief Conservator of Forests & HoFF, Odisha, Sri P.K. Sahu, IFS, Conservator of Forests (WP), O/o The PCCF & HoFF, Odisha Bhubaneswar for his timely advice to complete the working plan.

The author is indebted to Sri Ligaraj Otta, IFS, Ex- Regional Chief Conservator of Forests, who was my source of inspiration for finalizing this working plan. I am also very much thankful to Sri Bhanja Kishore Swain, IFS, Ex-RCCF, Rourkela and Dr Arun Kumar Mishra, IFS who has given valuable suggestions to complete the working plan as per National Working Plan Code-2014. I extend my sincere thanks for sharing their valued experience.

The author during the revision of this plan has been constantly helped by Divisional Forest Officers, Keonjhar Division and his staff. The author also extends his heartfelt thanks to Sri Shankarsan Behera, OFS-I (SB), Ex-WPO, Keonjhar, who had drafted the PWPR. I also extend my thanks to Sri Bhimsen Maharana, OFS I (SB) for his guidance in yield calculation and other important aspects of the working plan. He has also shared his vast knowledge in the write up on Elephant Corridor in Wildlife (Overlapping) and Eco-sensitive zones in Protection Working Circle. I am also thankful to Sri Anadi Charan Das, Ex-AWPO and I/c WPO Keonjhar for his valuable contribution in this plan. I am very much grateful to Sri B. R. Rout, IFS, Ex-DM, OFDC Keonjhar and Sri Pradeep Kumar Sethy, OFS A (SB), Divisional Forest Officer, Keonjhar (KL) Division for their kind co-operation in providing information and for their valuable suggestion.

The author gratefully records his appreciation to Sri Susant Kumar Jena, OFS A (JB), Ex-AWPO, Keonjhar who constantly and enthusiastically took up the job as a challenge just after his training from CASFOS, Dehradun. His tireless effort for calculation of various data like Carbon Estimation, ND-Curves, Simpson and Shannon Index value, Yield Calculation etc has actually made boost for completion of the working plan. His effort is extremely commendable.

The author gratefully records his heartfelt appreciation of good work to Sri Santosh Kumar Mishra, Head Clerk of this division for his tremendous effort to give a shape in compilation, computerization and completion of working plan of Keonjhar Division. He has also shared his vast experience gained from different learned forest officers of Odisha and contributed a lot in writing the working plan. Without his assistance, it would have been impossible to complete the mighty task for which he is also extremely commendable.



I am thankful to Heads of different line Departments of the District like Dy. Director of Mines, Keonjhar, District Statistical Officer, Keonjhar and many other government Department for providing required information.

I am thankful to Prabir Kumar Das, Range Officer of this Division, all forester and Forest Guard deployed to this Division, All Range officers, Foresters, Forest Guards of Keonjhar division for their active co-operation in various field work and data collection, all ministerial staffs and Data entry operators of this Division for their Valuable assistance for bringing out this plan to successful completion.

I hope, this Plan will lead to a sustainable management of Forest resource and act in a direction of checking the global Climate Change. It will provide vital guidance to field staffs, managers, planners, readers, Research scholars working in the field of Forestry & Wildlife.

At the end, once again I extend my heartfelt thanks and appreciation to all for their cooperation.

Place: Keonjhar,

Dated: 25th December, 2021

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A. Abbreviations used:

AJY	Aama Jungle Yojana
ANR	Assisted Natural Regeneration
BGBD	Below ground biomass density
BRF	B-Class Reserved Forest
CAGB	carbon in above ground biomass
CBD	Corrected Bulk Density
CBGB	carbon in below ground biomass
CDW	carbon in deadwood
CFM	Community Forest Management
CI	Criteria & Indicators
CLL	carbon in leaf litter
CWC	Coppice Working Circle
DFO	Divisional Forest Officer
DLC	District Level Committee
DPF	Demarcated Protected Forest
DTW	Depth to Water
FDA	Forest Development Agency
FRA	Forest Right Act
FRI	Forest Research Institute
FSI	Forest Survey of India
GBH	Girth at Breast Height
GIS	Geographic Information System
GPS	Global Positioning System
GS	Growing Stock
IGA	Income generating activities
IUCN	International Union for Conservation of Nature and Natural Resources
IWC	Improvement Working Circle
JFM	Joint Forest Management
JFM (O) WC	Joint Forest Management (Overlapping) Working Circle
KF	Khesra Forest
LULUCF	Land Use, Land Use Change and Forestry
MAPs	Medicinal and Aromatic Plants
MFP	Minor Forest Produce
MGNREGS	Mahatma Gandhi national Rural Employment Guarantee Scheme
MPCA	Medicinal Plant Conservation Areas
MPDA	Medicinal Plant Development Areas
MR	Miscellaneous Regulations
NGOs	Non-governmental organizations
NRSC	National Remote Sensing Centre
NTFP	Non-Timber Forest Produce
NTFP (O) WC	Non-Timber Forest Produce (Overlapping) Working Circle



OFA	Odisha Forest Act
OFDC	Odisha Forest Development Corporation
OFSDP	Odisha Forestry Sector Development Project
OMG	Older Metamorphic Group
ORSAC	Odisha Remote Sensing Application Centre
PCCF	Principal Chief Conservation of Forests
PF	Protected Forest
PFM	Participatory Forest Management
PRA	Participatory Rural Appraisal technique
PRF	Proposed Reserved Forest
PSM	Protection and Sustainable management
PWC	Plantation Working Circle
PWC	Protection Working Circle
QPM	Quality Planting Materials
RBM	Removal of River bed material
RCCF	Regional Chief Conservator of Forests
REDD+	Reduce Emission from Deforestation and Forest degradation
RF	Reserve Forest
RWC	Rehabilitation Working Circle
SFM	Sustainable Forest Management
SMC	Soil & Moisture Conservation
SOC	soil organic carbon
SOCD	Soil Organic Carbon Density
SWC	Selection Working Circle
TOF	Tree Outside Forest
UDPF	Un-Demarcated Protected Forests
UF	Unclassed Forests
VF	Village Forest
VFWC	Village Forest Working Circle
VHF	Very High Frequency
VSS	Vana Samrakshyana Samiti
WHO	World Health Organisation
WTO	World Tourism Organization

**B. List of Flora**

TREES		
VERNACULAR/ LOCAL NAME	BOTANICAL NAME.	FAMILY
Achhu	<i>Morinda tinctoria</i>	Rubiaceae
Akacia	<i>Acacia auriculaeformis</i>	Mimosaceae
Amaralata	<i>Bauhinia racemosa</i>	Caesalpiniaceae
Amba	<i>Mangifera indica</i>	Anacardiaceae
Ambada	<i>Spondias pinnata</i>	Anacardiaceae
Amla	<i>Emblica officinalis</i>	Euphorbiaceae
Ankulo	<i>Alangium lamrckii</i>	Cornaceae
Arjuna	<i>Terminalia arjuna</i>	Combretaceae
Asan	<i>Terminalia tomentosa</i>	Combretaceae
Asoka, Ashoka	<i>Saraca indica</i>	Caesalpiniaceae
Aswasth	<i>Ficus religiosa</i>	Moraceae
Babul	<i>Acacia nilotica</i>	Mimosaceae
Badahatikana	<i>Litsea nitida</i>	Lauraceae
Baghamari	<i>Bauhinia retusa</i>	Caesalpiniaceae
Bahada	<i>Terminalia belerica</i>	Combretaceae
Bandhan	<i>Ougeinia ougenensis</i>	Papilionaceae
Bankopasiak	<i>Kydia calycina</i>	Malvaceae
Bara	<i>Ficus bengalensis</i>	Moraceae
Barbakulia	<i>Dalbergia paniculata</i>	Papilionaceae
Baruna	<i>Crataeva religiosa</i>	Capparidaceae
Batra	<i>Melia composita</i>	Meliaceae
Bel	<i>Aegle marmelos</i>	Rutaceae
Benta	<i>Naringi crenulata</i>	Rutaceae
Bhalia	<i>Semecarpus anacardium</i>	Anacardiaceae
Bheru	<i>Chloroxylon swietenia</i>	Meliaceae
Bija (Piasal)	<i>Pterocarpus marsupium</i>	Papilionaceae
Borkuli	<i>Ziziphus mauritiana</i>	Rhamnaceae
Chakunda	<i>Cassia siamea</i>	Caesalpiniaceae
Champa	<i>Michelia champaca</i>	Magnoliaceae
Chandan	<i>Santalum album</i>	Santalaceae
Char	<i>Buchanania lanzan</i>	Anacardiaceae
Charaiguri	<i>Vitex leucoxylon</i>	Verbenaceae
Chauldhua (Paldhua)	<i>Glycosmis pentaphylla</i>	Rutaceae



Chauli (Mukha)	<i>Cassia glauca</i>	Caesalpiniaceae
Chhatian ,Chhachina	<i>Alstonia scholaris</i>	Apocynaceae
Chhuipatali	<i>Stereospermum angustifolium</i>	Bignoniaceae
Chikni (Kalicha)	<i>Glochidion lanceolarium</i>	Euphorbiaceae
Chotarai	<i>Dillenia aurea</i>	Dilleniaceae
Damghurudu	<i>Diospyros montana</i>	Ebenaceae
Damkurdu	<i>Gardenia latifolia</i>	Rubiaceae
Dhaman	<i>Grewia tiliifolia</i>	Tiliaceae
Dhaura	<i>Anogeissus latifolia</i>	Combretaceae
Dhauranjo (Kanju)	<i>Holoptelea integrifolia</i>	Ulmaceae
Dimiri	<i>Ficus retusa</i>	Moraceae
Eucalyptus (patas)	<i>Eucalyptus spp.</i>	Myrtaceae
Gadkhair	<i>Acacia lenticularis</i>	Mimosaceae
Gaigutia	<i>Dimorphocalyx glabellus</i>	Euphorbiaceae
Gambhari	<i>Gmelina arborea</i>	Verbenaceae
Gandhan	<i>Premna latifolia</i>	Verbenaceae
Gandhapalas	<i>Milusa velutina</i>	Anonaceae
Garkhari	<i>Acacia ferruginea</i>	Mimosaceae
Genduli	<i>Cochlospermum gossypium</i>	Bixaceae
Ghontol, Ghanta	<i>Ziziphus glaberrima</i>	Rhamnaceae
Giridhini	<i>Sterculia urens</i>	Sterculiaceae
Gohira	<i>Acacia leucophlaea</i>	Mimosaceae
Gurudu	<i>Gardenia gummifera</i>	Rubiaceae
Harida	<i>Terminalia chebula</i>	Combretaceae
Hinjal	<i>Barringtonia acutangula</i>	Lecythidaceae
Jaisanda	<i>Litsaea glutinosa</i>	Lauraceae
Jamu	<i>Syzygium cumini</i>	Myrtaceae
Jari	<i>Ficus retusa</i>	Moraceae
Jeutha	<i>Artocarpus lakoocha</i>	Moraceae
Kadamba	<i>Anthocephalus cadamba</i>	Rubiaceae
Kaitho	<i>Limonia acidissima</i>	Rutaceae
Kalicha	<i>Diospyros sylvatica</i>	Ebenaceae
Kamalagundi	<i>Mallotus philippinensis</i>	Euphorbiaceae
Kangada, Tangan	<i>Xylia xylocarpa</i>	Fabaceae
Kanso, Kansa	<i>Hymenodictyon excelsum</i>	Rubiaceae
Karada	<i>Cleistanthus collinus</i>	Euphorbiaceae



Karadha (Khurundu)	<i>Gardenia turgida</i>	Rubiaceae
Karanja	<i>Pongamia pinnata</i>	Mimosaceae
Kasi	<i>Bridelia retusa</i>	Euphorbiaceae
Kendu	<i>Diospyros melanoxylon</i>	Ebenaceae
Khair	<i>Acacia catechu</i>	Mimosaceae
Khakada	<i>Casearia elliptica</i>	Samydaceae
Kodala	<i>Sterculia villosa</i>	Sterculiaceae
Kotokol (Katak)	<i>Strychnos potatorum</i>	Loganiaceae
Kuchila	<i>Strychnos nux-vomica</i>	Loganiaceae
Kumbhi	<i>Careya arborea</i>	Lecythidaceae
Kurei	<i>Holarrhena antidysenterica</i>	Apocynaceae
Kurum, Haldu ,Koim	<i>Adina cordifolia</i>	Rubiaceae
Kusum	<i>Schleichera oleosa</i>	Sapindaceae
Limburmoi,Sarupatrimoi	<i>Bursera serrata</i>	Burseraceae
Lodha	<i>Symplocos racemosa</i>	Symplocaceae
Mahalimb, Mahal	<i>Ailanthus excelsa</i>	Simarubaceae
Mai or Moi	<i>Lannea coromandelica</i>	Anacardiaceae
Makharkendu	<i>Diospyros embryopteris</i>	Ebenaceae
Mamuri	<i>Antidesma diandrum</i>	Euphorbiaceae
Manda	<i>Macaranga peltata</i>	Euphorbiaceae
Mirigachara	<i>Grewia elastica</i>	Tiliaceae
Mohua, Mahula	<i>Madhuca indica</i>	Sapotaceae
Muchukunda, Baila	<i>Pterospermum acerifolium</i>	Sterculiaceae
Mukha	<i>Schrebera swietenoides</i>	Oleaceae
Mundi (Mitikinia)	<i>Mitragyna parvifolia</i>	Rubiaceae
Neem	<i>Azadirachta indica</i>	Meliaceae
Palas	<i>Butea monosperma</i>	Fabaceae
Paldhua	<i>Erythrina indica</i>	Fabaceae
Panasa, Panas	<i>Artocarpus integrifolia</i>	Moraceae
Panigambhari	<i>Trewia nudiflora</i>	Euphorbiaceae
Panikodala	<i>Sterculia colorata</i>	Sterculiaceae
Panipatuli	<i>Lagerstroemia speciosa</i>	Lythraceae
Patmossu	<i>Polyalthia cerasioides</i>	Anonaceae
Patuli (Barapatuli)	<i>Stereospermum chelonoides</i>	Bignoniaceae
Phasi	<i>Anogeissus acuminata</i>	Combretaceae
Pitakarichio (Pitakalchi)	<i>Wrightia arborea</i>	Apocynaceae



Pitamoi	<i>Garuga Pinnata</i>	Burseraceae
Poichandia	<i>Putranjiva roxburghii</i>	Euphorbiaceae
Poijamu	<i>Syzygium operculatum</i>	Myrtaceae
Rai	<i>Dillenia pentagyna</i>	Dilleniaceae
Rajmohi	<i>Lannea coromandelica</i>	Anacardiaceae
Raktachandan	<i>Pterocarpus santalinus</i>	Fabaceae
Ritha, Rentha, Soap nut	<i>Sapindus emarginatus</i>	Sapindaceae
Rohini	<i>Soymida febrifuga</i>	Meliaceae
Saguan (Teak)	<i>Tectona grandis</i>	Verbenaceae
Sahada	<i>Streblus asper</i>	Moraceae
Sajna (chhuin), Munga, Mungha	<i>Moringa pterygosperma</i>	Moringaceae
Sal ,Sargi, Rengal	<i>Shorea robusta</i>	Dipterocarpaceae
Salai	<i>Boswellia serrata</i>	Burseraceae
Salapa	<i>Caryota urens</i>	Palmaceae
Sidha, Sena	<i>Lagerstroemia parviflora</i>	Lythraceae
Sijhu	<i>Euphorbia royleana</i>	Euphorbiaceae
Silveroak	<i>Grevillea robusta</i>	Proteaceae
Simili	<i>Bombax ceiba</i>	Malvaceae
Siris	<i>Albizzia lebbek</i>	Mimosaceae
Sissu	<i>Dalbergia sisoo</i>	Papilionaceae
Sissu (Pahadi)	<i>Dalbergia latifolia</i>	Papilionaceae
Sunari	<i>Cassia fistula</i>	Caesalpiniaceae
Tala	<i>Borassus flabellifer</i>	Palmaceae
Tambal	<i>Ficus hispida</i>	Moraceae
Tangarchampa (Patharchampa)	<i>Ochna obtusata</i>	Ochnaceae
Telkuruma	<i>Ixora arborea</i>	Rubiaceae
Tentra	<i>Albizzia procera</i>	Mimosaceae
Tentuli	<i>Tamarindus indica</i>	Caesalpiniaceae
Thelku	<i>Randia malabarica</i>	Rubiaceae
Tilai	<i>Wendlandia tinctoria</i>	Rubiaceae
Toon	<i>Cedrela toona</i>	Meliaceae
BAMBOO		
Badibaunsa	<i>Bambusa nutans</i>	Poaceae
Bolangibaunsa	<i>Cephalostachyum pergracile</i>	Poaceae



Dababaunsa /Kantabaunsa	<i>Bambusa arundinacea</i>	Poaceae
Salia	<i>Dendrocalamus strictus</i>	Poaceae
SHRUBS		
Agnijhal	<i>Vernonia roxburghii</i>	Compositae
Ankhukoli	<i>Carissa spinarum</i>	Apocynaceae
Arakha	<i>Calotropis gigantea</i>	Asclepiadaceae
Arguna, Argha, Odasamari	<i>Cycas circinalis</i>	Cycadaceae
Ata	<i>Anona squamosa</i>	Annonaceae
Badichang	<i>Symphorema polyandrum</i>	Verbenaceae
Baibiring	<i>Embelia robusta</i>	Myrsinaceae
Baincha	<i>Flagellaria indica</i>	Flagellariaceae
Ban kulthi	<i>Atylosia scarabaeoides</i>	Papilionaceae
Bana tulasi	<i>Oscimum basilicum</i>	Labiatae
Banachiretia	<i>Leea asiatica</i>	Ampelidaceae
Banamalli	<i>Jasminum arborescens</i>	Oleaceae
Bankhajuri	<i>Phoenix acaulis</i>	Palmaceae
Basanga	<i>Adhatoda vasica</i>	Acanthaceae
Begunia	<i>Vitex negundo</i>	Verbenaceae
Bhenta	<i>Limonia acidissima</i>	Rutaceae
Budel, Murdha	<i>Butea parviflora</i>	Papilionaceae
Chakunda, (Chhotachakunda)	<i>Cassia tora</i>	Caesalpiniaceae
Dalsingha	<i>Canthium glabrum</i>	Rubiaceae
Dhatki or Jhatki	<i>Woodfordia fruticosa</i>	Lythraceae
Gangai	<i>Melastoma mala bathricum</i>	Melastomaceae
Gangasiuli	<i>Nyctanthes arbor tristis</i>	Oleaceae
Giliri	<i>Indigofera pulchella</i>	Papilionaceae
Guakuli	<i>Diospyros ferrea</i>	Ebenaceae
Jari	<i>Schefflera venulosa</i>	Araliaceae
Jhumpuri	<i>Phyllocllamys spinosa</i>	Moraceae
Jojoka	<i>Commiphora caudata</i>	Burseraceae
Kakusia	<i>Strobilanthes scaber</i>	Acanthaceae
Kamini	<i>Murraya paniculata</i>	Rutaceae
Kantasiju	<i>Euphorbia nivulia</i>	Euphorbiaceae
KaskasiJhari	<i>Ficus parasitica</i>	Moraceae
Kirkichikanta	<i>Mimosa rubicaulis</i>	Mimosaceae
Koko aru, Badurli	<i>Oxal scandens</i>	Oxalaceae



Korei	<i>Holarrhena antidysenterica</i>	Apocynaceae
Kumti (Telgunia)	<i>Clerodendron viscosum</i>	Verbenaceae
Lajwanti (Lajkulilata)	<i>Mimosa pudica</i>	Mimosaceae
Lal Berela	<i>Sida rhombifolia</i>	Malvaceae
Lantana (Bholupodi)	<i>Lantana camara</i>	Verbenaceae
Madanga (Epiphyte)	<i>Loranthus longiflorus</i>	Loranthaceae
Marmuri	<i>Antidesma diandrum</i>	Euphorbiaceae
Muraphal, Murimuri, Anita	<i>Helicteres isora</i>	Sterculiaceae
Nalwali	<i>Cipadessa fruticosa</i>	Meliaceae
NarasinghKhara	<i>Ardisia solenacea</i>	Myrsinaceae
Narguni	<i>Atalantia monophylla</i>	Rutaceae
Patalgaruda	<i>Rauwolfia serpentina</i>	Apocynaceae
Phanphana (Phapundi)	<i>Oroxylum indicum</i>	Bignoniaceae
Pokusunga	<i>Pogostemon plectranthoides</i>	Labiatae
Potua	<i>Catunaregam nutans</i>	Rubiaceae
Rani Dantakati	<i>Flemingia chappar</i>	Papilionaceae
Rani Dantakati(Salpini)	<i>Flemingia Paniculata</i>	Papilionaceae
Sijhu	<i>Euphorbia royleana</i>	Euphorbiaceae
Sonaragoda	<i>Grewia helicterifolia</i>	Tiliaceae
Tulshi	<i>Ocimum sanctum</i>	Labiatae
Gulsham	<i>Eranthemum purpurascens</i>	Acanthaceae

CLIMBERS

Achindi	<i>Calycopteris floribunda</i>	Combretaceae
Akanbindhi	<i>Cissampelos pareira</i>	Menispermaceae
Anantamula	<i>Hemidesmus indicus</i>	Asclepidaceae
Arkala	<i>Millettia auriculata</i>	Papilionaceae
Asadhua	<i>Capparis zeylanica</i>	Capparidaceae
Atundi, Kala Achindi	<i>Combretum decandrum</i>	Combretaceae
Baghchaar	<i>Argyrea setosa</i>	Convolvulaceae
Baidank	<i>Mucuna monosperma</i>	Papilionaceae
Bana Alu	<i>Dioscorea pentaphylla</i>	Dioscoraceae
Banakunduri	<i>Trichosanthes cucumerina</i>	Cucurbitaceae
Bhadalia(Kara)	<i>Opila amentaceae</i>	Olacaceae
Bichhuati	<i>Tragia involucrata</i>	Euphorbiaceae
Budli (Palasnai)	<i>Butea superba</i>	Papilionaceae
Dantari(Naikunti)	<i>Acacia pennata</i>	Mimosaceae



Gila, Gilo	<i>Entada scandens</i>	Mimosaceae
Gopkan, Gopakanu, Gar	<i>Cryptolepsis buechanani</i>	Asclepidaceae
Gudmari	<i>Gymnema sylvestre</i>	Asclepiadaceae
Handiphuta	<i>Pueraria tuberosa</i>	Papilionaceae
Kaincha, Ranja, Gunja,	<i>Abrus precatorius</i>	Papilionaceae
Kamba Alu	<i>Dioscorea alata</i>	Discoraceae
Kanta Alu	<i>Dioscorea glabra</i>	Dioscoraceae
Kanta Beta	<i>Calamus guruba</i>	Palmaceae
Kantaikuli	<i>Ziziphus oenopia</i>	Rhamnaceae
Karba Alu	<i>Dioscorea pentaphylla</i>	Discorscae
Korondia Alu	<i>Dioscorea belophylla</i>	Discoraceae
Kosa Alu	<i>Dioscorea anguina</i>	Discoraceae
Latanageshwar	<i>Hiptage madablota</i>	Malpighiaceae
Maharada	<i>Canavalia ensiformis</i>	Papilionaceae
Makirla	<i>Trichosanthes tricuspidata</i>	Cucurbitaceae
Malkamni, Korsana	<i>Celastrus paniculata</i>	Celastraceae
Malti	<i>Aganosma caryophyllata</i>	Apocynaceae
Mrigalendi	<i>Gnetum scandens</i>	Gnetaceae
Muthuri	<i>Smilax zeylanica</i>	Liliaceae
Mutri	<i>Smilax macrophylla</i>	Liliaceae
Mutri	<i>Smilax perfoliata</i>	Liliaceae
Noipalas (Latapalas)Murdha	<i>Butea parviflora</i>	Papilionaceae
Pani Alu	<i>Dioscorea oppositifolia</i>	Dioscoraceae
Pani Beta	<i>Calamus viminalis</i>	Palmaceae
Pankanch	<i>Vitis spp.</i>	Ampelidaceae
PichhuliNoi, RaktaPichhuli	<i>Gouania tiliaefolia</i>	Rhamnaceae
Pita Alu	<i>Dioscorea bulbifera</i>	Dioscoraceae
Prasaruni	<i>Paederia scandens</i>	Rubiaceae
Satabari	<i>Asparagus racemosus</i>	Liliaceae
Siali	<i>Bauhinia vahlii</i>	Caesalpiniaceae
SuamNoi	<i>Ichnocarpus frutescens</i>	Asclepidaceae
Tunga Alu	<i>Dioscorea wallichii</i>	Dioscoraceae
Uturdi	<i>Pergularia extensa</i>	Asclepiadaceae
GRASSES		
Chhana	<i>Apluda mutica</i>	Poaceae
Ghodalanja	<i>Aristida setacea</i>	Poaceae



Indian Blue Grass	<i>Bothriochloa pertusa</i>	Poaceae
Guguchia	<i>Chrysopogon aciculatus</i>	Poaceae
Dhanwantary	<i>Cymbopogon citratus</i>	Poaceae
Duba grass	<i>Cynodon dactylon</i>	Poaceae
Marvel grass	<i>Dichanthium annulatum</i>	Poaceae
Nandi blue grass	<i>Dichanthium caricosum</i>	Poaceae
Bogai/Sabai/Panasi	<i>Eulaliopsis binata</i>	Poaceae
Spear grass(Sinkola)	<i>Heteropogon contortus</i>	Poaceae
Thatch grass	<i>Imperata cylindrica</i>	Poaceae
Foxtail grass	<i>Setaria glauca</i>	Poaceae
Khas-khas	<i>Vetiveria zizaniodes</i>	Poaceae
HERBS		
Apamaranga	<i>Achyranthes aspera</i>	Amarantaceae
Pokasunga	<i>Ageratum conyzoides</i>	Compositae
Mundia saga	<i>Allmania nodiflora</i>	Amarantaceae
Kuranti	<i>Ammannia baccifera</i>	Lythraceae
Bhuineem (Chireita)	<i>Andrographis paniculata</i>	Acanthaceae
Bhutamari	<i>Anisomeles indica</i>	Labiatae
Sarpuni	<i>Argemone mexicana</i>	Papaveraceae
Rudrajata	<i>Aristolochia indica</i>	Aristolochiaceae
Banakulthi	<i>Atylosia scarabaeoides</i>	Papilionaceae
Amarpoi	<i>Bryophyllumcalycinum</i>	Crassulaceae
Dandipohala	<i>Canseora decussata</i>	Gentianaceae
Bhuinchakunda	<i>Cassia obtusifolia</i>	Caesalpiniaceae
Ganjachulia	<i>Celosia argentea</i>	Amarantaceae
Banalanka	<i>Chloris Pallida</i>	Gramineae
Biskandari	<i>Chlorophytum aurindinaceum</i>	Liliaceae
Day flower (Kansiri)	<i>Commelina benghalensis</i>	Commelinaceae
Gaigobara	<i>Costus speciosus</i>	Zingiberaceae
Ambaada	<i>Curcuma amada</i>	Zingiberaceae
Banapalua	<i>Curcuma angustifolia</i>	Zingiberaceae
Karkhasi	<i>Curcuma aromatica</i>	Zingiberaceae
Haldi	<i>Curcuma longa</i>	Zingiberaceae
Salpani, Krishnupani	<i>Desmodium polycarpum</i>	Papilionaceae
Samdulan	<i>Elephantopus scaber</i>	Compositae
Gongatulasi	<i>Hyptis suaveolens</i>	Labiatae



<i>Nilachara</i>	<i>Indigofera trita</i>	Papilionaceae
<i>Gayash</i>	<i>Leucas aspera</i>	Labiatae
<i>Paniloi</i>	<i>Merremia umbellata</i>	Convolvulaceae
<i>Lajakuli</i>	<i>Mimosa pudica</i>	Mimosaceae
<i>Banakadali</i>	<i>Musa balbisiana</i>	Musaceae
<i>Bana tulasi</i>	<i>Oscimum basilicum</i>	Labiatae
-	<i>Peucedanum nagpurens</i>	Umbelliferae
<i>Pipali</i>	<i>Piper longum</i>	Piperaceae
-	<i>Ruellia beddomei</i>	Acanthaceae
<i>Murga</i>	<i>Sansevieria roxburghiana</i>	Liliaceae
<i>Ankaranti</i>	<i>Solanum surattense</i>	Solanaceae
<i>Jalajali</i>	<i>Stachytarpheta indica</i>	Verbenaceae
	<i>Strobilanthes scaber</i>	Acanthaceae
<i>Bisalyakarani</i>	<i>Tridax procumbens</i>	Compositae
<i>Baidyachhanapata</i>	<i>Triumfettaria omboidea</i>	Tiliaceae
FERNS		
-	<i>Adiantum Caudatum</i>	Polypodiaceae
-	<i>Adiantum lunulatum</i>	Polypodiaceae
-	<i>Drynaria guereifolia</i>	Polypodiaceae
-	<i>Lastrea cochleata</i>	Polypodiaceae
-	<i>N. truncatum</i>	Polypodiaceae
-	<i>Nephrodium molle</i>	Polypodiaceae
-	<i>Selaginella proniflora</i>	Selaginellaceae
ORCHIDS		
-	<i>Dendrobium herbaceum</i>	Orchidaceae
-	<i>Eulophia nuda (Ground orchid)</i>	Orchidaceae
-	<i>Habenaria plantaginea (Ground Orchid)</i>	Orchidaceae
-	<i>Malaxis densiflora</i>	Orchidaceae
-	<i>Saccolabium papillosum</i>	Orchidaceae
-	<i>Vanda parviflora</i>	Orchidaceae
-	<i>Vanda tessellata</i>	Orchidaceae

**c. List of fauna.**

LOCAL NAMES	ENGLISH NAMES	SCHEDULE
Badudi	<i>Shortnosed fruit bat</i>	IV
Badudi	<i>Flying fox bat</i>	IV
Bagha	<i>Tiger</i>	I
Bajrakapta	<i>Pangolin</i>	I
BaliaKukur	<i>Wild dog</i>	II
Banabiradi (Katash)	<i>Jungle cat</i>	II
Barha	<i>Wild boar</i>	III
Beleramusa (Napali)	<i>Malayan Giant squirrel</i>	II
Bhalu	<i>Sloth bear</i>	I
Bilua	<i>Jackal</i>	II
Chausingha	<i>Four horned antelope</i>	I
Cheetah Biradi	<i>Leopard cat</i>	I
Chemgha	<i>Beared sheath tailed bat</i>	IV
Chhuchhundra	<i>Grey musk shrew</i>	---
GadaBhalu	<i>Ratel</i>	---
Gayal, Gaur	<i>Indian Bison</i>	I
Gunduchimusa	<i>3 stripped palm squirrel</i>	IV
Gunduchimusa	<i>5 stripped palm squirrel</i>	IV
Gurandi	<i>Mouse deer (Indian Cherrotain)</i>	I
Harina	<i>Spotted deer (Cheetal)</i>	III
Hati	<i>Indian elephant</i>	I
Hetabagha	<i>Hyena</i>	III
Jhinka	<i>Porcupine</i>	II
Kalarapatriabagha	<i>Leopard (Panther)</i>	I
Kokisiali	<i>Fox</i>	II
Kutura	<i>Barking deer</i>	III
Mankad (Hanu)	<i>Monkey</i>	II
Mankad (Pati)	<i>Rhesus macaque</i>	II
	<i>Rat</i>	IV
	<i>White tailed wood rat</i>	IV
Musa	<i>Indian garbills</i>	IV
	<i>Long tailed tree mouse</i>	IV
Musa (Nepali)	<i>Gaint Indian squirrel</i>	II
Neula (Hatia)	<i>Common mongoose</i>	II
Neula (Kuji)	<i>Small Indian mongoose</i>	II
Nilagai	<i>Blue bull</i>	III
Odha	<i>Smooth Indian otter</i>	II
Ramsiali (Bheriya)	<i>Wolf</i>	I
Saliapatni	<i>Small indian civet</i>	II
Sambar	<i>Sambar</i>	III



Thekua	<i>Hare (Rufous tailed Hare)</i>	IV
Reptiles and Amphibians		
Ahiraja	<i>King cobra</i>	II
Ajagarh	<i>Indian python</i>	I
Boda	<i>Common boa</i>	IV
Boda	<i>Russel's Earth Boa</i>	IV
Chiti	<i>Common Indian Krait</i>	IV
Dhamana	<i>Rat snake</i>	II
Dhandaboda	<i>Russels viper</i>	II
Dhulinaga	<i>Saw scaled viper</i>	IV
Domundia	<i>John's sandboa</i>	IV
Kandanali	<i>Tree snake</i>	IV
Laudonkia	<i>Common green whipsnake</i>	IV
Naga (Gokhar)	<i>Indian cobra</i>	II
PaniDhanda	<i>Checkeered keel back</i>	II
Rana	<i>Banded krait</i>	IV
Tampa	<i>Monocallota cobra</i>	IV
	<i>Common blind snake</i>	IV
Teli Sapa	<i>Bamboo pit viper</i>	IV
	<i>Green keel back</i>	IV
	<i>Copper head</i>	IV
LIZARDS		
-	<i>Fat tailed gecko</i>	--
-	<i>Banded gecko</i>	---
Bahurupi	<i>Indian chameleon</i>	III
Bahurupikuasap	<i>Garden gecko</i>	I
Bakalajhitipiti	-	--
Champainoli	<i>Skink / Mabuya</i>	---
Endua	<i>Rock gecko</i>	---
Godhi	<i>Land monitor</i>	I
Jhitipiti	<i>House lizard</i>	II
PaniGodhi	<i>Water monitor</i>	I
TURTLES		
ChabedaKaincha	<i>Land tortoise</i>	---
Chitra Kaincha	-	II
Kurma	<i>Indian tent turtle</i>	I
PaniKaincha	<i>Terrapin /Fresh water turtle</i>	I
CROCODILES		
Ghadiyal	<i>Gharial</i>	I
Magar	<i>Magar</i>	I
FISHES (FRESH WATER)		
Balia	-	-



Baligarda	-	-
Banasapati	-	-
Bhakur	-	-
Chenga	-	-
Chital	-	-
Dandkiri	-	-
Gadisa	-	-
Illisi	-	-
Jalanga	-	-
Jallha	-	-
Kantia	-	-
Kerandi	-	-
Kou	-	-
Magura	-	-
Mahurali	-	-
Mirakali	-	-
Neuli	-	-
Pabata	-	-
Phali	-	-
Pohale (Chuna)	-	-
Pohale (Denga)	-	-
Rohi	-	-
Serana	-	-
Seula	-	-
Singi	-	-
Todi	-	-
Birds		
Babbler common	<i>Kunda</i>	IV
Babbler jungle	-	IV
Babbler rufous	-	IV
Barbet crimson breasted or Coppersmith	-	IV
Barbet large green (Brown headed barbet)	-	IV
Baya (weaver bird)	<i>Baya</i>	IV
Bee eater blue tailed	-	IV
Bellied (Tawny –bellied) Babbler	-	IV
Bulbul (Red vented)	<i>Bulbul or Gobrachadhei</i>	IV
Bulbul Red whiskered	<i>Pahadi Bulbul</i>	IV
Chloropsis Gold fronted or Green bulbul	-	IV



Choloropsis Gold mantled	-	IV
Common Tailor Bird	<i>Phutki</i>	--
Cormorant (little)	<i>Panikua</i>	IV
Coucal or Crow pheasant	<i>Dhauka or Kumbhatua</i>	IV
Crow house	<i>Kau</i>	IV
Crow jungle (Large billed crow)	<i>Damarkau</i>	IV
Cuckoo	<i>Koili</i>	IV
Cuckoo Indian	<i>Koili</i>	IV
Dove Emerald or Bronze Winged	-	IV
Dove King	<i>Kapota</i>	IV
Dove spotted	<i>Kapota</i>	IV
Drongo Black or King crow	<i>Kajalpati</i>	IV
Drongo racket tailed	<i>Bhrungaraja</i>	IV
Duck Grey	<i>Hansa</i>	IV
Eagle Crested Hawk	-	I
Eagle crested Serpent	-	IV
Eagle Owl	-	IV
Eagle Tawny	-	IV
Egret Cattle	<i>Baga</i>	IV
Egret little	<i>Baga</i>	IV
Falcon shahin / Peregrine Falcon	-	IV
Flowerpecker Thickbilled	-	IV
Flowerpecker Tickell's	-	IV
Flycatcher Blue throated	-	IV
Flycatcher blue/ Black naped, Blacknaped Monarch	-	IV
Flycatcher blue/ Black naped, Blacknaped Monarch	-	IV
Flycatcher Grey headed	-	IV
Flycatcher Paradise	-	IV
Flycatcher Red breasted	-	IV
Flycatcher Tickell's blue	-	IV
Flycatcher verditor	-	IV
Goose Barheaded	<i>Bataka</i>	IV
Grebe little or Dabachick	<i>Hansarali</i>	IV
Green Bee eater	-	IV
Gull Black headed	-	IV



Harrier Marsh	-	IV
Harrier Pallid	-	IV
Heron Pond or paddy bird	<i>Kantiabaga</i>	IV
Hoopoe	-	IV
Hornbill common grey	<i>Bhaliakhai</i>	I
Hornbill malabar pied	<i>Kuchilakhai</i>	IV
Ibis white	-	IV
Indian Pied Hornbill	-	IV
Iora	-	IV
Jungle fowl grey	<i>Banakukuda</i>	IV
Jungle fowl red	<i>Banakukuda</i>	IV
Kestrel common	-	IV
King fisher Brown headed or Stork billed	-	IV
King fisher pied	<i>Machharanka</i>	IV
King fisher small blue /Common King fisher	-	IV
King fisher white breasted	-	IV
Kite Brahminy	<i>Sankhachilla</i>	IV
Kite common (pariah)	<i>Chilla</i>	IV
Koel	-	IV
Lapwing red-wattled	-	IV
Lapwing yellow-wattled	-	IV
Lark bush (singing)	-	IV
Minivet scarlet	-	IV
Munia spotted	-	IV
Myna Bank	-	IV
Myna hill	<i>Sari</i>	I
Myna Indian	<i>Bani</i>	IV
Myna Jungle	-	IV
Myna pied /Asian Pied Starling	<i>Ghukalika</i>	IV
Night Jar common Indian	-	IV
Nightjar Indian	-	IV
Oriole black headed	<i>Haladibasanta</i>	IV
Osprey/Fish eating Eagle	-	I
Owlet spotted	<i>Pecha</i>	I
Parakeet Blossom headed	-	IV
Parakeet large Indian	<i>Sua</i>	IV
Parakeet rose ringed	-	IV
Partridge grey	<i>Teetiri</i>	IV
Peafowl common	<i>Mayur</i>	I



Petronica	-	IV
Pied Crested Cuckoo	<i>Chatak</i>	IV
Pigeon (Blue) rock	<i>Deuliapara</i>	IV
Pigeon common green	<i>Harada chadei</i>	IV
Pigeon imperial green	-	IV
Pipit Indian	-	IV
Pitta Indian	-	IV
Plover little ringed	-	IV
Quail blue legged or common or bastard	<i>Gunduri</i>	IV
Quail Bush jungle	<i>Teetri</i>	IV
Quail Bush painted	<i>Teetri</i>	IV
Robin Indian	-	IV
Robin magpie	<i>Nilkantha</i>	IV
Roller or blue jay	<i>Bhadbhadalia</i>	IV
Ruddyshe duck or Brahmini	<i>Chakua-Chakoi</i>	IV
Sandpiper common	-	IV
Shama	-	IV
Shikra	-	IV
Snipe common or fantail	-	IV
Sparrow House	<i>Gharchatia</i>	IV
Sparrow yellow-throated / Chestnut- shouldered	-	IV
Spurfowl Red	-	IV
Stilt black-winged	-	IV
Stork openbilled	<i>Gendalia</i>	IV
Stork white-necked / Woolly necked stork	-	I
Sunbird purple	-	IV
Sunbird purple-rumped	-	IV
Swallow wire tailed	-	IV
Swift House	<i>Chataka</i>	IV
Teal common	-	IV
Teal cotton / Common Pygmy goose	-	IV
Teal lesser whistling/ Lesser whistling Duck	-	IV
Tern river	-	IV
Thrush white-throated ground/Orange headed Thrush	-	IV
Tree Pipit	-	IV



Vulture king	<i>Saguna</i>	IV
Vulture white backed	<i>Saguna</i>	IV
Wagtail large pied/White-browed wagtail	-	IV
Wagtail white	-	IV
Wagtail yellow	-	IV
Warbler Wren ashy	-	IV
Warbler Wren Indian	-	IV
Warbler wren rufous fronted	-	IV
Woodpecker Golden backed	-	IV
Woodpecker Pigmy	<i>Kathkhumpa</i>	IV



Executive Summary

The first Working Plans for Kendujhar was prepared by Late Dr. H.F. Mooney, the then Deputy Conservator of Forests in the year 1929 with prescriptions for management of forests for a period from 1930 to 1960. It was written entirely basing on his own field experience of the management of Forests and was elementary in its nature. The plan failed to address the future aspects of management of forests. The increasing pressure for agriculture further dwindled the forest cover by cutting vast chunk of forest in unscientific manner which has turned impatient, grasping and ungrateful, forgetful of past benefits that accrue from forests.

Subsequently, the plan was revised by Late A.B. Lal, Officiating Forest Officer, Kendujhar State during the year 1945 covering a period of 20 years (1945-46 to 1964-65). Late Dr. H.F. Mooney who by this time was the Chief Forest Adviser, Eastern States, had admired the efforts and endeavors put by Shri A.B. Lal for producing the first Working Plans based on some scientific data and was magnanimous enough to shower his choicest appreciations and congratulatory notes on Shri Lal.

The Working Plans prepared by Late A.B. Lal after its expiry was taken up for revision during 1964 by Shri G.G. Das, Deputy Conservator of Forests and followed by his successors Shri P.K. Pani, Deputy Conservator of Forests (up to 1967) as well as Shri U.N. Sarangi, I.F.S., Deputy Conservator of Forests who succeeded Shri Pani and concentrated in completion of the Part-II of the plan with certain, major changes. However, the then Chief Conservator of Forests, Orissa basing on a recommendation of Conservator of Forests, Development Circle entrusted Sri S.K. Prasad, IFS to redraft the plan de-novo as an independent as well as separate assignment. By the time Sri Prasad's draft plan was produced for approval and sanctioned during 1983, precious twenty years from 1964 to 1983 has already been lost and interim revision efforts by a galaxy of distinguished Forest Officers become irrelevant for which Sri Bhaskar Chandra Mohapatra, IFS was entrusted with the revision of the Working Plans and unlike his predecessors he was able to remain associated from initiation of revision works till its final publication.

Some of the salient features of Working Plans (From 1984-85 to 1993-94) of Sri Bhaskar Chandra Mohapatra, IFS are

- (i) For the first time enumeration in some forest blocks along with regeneration survey, preparation of management plan in 1:25,000 scale for majority of blocks,
- (ii) Made definite prescriptions to exploit matured crops in scientific management principles.



- (iii) Incorporated new reserved blocks as well as list of mining areas with simultaneous exclusion of de-reserved blocks and innovative Silvicultural Systems to suit local conditions.

The fate of the forests of Keonjhar during the plan period from 1930 to 1993-94 and up to 2006-07 has been strongly affected by rapid changes in the forms of economic organization and exploitation for which significant concerted effort has been attempted by Sri N. Samal in his draft working plan to fill the gap of the managerial deficiencies. Unfortunately, his plan could not get approval due to certain reason.

Obviously, a Working Plan serves as a principal pillar in any management strategy, since forests are not only important renewable resource in themselves, but they decisively influence other resources on which the survival of mankind depends; air and water. The present plan adopted strategies that includes, consists of genuine aspirations rather than being a set of specific targets linked to social objectives with detailed programmes.

Improper and inconsistent silvicultural operations during moratorium coupled with increasingly anthropogenic pressure on the forests have depleted the forest density to such an extent that compact patch of forest tract with 60% crown density and above is quite rare now. The major objectives of this plan concentrate on biodiversity conservation, environmental and ecological stability. Special attention has been paid to curb the factors influencing the disappearance of prime wildlife habitats in the forests. Simultaneously adequate importance has also been focused for engagement of indigenous community in management of forests through joint forest management mode.

CONSTRAINTS FACED IN PREPARATION OF WORKING PLAN:

Working Plan Division, Keonjhar was entrusted to write the working plan of Keonjhar Division vide No. 13642/F&E/10F(TR)67/2015 dated 31.07.2015 of Forest and Environment Department, Government of Odisha. Accordingly, the Preliminary Working Plan Report (PWPR) was prepared by Sri Sankarsan Behera, OFS I (SB) and submitted through the Regional Chief Conservator of Forest, Rourkela Circle. The Standing Consultative Committee meeting held on 15.12.2016 on PWPR was chaired by the then Principal Chief Conservator of Forests and HoFF, Bhubaneswar. The said Committee gave the formal approval of PWPR of Keonjhar Division vide Memo No. 1145/11F (SFM)-33/2014 dated. 17.01.2017. In the meantime, Sri Sankarsan Behera, OFS-I (SB) was retired from the government service on attaining the age of superannuation. The draft plan of Keonjhar Division was taken up by Sri AnadiCharan Das, AWPO on his posting to this Division and took over the charge of WPO, Keonjhar. During his tenure the draft plan could not get momentum due to various reasons like paucity of funds for field survey,



non-availability of Sample Points etc. Such a situation continued even after the author of this working plan Joined on 11.10.2017 and finally 920 Nos of sample point was supplied by the Chief Executive, ORSAC vide his Letter No. 2268 dated. 10.07.2017. The work actually commenced from the sample point enumeration. It was quite a strenuous job with limited field staff (one Range Officer, Four foresters and four Forest Guards). The help of divisional field staff of Keonjhar was taken to complete the task. The various information sought from Keonjhar Division Office could not be supplied in a time bound manner. The compilation of such data was time consuming with limited staff. However, analysis and outcome part taken by NRSC, Hyderabad was little bit delayed and finally furnished the result during October, 2019 with lot of error in digitization work, inclusion of new compartment and mismatch in area of forest blocks notified and area digitized etc. Lastly, a correction in digitization was done in the Office of the Chief Executive, ORSAC, Bhubaneswar so as to produce various maps (Management Map, Working Plan Map, Stock Map Reference Maps etc.) related to Working Plan during Covid-19 Pandemic. Such a situation has caused unwarranted delay to initiate the writing part of 2nd Part of the Working Plan and finally it could be completed.

The plan envisages total 10 Working Circles. Selection Working Circle has been kept confined to forest blocks of Telkoi Range only because of availability of harvestable girth class is more in comparison to the other forest blocks. Some of the forest blocks of other forest range have been excluded from the ambit of Selection Working Circle to improve the forest condition till next working plan even though otherwise eligible for inclusion. The main aim of retention of other forest blocks of the different ranges is to protect the habitats wild animals particularly elephants.

The piecemeal implementation of prescriptions of Sri Mohapatra's plan coupled with point blank moratorium caused congestion in crop in sizeable portion of the total working plan area. Such forest blocks having middle-aged crop approaching toward harvestable diameter class in near future are put in Improvement Working Circle with suitable prescription for further improvement in quality

Most of these forest blocks being the rich in mineral resources may make room for intense mining activities during present plan period. Vast tract of forests covered in this plan require restocking and suitable strategies for such degraded forests have been formulated and prescribed in Rehabilitation Working Circle.

Continuous and perpetual plantations in blank patches in forest blocks of Keonjhar Division has been a major effort toward enhancement of forest cover since 1961-62 to 1983-84. Since then a number of block plantation has been taken up as a result further area suitable for block plantation is not available in the division. In the current plan only one block plantation in Karo RF over 967.0255 ha of Barbil range has been prescribed because that area could not be planted during plan period 2007-08 to 2015-16. Certainly,



more and more area has been added under compensatory afforestation in the division. Introduction of social forestry plantation in village forests and other unused government land during last 8th decade, a massive afforestation programme was taken up resulting more fuel wood and small timber of acacia, Eucalyptus and Chakunda output but no effort was made to harvest such plantation which are over matured now. In the current plan harvesting of such plantation and replanting the area has been prescribed. Even, the commercial plantation of OFDC in RF/ PRF has been prescribed for harvesting and such area will be replanted with suitable local species. The yield from above two plantations can be shared as usufructs to VSS.

For the first time, in protection working circle, apart from protection of Eco-sensitive zone, both Protected Forest and Un-demarcated Protected forest blocks has been introduced to bring it to the fold of management of the division. These forest blocks were previously ignored and not included in any working plan of the division. No management strategy will succeed amidst hungry, deprived and dispossessed community. Even though Government of Orissa has introduced JFM concept with effect from 1988, the penetration is not satisfactory. However, recent initiatives in the form of National Afforestation Programme (NAP) and Orissa Forestry Sector Development Project (OFSDP) have provided the desired impetus to JFM mode-based activities. So, the concept of “forests of the people, by the people and for the people” has been incorporated into the present working plan in the form of a separate JFM (Overlapping) Working Circle”. Similarly, the interests of primary forest produce collectors have also been focused under NTFP (Overlapping) Working Circle. For the first time two new chapters has been introduced i.e. Tree outside Forests and Farm Forestry which are very much important for increasing the forest cover as well as increasing economic condition of the forest fringe and rural poor.

For the first time the working plans of forests of Keonjhar District are revised and updated using remote sensing techniques. Traditional strip sampling methodology for enumeration was discarded; instead randomized point sampling enumeration has been carried out. A total 920 numbers of sample points provided by ORSAC/NRSC, Hyderabad scattered all over the tract covering 86 forest blocks were taken. The result of sample point enumeration was done by NRSC, Hyderabad. The new methodologies facilitated calculation of availability of approximate stems and the volume as well with statistical accuracy and precision.

(a) **VISION STATEMENT:**

The present working Plan drafted for Keonjhar Division is envisioned to achieve various goals in different forestry sectors by 2030-31 which will co-terminus by end of the Plan Period. The Sector wise visions perceived are as detailed below.



1. Increasing Forest Cover:

As per report of FSI, Dehradun, the total forest cover in the Division is about 39.91% of the geographical area. This includes the Revenue Forests. It is aimed to increase the forest cover to 45% of the geographical area by 2030 through protection, plantation inside and outside the forest area as well as degraded waste land of the district with people's participation. More emphasis will be given to Farm Forestry, Avenue Plantation and creation of more village forests. These are thrust area having ample scope to make the goal realistic.

2. Qualitative improvement:

Most of the forest blocks of Keonjhar Division are in degraded stage. The quality of these forests is to be enhanced from low density to Medium Dense Forest (MDF) through people's participation, protection & suitable silvicultural practices. The crop composition is found to be more in lower girth class i.e. 30cm-60cm and 60cm to 90cm. Through appropriate silvicultural practices, diameter growth of existing crop will be enhanced and approach of trees to higher girth class of 120cm and above will be brought back to a standard level i.e. above 20% of the total growing stock. Invasion of obnoxious weeds to our natural forests will be checked by appropriate weed management practices allowing natural regeneration to flourish in the forest ecosystem.

3. Improvement of bamboo:

Though bamboo forests are virtually do not exist in this Division, bamboo plantation can be taken up in suitable forest area as an under growth. It will be our vision to enhance bamboo forests through Farm Forestry, Forest Development Agency and Odisha Bamboo Development Agency. It is contemplated to popularize bamboo in villages through Farm Forestry and land under Bamboo may achieve at least 2% of the area under private ownership by 2030. As there are plenty of planted bamboos in villages in private land viz- Bambusa nutans (Badi Bamboo) Bambusa bamboo (Kanta Bamboo), Dendrocalamus Strictus (Salia Bamboo), it is not impossible to achieve the target by 2030.

4. Conservation of Wildlife

Wild life management will be augmented through people's participation & cooperation of the people living in forest fringe villages. Ideal Wildlife habitat will be developed to provide adequate food, water and shelter to predators and preys living with the forest. More emphasis will be given to reduce animal depredation, man-animal conflict with appropriate modern technology available. The two Elephant Corridors (Karo-Karampada and Telkoi-Pallahara) will be restored with green cover with dense forest to have a safe elephant corridor. Habitat for tiger, leopard and angulates will be so



managed that they will be naturally re-inducted in the division and glory of the past days will reign again. Human Resource will be adequately trained to handle wildlife management with a more professional manner.

5. Secured Forest Boundary & Encroachment

All forest blocks will be digitized by DGPS Survey so as to ensure secured boundaries of RF and PRF. Shifting cultivation and encroachment of forest land will be discouraged and make them free gradually. All Forest boundaries (RF/PRF/PF/UDPF and VF) will be secured with RCC Pillars. All plantations will be depicted on topo maps after DGPS survey.

6. Peoples Participation

At present about 40% of Degraded Forest Land has been assigned to JFM for participatory Forest management. Our vision is to increase the level of participation to at least 85% level with qualitative participation. Collection & marketing of NTFP Species will be improved by linkage to market. Harvesting and value addition of NTFP / MAP will be most scientific and sustainable. Contribution of NTFP / MAP to people's economy especially to tribal will increase to a level of 20% of their annual income, Forest based NTFP resources are to be improved to that level so that, collection of various NTFP items will be economical and price will be at a competitive level.

7. Adoption of Modern technology in Forestry:

Modern technologies have been developed and introduced in to forest management in recent past. Tissue culture / vegetative propagation/hybrid variety of many species in agriculture has developed and introduced, but it has not been adopted in forestry sector to a desirable extent. More effort will be made to produce QPM (Quality Planting Materials) from High-Tech nurseries and central nurseries of the division. Sufficient number of Seed orchards, Seed Production Areas and Clonal seed orchards would be developed by end of this plan period and planting would be with advanced method and technology. Firefighting with high-tech gadgets viz-blower machines / use of chemical non-polluting extinguisher would eliminate forest fire.

8. Forest Resilience, Biodiversity and Climate Change.

Adequate measures will be taken to combat Climate Change and increase Carbon Sequestration. Emphasis will be given on Plastic Free environment which will be handed over to our future generation. By 2030, alternatives to Plastic will be in use and eco-friendly materials will be used in each house hold. Forest Department will play pivotal role to achieve this goal. Global temperature rise will be checked and reversed to 2010 level by end of 2030. Maintaining and restoring biodiversity in forests promote their



resilience to human - induced pressures and is therefore an essential insurance policy and safeguard against expected climate change impacts.

(b) GOALS AND OBJECTIVE OF MANAGEMENT

Forest Management Planning aims at providing sustainable management of forests and its biodiversity encompassing the ecological (environmental), economic (production) and social (including cultural) dimensions. The objectives for attaining this goal include conservation of forests and reducing forest degradation, maintenance and enhancement of ecosystem services including ecotourism, enhancement of forest productivity together with establishment of regeneration to improve forest health and vitality as per ecological and silvicultural requirements of the species, progressively increasing the growing stock and carbon sequestration potential, maintenance of biological diversity, sustainable yield of forest produce, prevention of soil erosion and stabilization of the terrain; improvement and regulation of hydrological regime; people's involvement in planning and management of forests fulfilling socio-economic and livelihood needs of the people, albeit with simultaneous implementation of Orissa Forest Act, Wildlife (Protection) Act, Forest Conservation Act, Biological Diversity Act, PESA Act and Forest Rights Act. All these entail that the specific composition and the structure of forests must harmonize with the environment of the locality.

The Revised Working Plan of Keonjhar Division will give emphasis on sustainable management of forests and its biodiversity at par with National Forest Policy encompassing the ecological (environmental), economic (production) and Social (including cultural) dimensions. The main objectives are mentioned below:

- Conservation of Forests
- Reduction forest degradation
- Maintenance and enhancement of ecosystem services including ecotourism
- Enhancement of forest productivity together with establishment of Regeneration to improve forest health
- Progressively increasing the growing stock
- Maintenance of biological diversity
- Sustainable yield of forest produce
- Prevention of soil erosion
- Stabilization of the terrain
- Improvement and regulation of hydrological regime



- People's involvement in planning and management of forests fulfilling socio-economic and livelihood needs of the people.
- Maintenance of forest with simultaneous implementation of Indian Forest Act, Orissa Forest Act, Wildlife (Protection) Act, Forest Conservation Act, Biological Diversity Act, PESA Act and Forest Rights Act.

(c) **SWOTANALYSIS**

1) STRENGTHS: The Keonjhar Forest Division consists of 7 Ranges, 25 Sections & 105 Beats for management and protection of forests of the Division. The total forest area of Keonjhar Forest Division is 161621.4002 ha (1616.21 Sqkm). There are 684 nos. of VSS which have been formed for joint management and protection the forest of this Division. There are 350 nos. of Eco-clubs formed in the concerned schools in Keonjhar District for creating awareness among the local peoples for management, protection and conservation of forest in the locality. In the interior pockets there are VHF communication system to the beats and vulnerable points to transmit messages about illicit felling and smuggling of timbers in this Division. A Divisional control room has been established in the office premises of the Divisional Forest Officer which functions round the clock to collect & transmit the information among the concerned field staffs in the Division. Sufficient numbers of four wheelers vehicles and motor cycles have been provided for strengthening the protection activities. Hired and Government vehicles have been provided even if to the Range level staff to reach the locations of occurrence of smuggling, hunting, fire etc very promptly.

2) WEAKNESSES: Illicit removals of Sal, Bija Asan, Dhaura, Kurum, Miscellaneous trees are regular phenomenon of timber smugglers and anti-social elements of local and neighbour districts. Contiguous forest patch comprising of Telkoi, Ghatagaon & Barbil Range are susceptible to illicit felling by the smugglers due to heavy increase in the demand of forest produce for construction, decoration of houses & domestic use by the local people. During rainy season, the forests are not approachable in view of Nallah, Stream surrounding the forest and profuse invasive weeds. There is no adequate movable road inside the forest. The economic condition of the people living on the fringe villages is not good. Besides pilferage of minor minerals is also regular phenomena in most of the forest areas of all Ranges of this Division which needs stringent action against the illegal intruders. Indiscriminate mining activities in Barbil, Champua and B&JP Range has dwindled the forest resources although work is being conducted as per guidelines issued by the GOI and state Forest Departments, Excavation of Soil in some RF/PRF/ DPF and UDPF of Keonjhar, Patna, Ghatagaon Range is in alarming situations which need special attention to save the natural resources of the Division.



3) OPPORTUNITIES: Development of communication system such as existing VHF stations, Mobile network & Road communication in Keonjhar Forest Division can further be improved for prompt detection of Forest & Wildlife offence cases which intern will minimize activities of forest offenders resulting in improvement of forest resource, conservation of biodiversity of the forest landscape. There are opportunities for deployment of armed Police Force and Forest protection squad in vulnerable points of the division to minimize the activities of smugglers by mobilising these forces. Posting of a Class-I Officers (ACF), 4 nos. of Foresters & 25 nos. of Forest Guards above the cadre strength, definitely will improve the protection and conservation of forests area of the Division. Provision of sufficient nos. of motor cycles & four wheelers will facilitate to involve the staffs for protection, execution and conservation of valuable forest resource of the Division. Development of infrastructures such as Buildings, Watch towers in Kalapat, Karo, Barabanka, Atai RF and other remote area will enhance the protection efficiency with presence of staffs deployed in these places to perform their duty. Participatory Management of forest in the fringe villages have been taken up among the 684 VSS for protection and management of forest. Public awareness is being created through Eco-clubs in different schools of the Division. General Body Meeting of the Forest Development Agency (FDA). Decentralized nurseries have been established to strengthen the VSS. Deployment of Young Para Forest Staffs more than 100 nos. Along with regular staffs is enriching the protection systems of forests.

4) THREATS: Development of township surrounding of this Division increases demand of forest produce for decoration, furniture's, doors and windows etc resulting removal of forest produce illegally from forests area. Similarly, laterite stone excavation from revenue as well as forest areas of all ranges for construction of buildings and excavation of morrums and boulders for construction of roads also create critical situation to save forest lands. Poaching of wild animals in is posing a great threat to the faunal biodiversity. The Wild Animals are depending to the human habitation in search of food & water. The conflict between wild animal and human being is a serious problem in the Division. Elephants from Jharkhand state are migrating to Keonjhar Division and are becoming resident to the Division. The wild elephants damage agriculture crops in surrounding paddy fields. Encroachment for habitations and agricultural practices are taking place in large scale in B&JP Range and Ghatagaon Range of the Division. Invasion of weeds on the moist locality and destruction of forest growth by insects, leaf defoliator, skeletonizer and stem borers are taking place in the Division. The occurrence of wild fire in summer season is also major threat for the forest.



(d) EXPECTED OUTCOME

Within the plan period multifarious works are required to be carried out in all working circles as per prescription subject to availability of sufficient fund. The benefit will be more than the cost as calculated in Chapter 24. Accordingly, it is expected to get some outcome at the end of implementation of this working plan. The followings are the expected outcome of the division.

- 1/3rd of the geographical area would be under forest and tree cover. There will be increase in forest area of FMU.
- There will be increase in the area of dense forest as attempt will be made to convert open and scrub forest into dense forest
- Non-forest land, community land and railway line side, canal and roadside etc. will be covered under tree outside plantation.
- 5% of the geographical area and 15% of the forest area would be available to brought under Protected areas.
- Existing species of animals and plants of the unit area would be increased.
- The uniqueness of the species of plants and animals will be in documented form and their habitat will be protected for their existence.
- The habitat for elephant and their corridor expected to be more safe.
- Appropriate silvicultural operations will induce wildlife management and also ensure that no viable population of plant and animal species intensively exploited.
- Seed origin seedlings will be sufficiently available and will be asset to division to tackle any need of people for plantation in private land.
- Forest fire management will minimize forest fire incident and losses.
- Documentation of frequency and extent of area affected due to fire will help in planning management interventions and it will help to minimize the impact.
- Assessment of carrying capacity of the forest areas will guide for proper control mechanism.
- Weed infestation to forest area will be eradicated at least 50% by the end of plan by applying necessary control measures.
- Degraded/prone to soil erosion forest areas will be treated as per working plan prescriptions and their impact will be periodically monitored and reported.
- Flow periodicity of major streams will be increased.



- Average ground water level in the wells is expected to be more than current level.
- There will be sign of increment in growing stock of major forest species.
- Increment of principal timber species in different forest types will be available for further comparison.
- Enhancement of productivity of area under plantations will be noticed.
- Establishment of seed production areas, seed orchards and number of plus trees etc. will the divisional requirement of quality seed.
- The demand of fuel wood, small timber and poles will be met through JFM activities.
- Introduction of bamboo will fill the gap of demand and supply of local bamboo requirement.
- Annual collection of non-timber biomass will be increased there by increasing the livelihood support of forest fringe poor people.
- Local communities will get more work in forestry actives
- The gap between demand and supply of Timber and Non-Timber Forest Products will be increased.
- Forest area to the extent possible should be under participatory management regime.
- Different communities living in and around forest have different type of indigenous knowledge. Extent of their applications in maintaining biodiversity and forest management will be incorporated in micro plans as a result of which desired aim will be achieved to some extent within the plan period.
- Provisions of policy and legal framework will be largely complied.
- Number of forest offence cases should show to a declining trend.
- Increasing financial investment in R&D; researchers and number of research projects/thematic studies will further boost the capacity building of the division.
- Adequate and appropriate training modules for each level of officials, communities and other stakeholders will have a definite (positive) impact on forest management .

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PART-I

REVISED WORKING PLAN OF KEONJHAR DIVISION



FOR THE PERIOD 2022-32

BY

SRI SUSHIL KUMAR NAYAK, OFS-A (SB)

WORKING PLAN OFFICER, KEONJHAR



CHAPTER – 1

THE TRACT DEALT WITH

1.1 Name and Situation:

During British rule up to 1947 the Forest areas dealt in working plan were a part of the former princely state of Keonjhar under the former ruler the “Dewan” of Keonjhar and subsequently constituted into a district after it merged with the province of Odisha in 1948. After independence, the “Dewan” of Keonjhar managed the forest growth by creating Forest Department headed by a Forest Officer by passing a rule of accession. Since then Keonjhar forest Division was created which constitute the entire district of Keonjhar with Headquarters at Keonjhargarh. The jurisdiction of Keonjhar Forest Division is almost Coterminous with Keonjhar Civil Sub-division and Champua Civil Sub-division of Keonjhar District having 10nos. of Tahasils and 10 numbers of CD blocks.

The undivided Keonjhar Forest Division continued to function till it is divided into 2 (Two) Divisions i.e. Keonjhar Division and Keonjhar (Wild Life) Division as per Forest and Environment Department notification No. 1F (A)-99/2003/13214/F&E dated 8th August 2003 (**Annexure-I**)w.e.f 01st October, 2003. The headquarters of Keonjhar Division continued at Keonjhar (also called Kendujhargarh), headquarter of Keonjhar (WL) Division has been fixed fixed at Anandpur (Salapada).

The Keonjhar Forest Division lies in between 21° 11’ N to 22° 16’ N Latitude and 85° 18’ E to 86° 08’ E Longitude having geographical area of 6268.56 Sq. Km. The entire division comes in 18 no of Survey of India Topo Sheet (1:50000 Scale). The numbers are as follows.

Toposheet New no	Old No	Toposheet New no	Old No	Toposheet New no	Old No
F45H4	73F/4	F45N6	73G/6	F45N12	73G/12
F45H8	73F/8	F45N7	73G/7	F45N13	73G/13
F45H12	73F/12	F45N8	73G/8	F45N14	73G/14
F45N1	73G/1	F45N9	73G/9	F45N15`	`73G/15
F45N2	73G/2	F45N10	73G/10	F45O2	73K/2
F45N5	73G/5	F45N11	73G/11	F45O3	73K/3

**Boundary of Keonjhar Division:**

Keonjhar Forest Division is bounded by Karanjia Division & Jharkhand State on North, Deogarh Forest Division & Dhenkanal Forest Division on South, Keonjhar (WL) Division, Anandapur on East & Bonai Forest Division on West. Keonjhar Division has its common boundary over 498.7 Km with four Territorial Division, one Wildlife Division and Jharkhand State. The details of the boundary are given in the **Table No. 1.1** below.

Table No 1.1 Boundary of the Keonjhar Forest Division		
Direction	Name of the adjoining Division / State	Common division / State boundary length with Keonjhar Division in km
North	Karanjia Division	110.40
	Jharkhand State	73.50
South	Deogarh Division	109.50
	Dhenkanal Division	36.30
East	Keonjhar (WL), Anandpur	105.60
West	Bonai Division	63.40
	Total boundary length	498.70

1.1.1 Geographical area:

The Geographical area of Keonjhar District is 8303 Sq. Km. The district extends from village BadaBarbil at north to village Jantia at the south covering a length of about 150 Km. It gradually widens and reaches maximum width of about 70 Km almost at the middle i.e. from Binjabahal in the west to Turumunga in the East. The following set up shows the Geographical area and Forest areas of both the divisions.

KEONJHAR DISTRICT
Total Area: 8303 Sq. Km.

↙ **Total Forest Area: 3374 Sq. Km(40.63%)** ↘

Keonjhar Division

Keonjhar (WL) Division

Geographical Areas: 6268.56 Sq. Km

Geographical Areas: 2034.44 Sq. Km

The range wise area and civil jurisdiction is as furnished at **Table No 1.2**

**Table No 1.2: Range jurisdiction & Geographical area**

SL no	Name of Range	Name of CD block/Tahasil	Area in sq km	Important Town/NAC/MC
1	Barbil	Barbil	433.95	Municipality
2	BJP	Banspal & Telkoi (P)	1158.15	
3	Champua	Champua	1144.60	Municipality
4	Ghatagaon	Ghatgaon, Harichandanpur	684.09	
5	Keonjhar	Keonjhar Sadar	995.29	Keonjhar Municipality
6	Patna	Patna, Saharpada	912.08	
7	Telkoi	Telkoi	940.40	
Division total			6268.56	

For administrative convenience, the division has been sub divided to seven Ranges, 25 Sections and 105 Beats. The Latitude / Longitude of Keonjhar Forest Division headquarters is 21° 38' 10.94" N & 85° 36' 27.98" E. The headquarters of Keonjhar Division is situated in the heart of Keonjhar town at the junction of National Highway No.49 (Now AH 46) and National Highway No.20.

The total population of Kendujhar district as per the Census of 2011 is 18, 01,733 of which 9, 06,487 are males and 8, 95,246 females (Male female ration: 988 female per 1000 male). It is divided into 3 Sub-Divisions, 13 Blocks, 13 Tahasils, and 25 Police Stations including Special PS (Energy), Keonjhar. The Sub-Division-wise (as related to Keonjhar Division) Population is given below as per census-2011.

Table No 1.3 Census abstract-2011 Keonjhar Division.

Sl No	Name of Block	Population
A	Keonjhar Sub Division	
1	Keonjhar	161931
2	Banspal	102527
3	Telkoi	96590
4	Harichandanpur	142150
5	Ghatgaon	118307
6	Patna	101518
7	Saharpada	88314
MC1	Keonjhar MC	60590
B	Champua Sub Division	
8	Joda	125728
9	Champua	115321
10	Jhumpura	113149
MC2	Joda MC	46631
MC3	Barbil	66540
10 block, 3 Municipality	Division Total	1339296



The population of the Division is 13,39,296 which constitutes about 74.33% where the geographical area is 75.50%.

The major town and major human habitations are well connected with all-weather roads. Keonjhar Forest Division hqs is situated at a distance of 122 Km from Panikoli (N.H.16) and 112 Km and about 5 km from Keonjhargarh Rail Station on East-Coast Railway. Keonjhargarh is well connected by road with Kolkata, Ranchi, Jamshedpur, Baripada, Rourkela, Cuttack, Bhubaneswar, Sambalpur and Bhadrak. The holly town Ghatgaon is famous for Goddess Tarini temple located at a distance of 50 Km from Keonjhargarh on the way to Panikoli in NH No.20. The headquarters of Keonjhar Forest Division is linked by Railway line and connected with Tata, Rourkela, and Bhubaneswar with superfast, express and fast passenger trains.

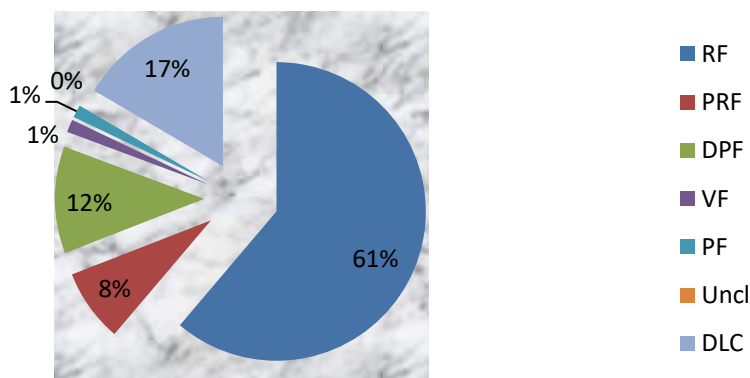
1.1.2 Forest area

The total forest area of the Division is 1937.31sqkm the legal class wise forest area is furnished as Table no 1.4

Table No 1.4 Legal Class wise Forest area of the Division				
Sl no	Category of the forest	No of blocks	Notified area in ha	% of total area forest area of the Division
1	Reserve Forest	77	118764.8610	61.21
2	Proposed Reserve Forest	24	15286.8573	7.88
3	DPF	61	22499.2134	11.60
4	Village Forest	456	2678.341	1.38
5	Protected Forest	44	2678.071	1.38
6	Unclass forest	88	22.0050	0.01
7	DLC Forest		32110.6037	16.55
	Total forest		194039.9524	100.00



Distribution of Forest Area



The total forest area computed to be 1940.39 sq km which is 30.95% of the total Geographical area of the Division.

1.1.3 Administrative set up:

For administrative convinieny the Division is sub divided to seven Ranges, 25 sections and 105 Beats. The name of the Ranges/sections and Beats are furnished in Table no 1.5

Table No 1.5 Range / Section & Beat name & Headquarters: Keonjhar Division

Name of Administrative Unit & Hqs	SI No Sec	Name of the Section/ Hq.	SI No Beat	Name of the Beat/Hq.	GPS Reading of the beat HQ in DMS
Division Hqs At Keonjhar					21° 38' 10.94" N 85° 36' 27.98" E
Keonjhar Range					21° 36' 48.49" N, 85° 38' 49.21" E
	1	Sadar	1	Town/ Keonjhar	21° 37' 47.35" N, 85° 36' 12.01" E
			2	Sidhamatha	21° 37' 7.45" N, 85° 34' 50.16" E
			3	Belda	21° 40' 42.03" N, 85° 40' 3.21" E
			4	Maidankel	21° 39' 58.39" N, 85° 38' 55.3" E
			5	Jadipada	21° 44' 19.2" N, 85° 38' 55.3" E
	2	Palaspanga	6	Palaspanga	21° 47' 0.6" N, 85° 34' 2.1" E
			7	Dhanurjayapur	21° 48' 25.80" N, 85° 30' 59.74" E
			8	Hatikucha	21° 43' 42.27" N, 85° 32' 16.02" E
			9	Kampodihi	21° 41' 59.91" N, 85° 30' 48.27" E
			10	Raikala	21° 49' 1.2" N, 85° 36' 39" E
	3	Naranpur	11	Naranpur	21° 36' 48.04" N, 85° 38' 49.11" E
			12	Raghunathpur	21° 36' 6.30" N, 85° 43' 45.6" E
			13	Gopalpur (E)	21° 32' 11.80" N, 85° 43' 21.7" E
			14	Gopalpur (W)	21° 33' 58.65" N, 85° 42' 5.94" E
			15	Balabhadrapur	21° 29' 26.03" N, 85° 40' 41.28" E
	4	Janghira	16	Janghira (E)	21° 25' 45.89" N, 85° 37' 12.02" E
			17	Janghira (W)	21° 25' 45.84" N, 85° 37' 11.93" E
			18	Pithagola (E)	21° 18' 20.39" N, 85° 37' 52.73" E



			19	Pithagola (W)	21° 18' 50.4" N ,85° 37' 53" E
Champua	5	Champua	20	Champua	21° 53' 4.18" N, 85° 34' 20.93" E
			21	Kalaikaprasad	21° 58' 55.8" N, 85° 36' 5.8" E
	6	Ukhunda	22	Ukhunda	21° 48' 48.7" N, 85° 41' 9.3" E
			23	Banika	21° 59.0' 18.0" N, 85° 43.0' 41.0" E
			24	Jyotipur	21° 53' 06.3" N, 85° 45' 12.72" E
	7	Balibandha	25	Balibandha	21° 53' 45.51" N, 85° 34' 29.94" E
			26	Laxmiposi	21° 53' 58.84" N, 85° 37' 20.74" E
			27	Chipinda	NA
			28	Gumura/ Balibandh	21° 53' 45.0" N, 85° 40' 05.8" E
	8	Joda	29	Joda	22° 01' 18.62" N, 85° 25' 22.06" E
			30	Khandabandh	22° 01' 18.3" N, 85° 25' 21.2" E
			31	Jurudi	22° 01' 18.3" N, 85° 25' 21.1" E
	9	Bamebari/ Badakalimati	32	Dubuna/ Badakalimati	21° 52' 5.03" N, 85° 24' 14.6" E
			33	Nayagarh/ Badakalimati	21° 52' 05.27" N, 85° 24' 14.8" E
			34	Malada	21° 49' 08.1" N, 85° 27' 50.2" E
Barbil	10	Barbil	35	Barbil	22° 5' 30.34" N 85° 23' 4.97" E
			36	Haramatha	22° 03' 24.3" N, 85° 17' 21.3" E
			37	Kiriburu	NA
			38	Bolani	22° 06' 47.35" N, 85° 20' 0.85" E
	11	Guali/ Rugudi	39	Rugudi	21° 59' 28.6" N, 85° 19' 18.4" E
			40	Kendudihi	NA
			41	Roida	NA
			42	Jhargaon	22° 03' 22.11", 85° 22' 59.98"
			43	Bhadrasahi	NA
	12	Nalda	44	Ulliburu	22° 08' 40.8" N, 85° 23' 7.7" E
			45	Karo	NA
			46	Thakurani	NA
	13	Bileipada	47	Balita	22° 03' 15.2" N, 85° 28' 42.6" E
			48	Purusottampur	NA
			49	Murga	NA
B & JP	14	Kanjipani/ Bayapandadh ar	50	Kanjipani	21° 37' 48.1" N, 85° 33' 7.1" E
			51	Gandijoda	21° 33' 32" N, 85° 30' 11" E
			52	Gonasika	21° 29' 33" N, 85° 31' 28" E
			53	Tandijoda	21° 32' 35" N, 85° 27' 19" E
	15	Suakati/ Anjar	54	Suakati	21° 37' 47.5" N, 85° 33' 07.0" E
			55	Banspal	21° 36' 25" N, 85° 24' 24" E
			56	Anjar	21° 37' 47.5" N, 85° 33' 07.0" E
			57	Nayakote	21° 44' 11" N, 85° 16' 15" E
			58	Taramakant	21° 35' 24" N, 85° 19' 18" E
			59	Kusakala	21° 42' 17" N, 85° 19' 9" E
			60	Kumundi	21° 39' 3" N, 85° 27' 6" E



Telkoi	16	Telkoi	61	Telkoi	21° 21' 25.28" N 85° 23' 54.89" E
			62	Dubulapal	21° 21' 26.2" N, 85° 23' 55.4" E
			63	Ahigola	21° 17' 56.4" N, 85° 26' 39.4" E
			64	Golabandh/ Jagamohanpur	21° 26' 4.3" N, 85° 21' 56.9" E
			65	Barhadebta	21° 26' 4.3" N, 85° 21' 56.9" E
	17	Talpada	66	Talpada	21° 19' 56.9" N, 85° 32' 34.92" E
			67	S.N.PurGoda/ Sankarpur	21° 21' 57.7" N, 85° 28' 59.7" E
			68	Oriya/ Katarapali	21° 23' 2" N, 85° 24' 40.54" E
	18	Bimala	69	Bimala	21° 11' 41.2" N, 85° 23' 58.7" E
			70	Kardangi	21° 16' 19.5" N, 85° 23' 22.5" E
			71	Ranibeda	21° 10' 33.9" N, 85° 28' 15.9" E
			72	Raisuan	21° 09' 46.01" N, 85° 30' 17.7" E
			73	Patkholi	21° 11' 28.0" N, 85° 31' 48.8" E
			74	Padang/ Bandhanjhari	21° 16' 6.4" N, 85° 25' 54.7" E
			75	Kaliahata (N)	21° 12' 10.3" N, 85° 35' 42.3" E
	19	Kaliahata	76	Kaliahata (S)	21° 12' 10.2" N, 85° 35' 42.4" E
			77	Purujoda	21° 11' 52.9" N, 85° 35' 0.5" E
			78	Rekuti	21° 8' 43.9" N, 85° 36' 59.2" E
Ghatgaon	20	Ghatgaon	79	Ghatagaon	21° 23' 48.4" N, 85° 53' 46.2" E
			80	Baiganpal (N)	21° 28' 41.4" N, 85° 56' 12.2" E
			81	Baiganpal (S)	NA
			82	Kadabahali(N)	NA
			83	Kadabahali(S)	21° 23' 58.3" N, 86° 01' 43.9" E
			84	Kolimati	21° 20' 05.2" N, 86° 02' 27.7" E
			85	Melan	21° 22' 29.1" N, 85° 58' 12.1" E
	21	Dhenkikote	86	Dhenkikote	21° 29' 52.1" N 85° 49' 55.5" E
			87	Pipilia	21° 34' 04.8" N 85° 46' 07.1" E
			88	Balipokhari	21° 22' 29.1" N 85° 48' 21.4" E
	22	Deobandh	89	Deobandh	21° 26' 4.9" N 85° 43' 8.7" E
			90	Raghubeda	NA
			91	Manpur	21° 26' 04.2" N, 85° 43' 07.6" E
Patna	23	Patna	92	Patna /Sanraposi	21° 38' 4.17" N, 85° 53' 43.18" E
			93	Poipani	21° 36' 55.6" N, 85° 46' 54.2" E
			94	Malliposi	21° 34' 31.56" N, 85° 53' 49.55" E
			95	Tando/ Hatinota	21° 33' 37.04" N, 85° 57' 54.02" E
			96	Kendeiposi	21° 41' 5.54" N, 85° 48' 0.19" E
	24	Khireitangiri	97	Khireitangiri	21° 42' 46.73" N, 85° 42' 23.22" E
			98	Jamunaposi	21° 42' 47.35" N, 85° 45' 16.47" E



			99	Rajnagar	21° 45′ 37.75″ N, 85° 48′ 36.9″ E
			100	Tinda/ Turumunga	21° 48′ 31.84″ N, 85° 48′ 3.22″ E
	25	Saharpada			21° 43′ 29.5″ N,85° 23′ 54.6″ E
			101	Udayapur	NA
			102	Gurandijodi	21° 43′ 38.4″ N, 85° 57′ 57.3″ E
			103	Macchagarh (N)	21° 39′ 20.4″ N, 86° 03′ 24.3″ E
			104	Macchagarh (S)	21° 36′ 20.7″ N,86° 01′ 35.6″ E
		105	Raidiha	NA	
7 Range		25 Section		105 Beat	

Table No 1.6 Abstract of Administrative set up			
Sl. No.	Name of Range	No. of Section	No. of Beat
1	Barbil	4	15
2	Bhuyan&Juang Pirh (B&JP)	2	11
3	Champua	5	15
4	Ghatgaon	3	13
5	Keonjhar	4	19
6	Patna	3	14
7	Telkoi	4	18
	Total	25	105

1.1.4 Building and Forest Road

A) Building

There are numbers of buildings in Keonjhar Division. All offices are functioning in own building. The complete building list is at **Annexure-II**

B) Forest Rest House

There are three (3) Forest Rest Houses (FRH) in the Division to provide accommodation during field visit / inspection and patrolling. List of FRH in the division is furnished below. (Table no1.7)

Table No 1.7 List of FRH: Keonjhar Division.					
Name of the Range	Rest House/ Rest Shed with Lat / Long		Name of the Section	Year of construction	Remarks
Barbil	Barbil	N 22° 06' 28.5" E 085° 22' 20.7"	Barbil	1974-75	FRH
Ghatgaon	Ghatgaon	N 21° 23' 46" E 085° 53' 45"	Ghatgaon	2004-05	Rest Shed
Telkoi	Jagamohanpur	N 21° 26' 46.41" E 085° 53' 45.84"	Telkoi	2005-06	Rest Shed

C) Forest Roads:

There are 17 forest roads in the division to facilitate transportation of Forest Produce and inspection of Forests, The total length of the forest Road is 153.88 km



Table No 1.8 List of Forest roads Keonjhar Division.

Sl No	Name of Range	Name of the Forest Road	From	To	Name of RF/PRF	GPS of starting point	GPS of end point	Type of Road			Total Length in Kms
								C.Con.	Motora ble	Non-Motora ble	
1	Barbil	Harmatha-Nadidiha	Haramath	Nadidiha	Karo R.F.	N- 22 00 23.3, E- 85 16 08.6	N- 22 01 41.7, E- 85 16 38.1		6.00	0.00	6.00
2	Barbil	Murga-Karo	Murga	Karo	Thakurani R.F.	N- 22 07 52.1, E- 85 28 02.2	N- 22 08 52.6, E- 85 26 05.6		3.00	0.00	3.00
3	Ghatgaon	Kadabahali-Baiganpal	Kadabahali	Baiganpal	Atei RF	N 21 28 43.8 E 85 56 23.9	N 21 24 11.1 E 86 01 16.0		17.00	0.00	17.00
4	Ghatgaon	Melan-Mahisagotha	Melan	Mahisagotha	Atei RF	N 21 21 54 E 85 58 15	N 21 24 35.5 E 85 58 59.0	1	7.00	0.00	8.00
5	Ghatgaon	Melan-Musal	Melan	Musal	Atei RF	N 21 21 59 E 85 57 47	N 21 20 15 E 85 57 16		5.29	0.00	5.29
6	Ghatgaon	Murgapahadi-Mahisagotha	Murgapahadi	Mahisagotha	Atei RF	N 21 26 07.4 E 85 54 32.0	N 21 24 35.5 E 85 58 59.0		11.00	0.00	11.00
7	Ghatgaon	Sunariposi-Khuntaposi	Sunariposi	Khuntaposi	Barabanka RF	N 21 23 26.0 E 85 45 59.5	N 21 21 28.6 E 85 42 04.7		18.00	0.00	18.00
8	Ghatgaon	Baiganpal-Sitanadi-Bhimakund	Baiganpal	Sitanadi	Atei RF	N 21 28 40.6 E 85 56 12.2	N 21 30 13.4 E 85 56 05.0		4.00	0.00	4.00
9	Patna	Bhimakund-Sitanadi--Baiganpal	Bhimakunda	Sitanadi	Atei RF	N21 33 49.7 E 85 59 5.5	N21 30 15.6 E 85 56 5.6		16.00	0.00	16.00
10	Patna	Banamahuldiha-Tando	Banamahuldiha	Tando	Atei RF	N 21 33 21.1 E 85 59 58.6	N21 31 48.1 E 85 59 8.4		5.00	0.00	5.00
11	Keonjhar	Badakhman-	Janghira	Badakha	Khajuribani	N21 24 24.82	N21 24 37.65		12.00	0.00	12.00



Revised Working Plan of Keonjhar Division for the period 2022-23 to 2031-32

		Janghira		man	PRF	E85 37 04.77	E85 34 47.39				
12	Telkoi	Badakhman-Similipal	Badakhman	Similipal	Kalapat RF	N21 20 13.7 E85 31 28.2	N21 21 6.2 E 85 33 41.7		10.00	0.00	10.00
13	Telkoi	Ahigola-Sankoi #	Ahigola	Sankoi	Kalapat RF	N21 17 56.7 E 85 26 39.7	N21 19 7.2 E85 30 1.4	0.30	9.70	0.00	10.00
14	Telkoi	S.N. Pur Goda-Talpada	SNpurGoda	Talapada	Kalapat RF	N21 20 12.8 E85 31 30.8	N21 21 47.7 E85 29 00.8	0.80	6.20	0.00	7.00
15	Telkoi	Sankoi-Similipal	Sankoi	Similiopali	Kalapat RF	N21 19 7.2 E 85 30 1.4	N21 19 47.9 E85 30 40.2	0.00	7.00	0.00	7.00
16	Telkoi	Ranibeda-Karamangi	Ranibeda	Karamangi	Ranibeda RF	N21 10 36.18 E85 28 2.64	N21 12 52.86 E85 28 35.34	0.00	7.59	0.00	7.59
17	Telkoi	Talpada-Pithagola	Talapada	Pithagola	Kalapat RF			0.00	7.00	0.00	7.00
					Total:			2.10	151.78	0.00	153.88
# Allowed to develop under Mukhya Mantri Sadak Yojana (MMSY) vide FF&CC Depat Odisha O.O. no 7758 /F&E Dated 21.05.2020											



1.2 Configuration of the Ground:

Eastern half of the district are the plains of Anandapur. To the west is a range of hills containing peaks such as Gandhamardan (3477 ft), Mankadnacha (3639 ft), Gonasika (3219 ft) and Thakurani (3003 ft).

The highlands consist of clusters of rugged crags and the mountaintops appear to be sharply ridged or peaked, however they have extensive tablelands on their summits. In some areas, isolated hills rise abruptly from the plains, but most areas have a general elevation of over 600m. The highlands form the watershed for a number of rivers, including the Baitarani River.

Nomira National Geological Monument:

Pillow Lava in Iron ore belt at Nomira 2 km east of Nomira 18 km from 18 km south of Joda town, on the Keonjhar-Barbil-Lahunipada state highway, has been declared the National Geological Monuments of India by the Geological Survey of India (GSI), for their protection, maintenance, promotion and enhancement of geotourism. Pillow Lava, Iron ore belt of Nomira is an exposure of ellipsoidal pillow lava of a maximum thickness of 2m x 0.6m. The fine to medium grained, green to bluish green coloured with abundant Vesicular texture filled with quartz. The lavas and the associated pyroclastic rocks and tuffs are underlain by quartzite and overlain by shale, chart-shale and banded hematite jasper.

The site can be reached from Joda by following Joda Nayagar road up to Bamebari and then following a 2 km unmetalled road leading eastward up to Nomira.

The tract covered in this ongoing working plan has no sharp features to divide it in to different Physiographical Zones. The whole tract is generally hilly and interspersed with winding strips of valleys. Keonjhar Division is distinctly divided in to two parts which are highly dissimilar in nature i.e., lower Keonjhar and upper Keonjhar. The lower Keonjhar consists of Keonjhar valley and low lands of Anandapur civil subdivision. The upper Keonjhar is mountainous and undulating which are in Sadar (Keonjhar) and Champua Civil Sub-divisions.

1.2.1 Topography:

Keonjhar Forest Division comprises a chain of mountains and hills on its western and southern border having distinct slopes towards river Baitarani on the north and river Brahmani on the south. The altitude of these hill ranges varies from 600m to 900m. The highest point of this division is Mankadanacha peak (1117.00 m MSL), which is situated on the western border overlapping the Koira valley of Bonai forest division.

**1.2.2 Altitude of the hills:**

The altitude of different hills lying within the geographical jurisdiction of different forest block above mean sea level has been given in **Table 1.9**.

Table No 1.9 List of Hills in Keonjhar division.					
Sl. No.	Name of the peak	Height in meters	Sl. No.	Name of the peak	Height in meters
1	Mankadanacha	1117	12	Kiriburu hill Top	883
2	Gandhamardan I	1090	13	Dahighar	874
3	Gandhamardan II	1062	14	Suring	834
4	Meghanad	1054	15	Purunapani	829
5	Gonasika	1009	16	Siddhamath	805
6	Baliparbata	990	17	Mahaparbat	721
7	Kajalpahar	929	18	Koili	667
8	Thakurani	918	19	Sikheswari	589
9	Pithapidha	916	20	Sinduria	511
10	Ranga Parbat	897	21	Kalapahar	463
11	Tankiahudi	890			

The most characteristic feature of the Keonjhar plateau is that it is open except for the hill ranges. It is noteworthy to mention here that the plateau is slowly descending from Ghatagaon (335 m) into the low-lying planes of Anandapur Civil Sub-division.

1.2.3 River system:

The district is mainly drained by the river Baitarani and its tributaries barring a very small patch in the extreme south-western part, falling in Brahmani basin. The major tributaries are Kanjhari, Sitanadi, Salandi, Musal nadi, Orarai nadi, Remal, Kasai and Deo nadi etc. and these are mostly perennial. The drainage pattern is mostly dendritic in nature. Sub-parallel drainage pattern is well developed in the south-eastern part of the district. The drainage density is moderately high in western part of the district representing high hill ranges constituted mostly by Iron ore group of rocks and volcanics which suggest high run off and low infiltration. Hydrogeological surveys and remote sensing studies have revealed that the drainage pattern in the district is controlled by the fracture system which is developed due to tectonic deformation occurred in the area in several phases.

1.3 Geology, Rock and Soil:

The Geology of Keonjhar District is very interesting due to its mineral potential. It can be broadly divided into two distinct physiographic features i.e. (i) Eastern alluvial plains of Anandapur and a portion of Sadar and Champua Sub-division and (ii) Western mountainous terrain containing of lofty hills with intervening narrow valleys. The area is



densely forested and represented by high hills namely Gandhamardan (Height 1090m MSL) and Mankadanacha 1117m MSL).

1.3.1 Geology

The geology of district is very interesting in view of mineral deposits. It is broadly divided into seven geological units Viz:

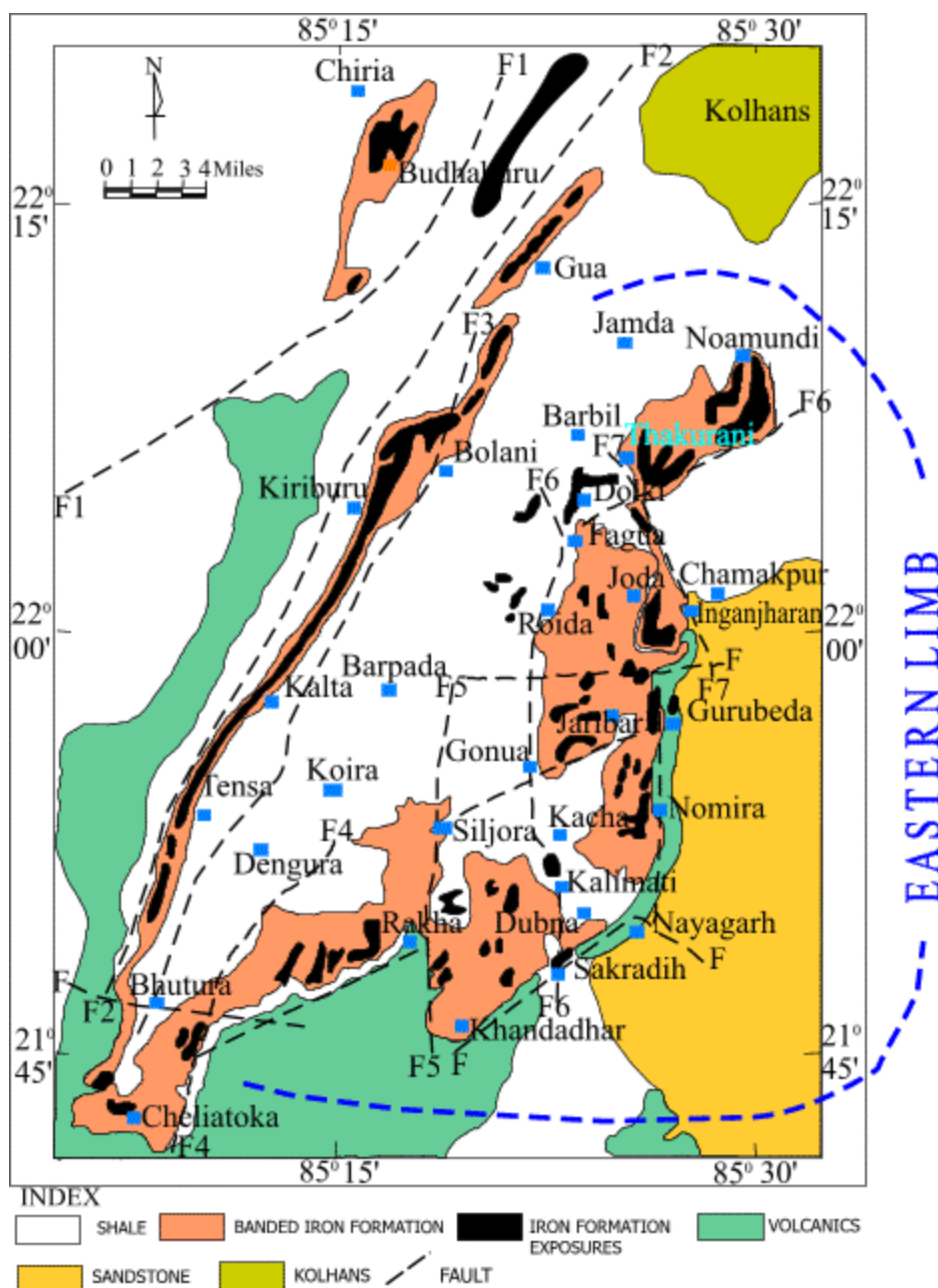
- The occurrence of metamorphic patches belonging to older Metamorphic of Archaean age
- Huge batholiths of Singhbhum Granite with swarms of newer Dolerite dykes in the eastern part of the district
- Volcano-sedimentary sequence intruded by Bonai Granite belonging to Lower Bonai Group of age ranging between Archaean to Palaeo Proterozoic age in the SW and on the NW
- Intrusive like chromiferousultramafics, gabbro-anorthosites, dolerite & quartz vein of Archaean to Proterozoic age
- Sedimentaries and metasedimentaries belonging to Kolhan Group ranging in age from lower to middle proterozoic
- Laterites of Cenozoic age and
- Quarternaries represented by Kaimundi formation & unclassified alluvium.

The stratigraphic sequence of Keonjhar Forest Division given in **Table 1.10**.

Table No. 1.10: Stratigraphic sequence:		
Holocene	Alluvium	Kaimundi formation
Late Pleistocene to early Holocene	Clay with calcareous concretions	Kolhan Group
Cenozoic	Laterite and lateritic bauxite	
Palaeo to meso Proterozoic	Conglomerate, Sandstone & Shale	
Palaeo-Proterozoic	Danguaposi Lava	Kolhan Group
Proterozoic (undifferentiated)	Granophyres/Gabbro/Anorthosite/Norite	
Archaean Proterozoic	Newer Dolerite Ultramafic Rocks+ Chromite	
Archaean to Palaeoproterozoic	Basalt Tuff, Metagabbro	Lower Bonai Group
	Granite	
	Shale, Tuff, and Manganese	
	BHQ, BHJ, Ferruginous Shale and Quartzite	
	Gritty Sandstone, Ortho Quartzite & Conglomerate	



Archaean	Hornblende schist, Cholorite schist, Amphibolite and Meta Gabbro	Gorumahisani Group
	Quartzite, Quartz sericite schist, Cherty Quartzite, Fuchsite Quartzite and Black Chert	
	Quartzite, Chert	
	BHQ, BMQ, BCQ, BJQ	
	Ferruginous Shale, Carbonaceous Shale, Phyllite and Mica schist	
	Pebbly Quartzite, Gritty Quartzite and Quartzite	
	Singhbhum Granite/ Hornblende Granite	
	Politic schist, Quartzite, Amphibolite	Older Metamorphic Group



Older Metamorphic Group (OMG):

These indicate the oldest rocks of the platform which were deformed and metamorphosed by basic and granitic activities. OMG, comprising of suite of amphibolites facies metasedimentary rocks which is considered to be the oldest recognizable lithologic component of Eastern Indian craton. These typically occur as enclaves ranging in size from a few square meters to about 200 Sq. Km within younger granitoids and gneisses. In term of lithology, the OMG comprises of polytic schist with several thick bands of para amphibolites, relatively thin bands of quartz-sericite-schists, local band of quartz-magnetite-cummingtonite-schists and talc tremolite schist. The type area of OMG is

located to the West of Champua.

Singhbhum Granite:

A major part of the granitic batholiths, commonly referred to as the Singhbhum Granite complex, occupies large tracts in Keonjhar district of Odisha. The granitic complex, with numerous enclaves of granititemetasupracrustal rocks covers an area of approximately 8000 Km². The Keonjhar granite is a part and parcel of Singhbhum Granite body. It shows wide variation from foliated to nearly massive muscovite-biotite granodiorite. The feldspathic gneissic, porphyritic, aplitic varieties are exhibited throughout the granitic body. The granitic body was believed to be emplaced around 2700 years ago.

Gorumahisani Group:

The Gorumahisani Group belonging to Archaean age is a long N-S trending easterly convex arcuate belt. The metasupracrustals in this belt comprises of pillowed metabasalts with interbedded chert, Bif (BMQ dominant), sheared pebbly quartzite, hornblende schist, ferruginous shale, carbonaceous shale, epidiorite and phyllite with inter layers of acid volcanic and tuff. The mafic volcanic in this sequence are represented by pillowed, spinifex textured peridotitic to basaltic komatiites.

Lower Bonai Group:

The Lower Bonai Group, in the Bonai- Keonjhar region exposes BIF-bearing horizons. This is an asymmetric synclinal structure described as Horse Shoe Synclinorium. It comprises of basic volcanic, BHQ, BHJ, BMQ, BCQ, ferruginous ultrabasics of Nausahi and mafic-ultramafic complex of Baula rich in Cr-Fe-Ni and is the probable locale of PGE. The banded iron silica rocks gave rise to rich and extensive iron and manganese deposits of the district. Occurrences of impure dolomite with stromatolite like impressions are associated with iron ore group of rocks in Kasia- Barapada area. To the West of Keonjhar up to Keonjhar-Dhenkanal district boundary and further south wards the hill ranges belong to Dhanjori orogeny.

Bonai Granite Complex:

The Bonai Granite Complex occurs to the west of the Singhbhum Granitic Complex. In areal extent the Bonai Granitic Complex is approximately one fifth of the size of the Singhbhum Granitic Complex (Sen, 2001). Bonai Granitic Complex comprise of trondhjemitic- granodiorite-granite with xenolithic enclaves of older trondhjemitic rocks, banded gneisses, metasupracrustals, mafic/ultramafic rocks, amphibolites and metalavas (Sengupta et al., 1991; Saha 1994).

Ultramafic Complex:

Major mafic-ultramafic complexes of the EIC are located in the Baula-Nausahi and Sukinda areas. In addition, several small masses of mafic-ultramafic rocks are intermittently exposed along an arcuate belt in the Southeastern marginal zones of the craton. In Baula-Nausahi area of Keonjhar district, an ultramafic suite, comprising of dunite-peridotite-pyroxenite and gabbro/anorthosite, intrude metasupracrustals. Dolerite dyke swarms in turn, intrude the ultramafic-mafic suite. The eastern marginal Zone of this complex is brecciated. The noble metal (PGE) mineralization in the complex is confined to the brecciated zones: the brecciation of the ultramafic rocks has been induced by gabbro intrusion (Auge et al.).

Newer Dolerite:

Mafic dyke swarms constitute an important lithologic component in Keonjhar district of Odisha. Dunn and Dey (1942) coined the Newer Dolerite, to the youngest stratigraphic unit in the terrain. The dykes are represented mainly by dolerites and gabbros though minor ultramafic, noritic and granophyric dykes are also reported.

Gabbro-anorthositic-noritic Complex:

These are reported to intrude the metasupracrustal rocks of the Gorumahisani-Badampahad Group as well as the Singhbhum Granite Complex (Saha et al. 1977; Chakrabarty et al. 1981). Auge et al. (2003) correlated the gabbro-anorthosites of this belt of the old Bangur gabbro to Baula belt.

- a) **Danguaposi Lava:** The Danguaposi lava is lying in the NE corner of Horse Shoe Synclinerium which is very weakly metamorphosed occupied by extensive flat lying lava flows. The bulk composition of the basaltic rock is andesitic tholeiite with differentiates of oligoclase andesite.
- b) **Kolhan Group:** Kolhan Group comprising of sandstone, silt, shale and conglomerate are deposited by the side of Baitarani river in the Joda-Banspani sector. Wide spread weathering, erosion and lateritisation were continued during quaternary period as evidenced in the highlands. As a result of which the soil and alluvium were derived and deposited, achieving the peneplanation stage of the platform.
- c) **Kaimundi Formation:** The quaternaries are represented by Kaimundi Formation consisting of sandy sticky clay impregnated with caliche and unclassified quaternaries represented by black to brown clay and coarser to fine sand.

Structure and tectonics:

Some Geologist believe that the earliest Eastern Ghats Orogeny which occurs to the south in the districts of Cuttack and Puri was already stabilized before the deposition of Iron-Ore

Super Group of rocks. Chromiferous ultrabasic rocks which were pre-organic in the Iron-Ore Super Group were emplaced into the Eastern Ghats Group along zones of dislocation confirming the idea that, the Iron-Ore Super Group exist as mobile belt when the Eastern Ghats Orogeny was already a stable craton. Others, however believe that either the Eastern Ghats Orogeny is younger to (sarkar and saha, 1962) or co relatable with (sarkar, 1972) the Iron Ore Orogeny. Although the data on this problem is still meager, it may be stated without any doubt that the Eastern Ghats and Iron Ore Orogenic craton was subjected to one or more epeirogenic movements, probably in the Quaternary period which complicated the problem all the more. The structural frame work of the Iron Ore Super Group of rocks is highly complicated with the development of refolded folds and reclined fold at places. However, the broad regional disposition of the Iron Ore Super Group is suggestive of its having been moulded the stable Eastern Ghats Orogeny.

Tectonically, the lithological assemblage of Koira-Nuamundi Group represents a stable shelf association deposited on the craton made up of Iron Ore Super Group of rocks and granite. The sedimentary history of the basin terminated at the end of manganese shale deposition with onset of minor diastrophic activity after which Kolhans were probably deposited in discrete basin. In the Koira area the rocks form a major low North-plunging synclinorium, the eastern limb of which is exposed in the Keonjhar district. Remnants of latertised plantation surfaces found above 1000 meters may be related to epeirogenic movements resulting in the uplift probably in the Quaternary period.

1.3.2 Mineral Resources:

Keonjhar district is regarded as the richest district for mineral wealth in Odisha, endowed with extensive deposits of Iron Ore, Manganese Ore, Bauxite, Gold, Chromite, Vanadiferrous magnetite, Kyanite, Pyrophyllite, China clay, Clay/kaoline, soapstone, Dimension stone etc.

Iron Ore: Keonjhar Division is very rich in Iron ore deposits. The main iron ore deposits are found along the classic Bonai-Keonjhar Horse Shoe shaped synclinorium which spread over an area of about 60KmX25Km. Hematite is the chief mineral resource of this district. While Orissa has about 30% of the country's resources of Haematitic ore, Keonjhar district alone is contribution about 75% of the reserves of the state. Important iron ore deposits are found in Thakurani, Bolani, Kiriburu, Joda East, Barapada, Jilling-Longolata, Jurudi, Guruda, Jharibahal, Dabuna, Bamebari, Jajang, Murgabeda, Palsa, Malangtoli, Chamakpur, Gandhamardan, Daitary, Inganijharan, Uliburu and Haramath-Guali. The reserve forest areas of Karo, Sidhamatha, Baitarani, Thakurani and Uliburu are situated in this area where the soil is normally reddish, yellowish to Brownish and as such are ferruginous in



nature. Reserves of some important Iron Ore deposits of all categories (proved, probable, and possible) are given in **Table 1.11**.

Table No. 1.11 Reserves of some important Iron Ore deposits		
Sl No	Location	Total in Million Tonnes
1	Banspani	0.098
2	Belda	57.580
3	Bhadrasahi	31.226
4	Bonai	149.990
5	BP jajang	05.187
6	Deoghar	502.80
7	Deoghar B	253.640
8	Gandhamardhan A	05.000
9	Gurubeda	01.060
10	Horomoto-Guali	81.914
11	Joda East	232.372
12	Jurudi	23.760
13	Kasia	114.830
14	Katamati (TISCO)	112.607
15	Khandbandh (TISCO)	257.873
16	KolhaRoida	10.907
17	Bhadrasahi	36.679
18	Thakurani	37.129
19	Thakurani B	252.370
20	Malangtoli	434.000
21	Thakurani A	187.000
	Total	2788.022

Manganese:

Keonjhar district produces more than 77% total production of manganese of the state which is one of the most important ore producing regions of the country. The manganese leases of this district are extended over an area of about 222 Km². The Keonjhar manganese belt is a part and parcel of Singhbhum-Bonai belt and one of the most important manganese ore producing regions of India. This is confined to shale formation of Pre-Cambrian iron Ore Super Group as stratiform, strata bound and lateritoid types. The ores are usually spongy and cavernous in appearance exhibiting a botryoidal appearance and maxillary structure. The ore minerals are chiefly psilomelane and pyrolusite with some cryptomelane and manganite. The ore produced in this district is characterized by



low phosphorous and high iron content. The ore is particularly preferred by the ferro-manganese producers in the country on account of its low phosphorous content. These are used mainly iron and steel industry ferro-manganese industry, dry cell (battery) and chemical industry. The reserve of manganese ore is estimated to be 127.27 million tonnes as per the District Survey Report, Notification No. S.O. 3611(E) New Delhi, 25th July, 2018 of MoFF&CC).

Bauxite:

Bauxite of Dholkatapahar of Keonjhar district gains its importance due to availability of refractory and chemical grade Bauxite which is of high demand. The Bauxite, on Dholkata and its surrounding hills occurs as pockets, ribbons and boulders within the, ferruginous laterites. The pockets are of various sizes and are mostly exposed on the surface and often continuous to the depth of 3m. It is of high alumina, high iron, low silica, and low titanium grade having 60 to 70% tri-hydrates as gibbsite and rest Boehmite. The predominant iron minerals are goethite and hematite occurring as colloidal bands. Dholkata Bauxite is suitable for metallurgical, cement and abrasive purpose. Most of the bauxite samples show high iron (ranging from 13 to 30% Fe_2O_3) which can be tolerated in the above three industries but is highly objectionable for refractory and chemical purpose. Reactive and non reactive silica are low and do not cause harm for refractory grade. L.O.I. being always above 20% is most suitable for metallurgical purpose. A total of 11 million tonnes (5 million tonnes probable reserve + 6 million tonnes possible reserve) having Al_2O_3 : +40%, Fe_2O_3 : 13-30% & SiO_2 : 2-10% has been assessed around Dholkata.

Chromite:

Odisha holds the 1st place in the production of Chromite ore contributing over 90% of the country's output. The deposit is situated near the southern fringe of Baula state forest of this district. The ultrabasic body extends for about 3 kms in an N-S direction. It is a dyke like body dipping steeply to the east and is widest in the centre and gradually tapering towards north and south. The ultramafites include enstatite, bronzite, pyroxenite, serpentinitised dunites, peridotites, talc schist, silicified dunites & chromitites with chromite loads. The chrome ore available are mostly of lumpy type. These are mostly used as chromium metal, various alloys with iron, nickel, cobalt, tungsten & in refractory industry. The estimated reserve is 8.27 million tonnes (proved reserve) in Baula, Nausahi and Bangur area with Cr_2O_3 content varies from 40 to 45%.

Vanadiferrous Magnetite:

The Vanadiferrous magnetite occurrences are reported around Phulinjhorhuli near Nausahi of Keonjhar district. These magnetite deposits are restricted within the anorthosite-gabbro-norite rocks. The deposit occurs in three belts and is of lenticular



shape varying from 2m to 250m in length. The ore is highly jointed and roll as small boulders covering the neighbouring areas as floats. The ore is greyish black in colour and mostly crystalline. The Fe content of the ore grade between 50-60% while TiO_2 and V_2O_5 averages between 10-14% and trace to 0.94% respectively. It is used as the alloys of iron & steel industry (Ferro vanadium).

Gold:

The gold occurrences of Banspal and Telkoi block of Keonjhar district have been reported around Saleikena, Sirisbahal, Dublapal, Bangadiha, Odal, Gopur, Gajipur, Kusuguda etc. The area covering the gold deposits constitute the rock units belonging to Iron Ore Super Group comprising of basic lava, tuffites, basic intrusives, metagabbro, metadiorite, amphibolites, quartzite and chlorite schist. The significant placer deposits are found with alluvium, sand, conglomerate at Gajipur, Samakoi and Sonapent area of the district. The placers often served as the valuable guides to the proximity of lodes of commercial value. The gold is recovered in the form of dust, scales, specks, pellets and nuggets.

China Clay:

Pockets of China clay are encountered near Judiapahar, Tarrenipokhari, Anupura, Fakirpur, Padmakesharpur, Jaypur, Kankdajodi, Ambuapani, Adakata, Govindpur area of the district. The Clay is yellowish white, gritty and occurs as pocket type. The Al_2O_3 content varies from 18.25% to 22.77%. China clay is used in ceramic, pottery industry, cement industry, textile industry, paper, rubber & paint industry.

Pyrophyllite:

The occurrences of pyrophyllite are stretched over a 90km long belt extending from Rebna-Palasbahal in the south to Dhobakuchuda-Balabhadrapur in the north. These are associated with the border area of Singhbhum Granite and quartzite hills Such as Madrangajori, Macchakandana, Jodiaghat and south of Uchakabeda, eastern slope of Chantrabhangapahar, Dalimpur and Sidhamath area. The pyrophyllite occurrences mentioned above are in the form of very fine flakes, typically soapy feel and associated with pyrophyllite quartz schist, quartz tourmaline pyrophyllite rocks, and quartz tourmaline pyrophyllite schist as irregular patches. It is mainly used in refractory industry, stone ware, china ware, sanitary ware & porcelain. Reserves of 8.37 million tonnes have been assessed in Keonjhar district. The average percentage of Al_2O_3 is 20- 23%, SiO_2 -65-75%, Fe_2O_3 -0.77% & LOI- 3-4%.

Kyanite:

Kyanite occurs in the contact zone of amphibolites and quartz mica schist profusely near Magarmuhan, Bankhol and Kardangi area. The bands extend over a length of 1.4 kms



discontinuously in the quartz schist. A few big boulders are marked in Magarmuhan area. The kyanite boulders are massive containing 45% Al_2O_3 but the insitu kyanite bands are quite poor in Al_2O_3 content ranging from 23% to 38%.

Soapstone:

The soapstone, derived from peridotite is encountered near Dholkata, Dalangpur, NE of Sayedmulia, Suramundi, Around Kuladhamkuni, Sapghosara, Pithagola, Alanga area. These are locally utilized for preparation of stone ware & statues. The MgO content varies from 11.397 to 22%

Quartzite:

High grade quartzite mining activities are continuing near Barapada, Barang, Paharpur, Parsala area of the district. Besides, Cherty and massive quartzites with 99% SiO_2 are marked intermittently in the iron ore series and studied by the Officers of the Directorate of Mines, near Rebna-Palaspal, Magarmuhan, Jaypur, Dalmaposi, Chauthia, Nawabeda area. Quartzite is used in ceramic, refractory, iron & steel making, ferrosilicon, glass, chemical & textile industries. A reserve of 8.424 million tonnes of quartzite has been estimated in Keonjhar district. The average SiO_2 content varies from 95 to 99.66%.

Dimension Stone:

Singhbhum Granite, dolerite dykes and ultrabasic rocks of the district are suitable for dimension stone/decorative stones. The 150km long Palaspanga dyke extending from Keonjhar to Chainbasa, the longest dyke in Asia is being used for the above purpose in view of its colour, texture, composition and hardness. These are quarried at number of places around Dhurpada and Keonjhar. A part of dyke to the east of Kalikaprasad village has been estimated to contain 500m³ of dimension stone of block size 0.5m x 0.5m x 0.5m (Source- Reports of Directorate of Geology). Lower shale formations found near village Lunagothani was found to be suitable for decorative purpose. These are used as polished blocks and tiles for flooring, kitchen platforms, and wall panels, table tops, in commercial complexes, monuments and platforms. Some are used for flower vases, name plates, pen stands, paper weights, statues and modern sculptures.

Minor minerals:

In addition to this, the district is endowed with vast resources of minor minerals like granite, dolerite, basic rocks, laterite stone and river sands which are used as building and road materials.

1.3.3 Rocks:

The rocks of Keonjhar district belong to the Iron ore series of the Dharwars, an exceedingly ancient system of archaen rocks, which also occurs in neighbouring Singhbhum and



Sundargarh Districts. This mass gives passage after a short distance south of Keonjhar boundary to rocks of Gondwana system, to Archaean rocks (Khondalite and charnockite) at its west, southwest and to quaternary rocks at its southeast. Shale, phyllites, schists, sandstone, conglomerates and quartzite occur often with extensive basic intrusion. Most part of this district is covered by rocks of Iron ore group represented by BHJ, BHQ & BMQ which provides the iron ore deposits. This group of rocks is overlain by younger granites. The formation of different rocks from the geological groups is given in **Table No. 1.12**

Table No. 1.12 Formation of rocks		
Sl. No.	Name of Geological group	Name of Rock
1	Archean	Khondalite, Charnockite, Porphyritic granite gneiss, Pyroxene granulites schist, Garnetiferous, granite gneiss, Quartzite, Quartz schist etc.
2	Gondwana	Feldspathic, Gritty sandstone, Green shale, Barkar, Carbonaceous shale, Talchirs, Panchets etc.
3	Intrusive	Pegmatite, Quartz veins, Dolerite etc.
4	Recent	Alluvium, Laterite etc.

(Source - Director of Mines, Sambalpur.)

Description of Rocks:

The description of different rocks and its availabilities in the forest blocks have been discussed briefly in **Table No. 1.13**.

Table No. 1.13 Description of rocks			
Sl. No.	Name of rocks	Description	Name of the Blocks
1	Khondalite	Khondalite is the common rock made up of metamorphosed sediments in the series. This is an oldest and prevalent rock formation in this zone. It contains varying proportions of Quartz, Feldspar, Garnet and Sillimanite. In some patches it contains Graphite and Biotite. They are medium to very coarse-grained containing large crystals of pink garnet. It exhibits schistose to gneissose texture. Quartzites are hard, compact and dirty white to light gray in colour.	Bardhana, Kalikaprasad, Khajurimundi, Lunaghar I, Champei, Raiguda, Mundala, Ukhunda, Shaharpur



2	Charnockite	The Charnockite rocks are noticed in high rugged hills due to their resistance to weathering and erosion. The rocks are medium to fine grained and compact. The rocks have waxy appearance and are found to consist mostly of gray feldspar and pink garnets. It is characterized by granulites texture and presence of hypersthene. Its constituents are Quartz, Orthoclase, Plagioclase and Augite. The Quartz –muscovite schist make of the long chain of east-west hill ranges of Nadia reserve forest. Being less resistant to weathering and erosion it is found as mounds in low laying area along Nallas.	Kalimati, Barabanka, Palaspada, Ninua, Atei, Nalapanga, Lakshmiposi, Mooney, Naibuga, Masinabila, Balipokhari
3	Quartz Veins	The band of syenite occurs within band of granular Quartzite. It is medium to coarse grained in texture and white in colour. It is composed mainly of feldspar with minor amount of biotite and hornblende. It is quite big in size and contains Quartz. It is marked along the foliation plains.	Sidhamatha, Suakathi I, Suakathi II, Kandra A, Kandara B, Gandhamardan, Gonasika, Danla, Champei, Jotipur
4	Pegmatite	The pegmatite is found as intrusion into the country rock. It is acidic in nature and occurs as zoned or simple small bodies. At the intermediate zone the pegmatite shows development of distinct Quartz core and mineralisation of muscovite mica. The pegmatite contains gem quality beryl crystal of transparent variety. Its colour varies from light blue to greenish.	Raghunathpur, Jadipada, Belda, Padmapur, Pradhanpada, Dublapal, Ghatgaon



5	Sand-stone	The youngest group of rocks belonging to the Gondwana group of sediment is found to occur as isolated low hill of typical hunch shape in the eastern part of this Division. The lower group of Gondwana rocks are marked as greenish laminated shale inter bedded with dirty grey sandstone. It contains undecomposed feldspar suggestive of prevalent cold condition during the period of deposition.	Baitarani A, Baitarani B Naibuga, Bardhana, Kandra C, Gandhamardan, Maidankel, Basantapur, Naranpur
6	Shale	The shale corresponded to the needle shale of Talcher. It is the youngest group of rocks belonging to the Gondwana group. It is found in isolated low hills.	Sidhamatha, Baitarani, Thakurani, Jagar
7	Barkar	It is the group of rocks consisting of white to fawn colour feldspathic sandstone and gritty with occasional informational conglomerate beds and shale. The sandstone often contains decomposed feldspar in course angular grains of Quartz. Gradation of medium grained sandstone to pebbly stone through grit is observed at different places, which may be grouped under Barkar.	Benamunda, Golabandha, Ranibeda, Raiguda, Kudbil, Kalapat, Renda, Rekuti
8	Iron-stone	A group of rocks represented by alternate beds of purple red shale and micaceous sandstone occur at places. It corresponds to the upper Gondwana formation.	Karo, Ulliburu, Sidhamatha, Baitarani, Thakurani

1.3.3.1 The geological formations and rock types:

The geological formations and rock types met within the district as per the report prepared by the Geological Survey of India, Bhubaneswar are as follows:

- a) Recent to Quaternary: - Alluvium, Soil, laterite
- b) Kolhan group (1500-1600million years): - sands stones, shales, lime stones and conglomerates
- c) Unconformity
- d) Newer Dolerite
- e) Mayurbhanj Granite (2000-2001 million years)
- f) Ultramafic Intrusives
- g) Dhanjori Groups: - Dhanjori-Similipal Lava (2100 million years), Quartzites and Conglomerates
- h) Singhbhum Granite (2950 million years)
- i) Iron Ore Group: - Upper lava formation Upper phyllite formation
- j) Banded Iron ore formation
- k) Lower phyllite formation
- l) Lower lava formation
- m) Sandstone and Conglomerate

Older Metamorphics Groups (3200 million year):

The rocks of older metamorphics comprising of schistose and gneissose rocks are confined to Champua and Barbil areas. The older metamorphics group (OMG) rocks occupy an area of about 200 Sq. Kms to the west of Champua cut within the Singhbhum granitic batholith. These rocks comprise high-grade metamorphic gneiss and schists i.e. horn blende schists, biotic granite gneiss including tonalite gneiss. This older metamorphic tonalite gneiss (OMTG) is said to be the oldest rock unit of Orissa.

Iron Ore Groups of Rocks:

The most important mineral group i.e., iron ore groups of rocks comprising of tuffites, shales, banded haematite jasper, traps and quartzite immerge subsequently and gave rise to rich and extensive iron and manganese deposit of the district. These groups of rocks were intruded by Singhbhum granite. The Singhbhum granite occupies a vast stretch of land mostly the central portion of the district starting from Rimuli to Kanto and Keonjhar to Turumunga. This granite is made-up of at least twelve magmatic bodies

of biotite-granodiorite-granite emplaced in three closely related phases. These are later intruded by dolerites and ultramafics. In Kasia-Barapada area impure dolomite with stromatolite impressions associated with iron ore groups are also seen containing Ca percentage ranging from 31 to 44 and Mg Percentage from 0.50 to 16.00.

Iron Ore Groups of Rocks Deposits:

Iron ore bands occur in layered BIF bands along with volcano sedimentary rock piles known as Iron Ore Super Group. Usually, four types of ore are seen i.e., hard massive, laminated, lateritic and blue dust. These are used as pig iron, sponge iron, steel, blast furnace, as alloys in cement industry. A total of 3621.251 million tons of iron ore resource of all categories have been assessed with 64-68% Fe in massive, 62-65% Fe in laminated, 65-68 Fe in powdery blue dust type of ore.

The Conglomerate, Shale, Limestone and Sand Stone:

The conglomerate, shale, limestone and sand stone belonging to Kolhans were deposited by the side of Baitarani river in Joda-Banspani area. Widespread weathering, erosion continued and during quaternary period extensive lateritisation was marked on the high lands and soil and alluvium are deposited on the planes. For the purpose of easy description of mineral deposit, the district can be divided into 04 regions.

a) The JodaBarbil plateau extending from Chamakpur to the boarder of Singhbhum of Jharkhand in north and boarder of the Bonai in the west. This region is very largely an extension southward of Singhbhum rocks. This group of rocks comprising trap, tuffites, shale, quartzite, phyllite, banded haematite jasper and banded haematite quartzite form high hill ranges with narrow deep valley in between. In this area massive deposit of iron and manganese are associated with B.H.J. and shales respectively. The iron ores precipitates are in the form of oxide, carbonates, silicates and sulphides. The most characteristics feature of the iron ore i.e. haematite is that it is in the form of massive beds, pockets and large lensoid soil bodies. In this area normally four types of ores are seen i.e. hard massive, Laminated, Lateritoid and Blue dust. Another most characteristic feature of associated manganese ore is its occurrence in form of pocket, lenses in the shales of the iron ore group. It is also seen extensively as residual deposit.

b) Manganese ore deposits are mostly confined to the Singhbhum-Bonai belt of Keonjhar district associated with BIF of Iron ore group. The ore minerals are chiefly pyrolusite and psilomelane. The important manganese deposits of the district are located at Roida, Sidhamatha, Bhadrasahi, Guruda, Joda, Harmath-Guali and Bamebari. The reserve of Manganese ore established so far is 29 million tons. Various grades of Manganese ore contain 25% manganese to dioxide grade.



c) The Bhuyan-JuangPirh areas including Nayagarh reserve forest: -This area of central Keonjhar is known as Bhuyan- Juangpirh, which is famous for quartzite and lava deposits. The quartzites are normally seen on the hilltops extending roughly in north-south direction to west of Keonjhar. The quartzite is underlain by pyrophyllite, which forms economic deposits at some places. This is in turn underlain by weathered Keonjhar granite. At times, on the top of the weathered granite, china clay pockets are available. On the further west, trap and tuffites are seen. White to yellowish lithomarge is also seen associated with traps. Buxites with intercalated laterite cap over metavolcanics on the flat-topped hill of Dholkotapahar near Kuanr, about 30 K.M west of Keonjhar has been reported with reserve of 10 million tons with $Al_2O_3\%$ up to 49. Dolerite dykes and basic intrusive are also seen in this central area. Due to the availability of quartz sericite schist and amphibolite predominantly in this area, better agricultural lands are found in Telkoi and Banspal.

d) *The Kalapat region including Charigarh:* This region contains extensive hill ranges stretching along Angul Division Border to Keonjhar District. Quartzite, Quartz schist, BHJ and phyllite of the rocks of iron ore group are available in this area. Occurrences of gold have been reported in several localities of Telkoi and Banspal block of Keonjhar District. The localities are Saleikena-Siriabahal-Dimirmunda, Kardangi, Podal, Gopur, Gajipur and Kushkala. The above occurrences include both placer and in-situ type. Due to erratic nature of gold concentration, the exploration undertaken by Directorate of Geology and Geological Survey of India have been failed to locate any economic occurrences of gold so far. However, in Gopur area, a 60.00 m. long auriferous lode is delineated with gold concentration ranging from 2.5 to 10 g/ton.

e) The great central plateau from Champua to foothills Santoshpur on the east of Baitarani River. This region which stretches from south of Champua up to Anandapur Sub-Division is dominantly covered by granites. The granites are of different textures. They are usually coarse and porphyritic. Medium to fine grained granite exposures are also seen. They are normally gneissic in structure and are felspathic. At Tarinipokhari and in some places china clay pockets are also seen. These clay pockets are derived from granites by chemical weathering. These rocks are traversed profusely by dolerite dykes mostly along the joint planes of granites. Such types of dykes are found near Palaspanga extending for miles along northeast-Southwest direction. It is evident from road cuttings. Soils derived from granite are not suitable for agricultural purpose. The massive forests of Atai, Kalapat and Barabank are situated in this region are mainly unfertile. Occurrences of dimension stone have been reported around Dimbo and Baliaguda village near Keonjhar Town.

Minerals:

The area under this division has been visited from time to time since 1943-44 by several geologists of the Geological Survey of India and the State Directorate of Mines for



investigation of minerals. The important Minerals noticed in this tract along with their description and distribution has been discussed in brief in **Table No. 1.14**

Table No. 1.14 Description of minerals			
Sl. No	Name of Minerals	Description	Name of blocks
1	Graphite	Crystalline flaky Graphite is sparsely disseminated as streaks and lenticels along the foliation of the gneiss. The gneissic rock is superficially almost rotten and crumbling. Separation of the Graphite from the associated components of the gneiss is not very difficult. The local concentration of Graphite has been noticed in limited places. The percentage of Graphite is nowhere high enough for the occurrence to be commercially exploited.	Nayagr, Raghunathpur, Nalpanga, Jadipada, Bayakumutia, Lunaghar I, Raiguda
2	White Clay	The result of disintegration and decomposition of the feldspathic elements of the Gondwana formation developed White Clay. The development of this White Clay on the top of the Gondwana grits has been noticed in different Nalla of this tract. These minerals have considerably developed in an elevated area between two tributaries.	Jadipada, Belda, Pipilia, Pedipokhari, Baunsuli, Bila A, Chemena A
3	Iron-ore	The gritty formation in the Gondwana system often shows fairly rich hematite and limonitic materials in them. The accumulation of ferruginous materials is also very common in this zone. In the past, the local smelters used the ferruginous concentration in their charcoal furnaces worked for extraction of pig iron. This is evidenced by the huge accumulation of slag in many villages of this area.	Karo, Uliburu, Sidhamatha, Baitarani, Thakurani, Raikala, Sarupat, Tangrani
4	Mica	The pegmatite is composed of muscovite transparent Quartz and plagioclase feldspar. Muscovite bearing pegmatite dykes have been found intrusive into the garnetiferous gneissic formation. Mica bearing pegmatite of cream colours is fairly numerous in rocky tracts. The materials as judged from the surface indication are not of commercial important.	Gonasika, Danla, Champei, Jotipur, Suakathi-I, Gadgadei,



5	Rock crystal	Coarsely crystallized Quartz occurring in a highly fractured Quartz dyke has been seen in this zone. The crystals aggregate occurs as nest crowding the cracks and crevices of the dyke. The crystals attain a considerable size but they are not perfect for manufacturing.	Sidhamatha, Suakathi II, Kandara-A, Kandara- B, Kalimati, kalikaprasad, Nalpanga
6	Manganese	It resembles iron in its behaviour and usually occurs as an oxide. Its availability is reduced by bad drainage and organic matter content and deficiency may occur in soil, which are rich in organic matter or bad drained and with a high-water table or are calcareous in nature. Oxidizing bacteria also render it unavailable to plant.	Kandra -C, Karo, Mundala, Kanjipani, Jagar, Uliburu

1.3.4 Soil:

The soil type of the district is dominated by Mixed Grey Soil (Inceptisols), Unaltered Soils with Coarse Parent Materials (Entisols), Matured, Red & Lateritic Soil (Alfisols).

Classification:

As per the latest classification, the soil of the district belongs to two major categories i.e. Alfisol and Vertisol. In soil formation process, the climate plays a very vital role. But deviations are noticed in hilly areas where the topsoil is subjected to shift as they are immature and have formed no stable profile although the rocks from which they are derived may be exceedingly ancient. A limited area, under this plan, possessing more or less uniform climatic condition with hilly country has immature soil, and the parent rock continues its influence. The soil in consequence retains some of their original lithological characteristics. The soil can be classified under the rocks from which they are derived. The different types of soil noticed in this tract have been discussed in **Table 1.15**.



Table No. 1.15 :Analysis of soil

Sl. No	Name of soil	Description and Analysis of Soil	Distribution into blocks	Suitable to trees
1	Black	This is derived from the alteration of Basaltic rock (Igneous Volcanic), Deccan Trap, Dharwar Schists, Lime Stone and Granites. It is predominately seen at number of places as patchy occurrences. This is heavy and clayey in nature during rainy season but pronounced cracks appear on the surface during dry months. It is neutral to alkaline, poor in nitrogen and phosphorus but rich in potash and lime content. PH varies from 7.4 to 7.7. The depth of the soil extends up to 122 cm.	Belda, Nalpanga, Sarupat, Nelung, Padmapur, Patna, Poipani, Pipilia, Kalimati	Babul, Palas, Ashan, Gohira, Teak, Khair
2	Saline alkaline	The soil derived from Khondalite rocks of the Eastern ghat group and the Quartzites of the Dharwar group are coarse and sandy. It contains more silica and has less moisture retaining capacity. The soil is poor in nutrients and all alkaline in nature. The PH value varies from 9.1 to 9.5. It extends up to a depth of 75 cm.	Sidhamatha, Suakatil, Kandra A, Gonasika, Danla, Champei, Jyotipur	Khair, Neem, Sisoo, Karanja, Jamun
3	Brown	The soil originated from Charnockite, Khondalite, Granite and Pegmatite is greyish to reddish in colour. It is plastic in nature and has good water holding capacity. This type of soil is very fertile and support luxuriant growth of vegetation. The PH value varies from 4.0 to 5.8. The depth varies upto 183 cm.	Jadipada, Belda, Padmapur, Dublapal, Ghatgaon, Champei, Raiguda, Ukhunda	Sal, Bija, Sisoo, Asan, Harida, Bahada
4	Lateritic	The Talcher formation contains mostly Shale and Sandstone, which are easily weathered and soil originated from them impart a clayey loam texture. Due to presence of clay, the water retaining power of loamy sandy soils are quite good. The PH value varies from 5.2 to 5.9.	Karo, Sidhamatha, Ulibur, Kandra C, Mooney, Pedipokhari, Bardhana	Sal, Asan, Neem, Bela, Gambhari



5	Reddish	It is mainly associated with acidic granites, gneisses and schist. These are typically coarse, often with ferric concentration, neutral or acidic reaction, poor in mineral nutrients and organic matter. This type of soil exercises great influence on vegetation and usually carries miscellaneous species. It has medium water holding capacity. The PH varies from 4.9 to 7.2. The depth is up to 165 cm.	Poipani, Pradhanpada, Purunapani, Nalpanga, Ghatgaon, Mansinabila, Naranpur	Sal, Bija, Asan, Dhaura, Sisoo
6	Sandy & Gritty	Sandy or gritty soil in the hilly forest areas are produced moderately from the granite rocks. The clay fraction is derived from the decomposition of felspar. It usually flashed down into the lower ground to enrich the agricultural land. The Clay particles are generally carried down by percolating water into variable depths in the soil where the slope is gentle leaving the sandy layer on and very nearer to the surface. Such type of soil constitutes loams or clay loams, which are very favourable to the growth of forest species as seen in many forest areas. The soils derived from granite from hilly areas or from rocks with high percentage of quartzite are capable of supporting inferior forest areas as seen in Atai and Ghatagoan area. The top drying of Sal trees is mainly due to the presence of gritty soil derived from granite rocks.	Atei, Barabanka, Balipokhari, Belaposi. Baunsuli, Barbil, Rasapada, Belda, Raikala, Tangrani	Sal, Bija, Sisoo, Asan, Harida, Bahada



7	Loamy Soil	The phyllites and schists are generally converted to good loamy forest soils in the valleys and usually support forests where the rocks are basic in character. The quartzites and quartz schists are very impenetrable to weathering which are commonly seen in Kalapat hills and in JuangPirha area. Due to this factor, the slopes in this area are commonly devoid of soil and hence lack vegetation. But in the valleys where the soil is able to accumulate, good loams and sandy loam soils are seen and are favourable to sal. But most of the valleys in this area are steep and narrow. However, such type of soil available for sal forest is limited. Where sufficient moisture is not available on the slopes, the shallow quartzite soil supports dry mixed forest with predominance of Bheru, a common small tree.	Sikeswari, Kalapat, Benamunda, Jharbeda, Tamanga, Ranibeda, Godhihudi, Amuni	Bheru, Neem, Bela, Khair, Sal, Jamu
8	Calcareous	Calcareous soils are of common occurrence in the form of calcareous clays with kankar nodules. These are associated with the granites and give rise to eroded ravine lands.	Nelung, Padmapur, Patna, Poipani, Pipilia, Kalimati	Bheru, Swam, Gohira, Khaira, Panasi grasses

Source - Deputy Director Mines and Outgoing Plan

1.3.4.1 Soil Texture:

The relative proportion of the various size groups of individual soil particles are referred to as soil separation. Depending on the size of the particles of the soil, it can be grouped as given in **Table No. 1.16**.

Table No. 1.16 Soil group		
Sl. No.	Name of Soil Group	Size of Particles in mm
1	Clay	< 0.002
2	Silt	0.002 to < 0.02
3	Fine Sand	0.02 to < 0.2
4	Coarse Sand	0.2 to < 2.0
5	Gravel	2.0 and above

1.3.4.2 Soil Classes:

Soil is being a dynamic weathered layer of the Earth's crust and its composition varies in different soil classes. The percentage limits of mixture in the different soil classes found in this zone of vegetation have been displayed in **Table No. 1.17**.

**Table No. 1.17 Soil class and its mixture**

Sl. No.	Soil class	% Limits of mixture			Remarks
		Sand	Silt	Clay	
1	Clay	< 10	< 50	> 30	Homogeneous to feel with finger; very sticky and plastic when wet; can be made into ring; compact and hard when dry. This is grouped under Heavy Soil.
2	Sandy	> 85	< 15	< 15	This is grouped under Light Soil.
3	Sandy loam	50-80	20-25	20-25	Heterogeneous to feel; slightly plastic when wet; can be made into thread with difficult. This is grouped under Light Soil.
4	Loamy sand	80-85	15-20	15-20	Sandy to touch; cannot be made into thread. This can be grouped under Medium Soil.
5	Silt Loam	< 50	> 50	< 20	Contain hydrated iron and aluminium oxide; having a cellular structure.
6	Silt Clay	<20	50-70	30-50	It contains mostly the residue of organic materials. It is not plastic in nature. It has good water retaining capacity.
7	Sandy Clay	50-70	<20	30-50	The soil originating from some of the Khondalitic rocks of the Eastern Ghat Group are sandy clay. It has medium water retaining capacity.
8	Clayey Loam	20-50	20-50	20-30	Contain shale and sandstones, the water retaining capacity are quite good.
9	Loam	30-50	30-50	< 20	Not homogeneous to feel with finger; Plastic when wet; does not make long thread and cannot be made into rings.

1.3.4.3 pH Value:

The acidity and alkalinity of a soil solution is due to an excess of hydrogen ions (H⁺) and hydroxyl ions (OH⁻) respectively. Pure water is being the neutral body, when it percolates through soil it dissolves salts immediately and forms a very dilute solution. The extremely low concentration of ions is expressed by PH value. If the negative logarithm of the reciprocal of H⁺ ion concentration is 7 then it is called neutrality, higher values indicate alkalinity and lower values acidity. PH value does not remain constant and it has a profound influence on the distribution and growth of vegetation.

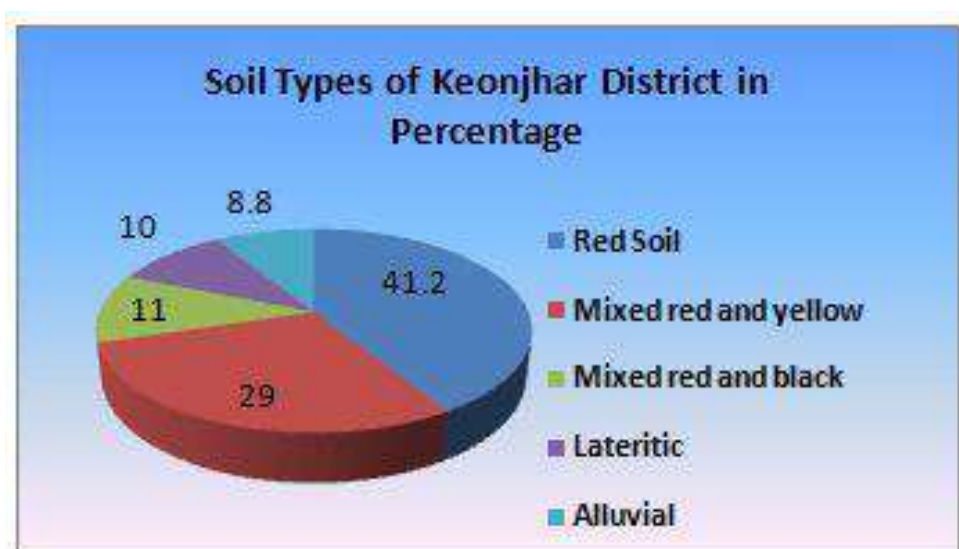
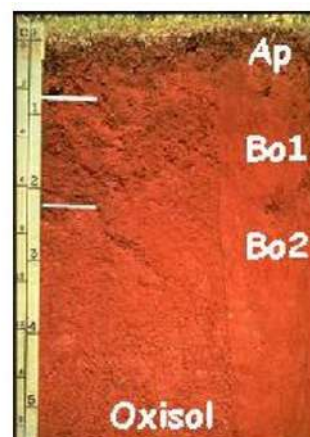
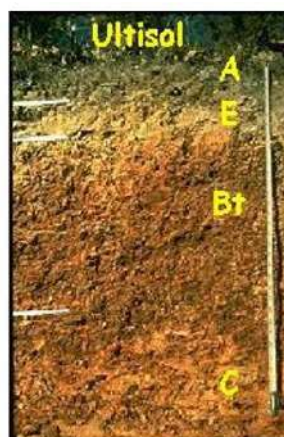
1.3.5 Soil Classification.

Soil Types: The distribution of different soil types in the district depends much on its physiographic and lithologic variations. The soil types in Keonjhar district can be broadly divided into two major groups namely Alfisols and Utisols.

Alfisols : These soils predominantly occur in Harichandanpur, Hatadhi, Ghasipura, Anandpur, Ghatgaon, Telkoi blocks. This group of soil can be sub divided into Sandy soil, red loamy soil, red gravelly soil and older alluvial soil. These soils are light textured usually devoid of lime concretions, nitrogen, phosphate and organic matter. The pH value varies from 6.5 to 7.3.



Ultisols: These soils predominantly occur in Champua, Patna, Jhumpura, Keonjhar and Sharpada blocks. Essentially these are lateritic, red and yellow soil and red gravelly soil. These soils are poor in nitrogen, phosphate, potassium and organic matter. The pH value varies between 4.5 to 6.0.





1.4 Climatic Parameters

1.4.1 Climate: The typical micro-climate of the Keonjhar District is suitable for the re-generation and multiplication of wildlife. The average weather condition prevalent in this Division depend on solar radiation (Light, Heat and Temperature), Moisture and Wind. The climatic conditions for the year have been discussed in Table 1.18.

Table No. 1.18 Climatic condition of the locality			
Sl. No	Climatic condition	Month	Descriptions
1	Summer	March to June	The summer season is more pronounced from mid-March to nearly end of June. The highest temperature is felt in the month of May-June. The highest temperature goes up to 42.8°C. Occasionally showers with thunderstorms and hailstone are a commonly experienced.
2	Rain	July to September	Uniform precipitation occurs mainly during June to September. But rain starts from 15th June. Practically there is no rain from December to January. Occasional shower occurs during February and March. It has been observed that unusual heavy torrential rainfall occurs during this period causing floods in the river systems of this division.
3	Post Monsoon	October to Nov.	Medium to heavy shower occurs in places, which impart an important role for the vegetation.
4	Winter	December to Feb.	Practically cold season starts from mid-November and lasts till the end of February. But in the higher altitudes cold winter is felt till the middle of March. The continuity of dense vegetation imparts a distinct cold for a longer period.
5	Spring	February to March	The spring season is experienced for a short period from late February to late March when it is neither too cold nor too hot. The days are warm but the nights are cool. The leaf shedding of all the deciduous trees at the initial days of this period make the forests open but subsequently filled with new leaves. The fire hazard in the forest reaches its peak during this period. Podu cultivation and collection of Mahua flowers during this season cause heavy fire incidence. After this phenomenon tender leaves found prevalent all over the division giving colourful look to the forests.

1.4.1 Rainfall:

The South-West monsoon usually set in this division towards middle of June and continues till end of September and occasionally in some years up to middle of October. Heavy and continuous rainfall is also experienced during this season and high flood is noticed in the river Baitarani. The relative humidity is very high in this season and the



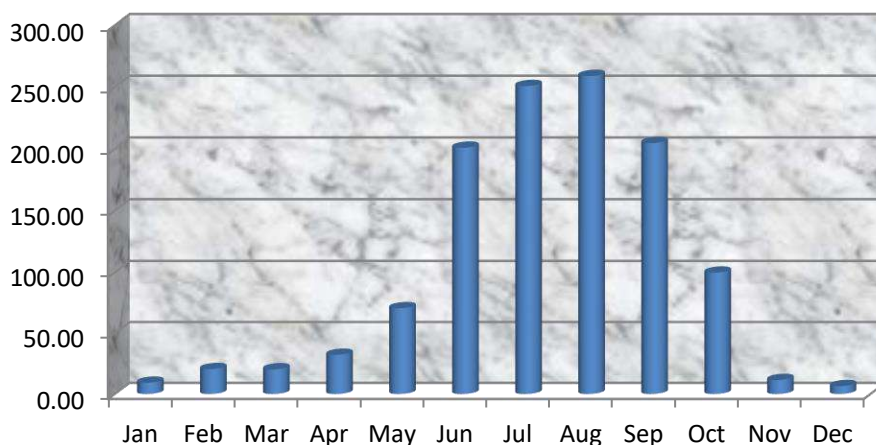
sky remains heavily clouded for most of the time. In Keonjhar district out of average 107 rainy days of the season, hardly 70 days are actually rainy days. The rainfall data of Keonjhar District from the year 2005-2020 is given in **Table No. 1.19**.

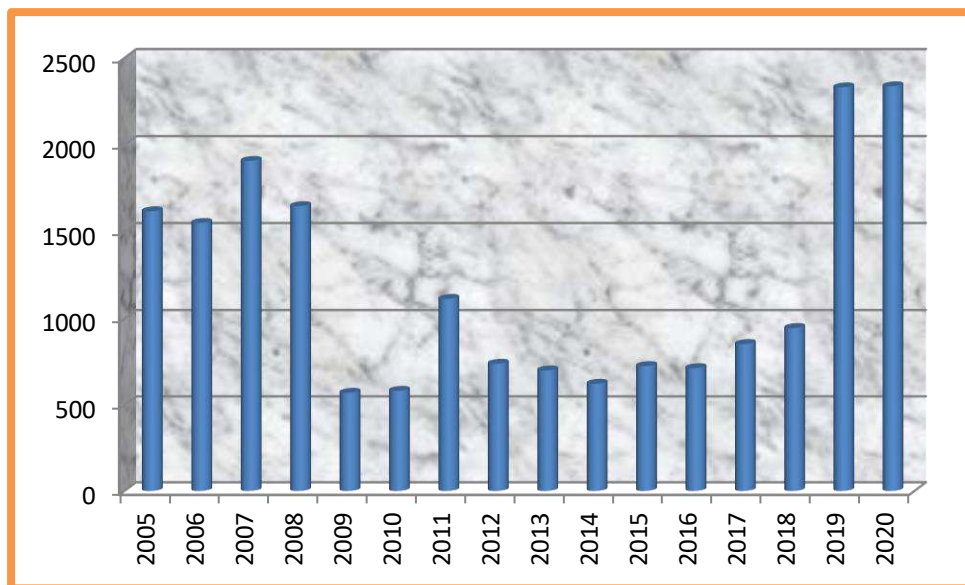
Table No. 1.19: Average relative Rainfall of Keonjhar from 2005-2020 (in mm)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2005	15.0	1.5	25.9	39.7	88.7	342.0	443.9	157.0	249.3	252.3	0.4	2.9	1618.6
2006	0.0	0.0	10.2	28.7	161.9	188.2	300.9	510.1	282.6	43.0	25.6	0.0	1551.2
2007	1.8	81.8	15.0	40.2	87.7	270.2	444.3	469.4	419.4	19.5	58.4	0.0	1907.7
2008	60.3	0.6	2.8	23.9	70.1	545.4	332.4	268.0	332.7	10.1	1.5	0.0	1647.8
2009	0.26	0.00	0.20	0.38	38.32	38.12	172.48	152.79	100.70	31.26	36.90	0.46	571.9
2010	1.79	0.89	0.38	0.65	36.95	78.66	108.25	141.17	76.50	100.81	19.02	18.00	583.1
2011	0.13	18.72	13.10	74.48	47.20	211.03	109.05	256.81	294.81	88.69	0.48	0.25	1114.8
2012	23.29	5.37	3.27	14.01	19.92	124.96	273.68	112.12	110.66	28.10	14.47	10.97	740.8
2013	1.57	5.12	2.91	20.15	35.05	90.36	102.63	184.37	108.34	151.58	0.22	0.00	702.3
2014	0.77	16.33	20.30	7.59	36.68	88.34	127.81	135.88	116.94	67.53	4.65	1.69	624.5
2015	10.04	1.11	12.80	45.04	40.23	147.59	196.69	159.12	71.51	25.54	0.68	16.85	727.2
2016	1.10	22.77	13.86	10.13	53.89	125.38	150.38	135.55	149.05	46.23	7.09	0.00	715.4
2017	1.39	0.01	25.17	4.25	19.52	184.84	139.31	135.17	225.35	108.25	7.63	4.23	855.1
2018	0.00	0.06	7.69	30.39	68.69	143.75	238.29	166.29	196.49	48.43	6.91	40.32	947.3
2019	14.10	109.70	80.60	40.70	229.50	179.00	373.20	613.90	253.50	426.80	0.60	9.00	2330.6
2020	17.40	64.20	91.20	135.60	94.00	456.00	499.70	545.60	286.40	147.00	NA	NA	2337.1
Ave.	9.31	20.51	20.34	32.24	70.52	200.86	250.81	258.95	204.64	99.70	11.53	6.54	1185.96

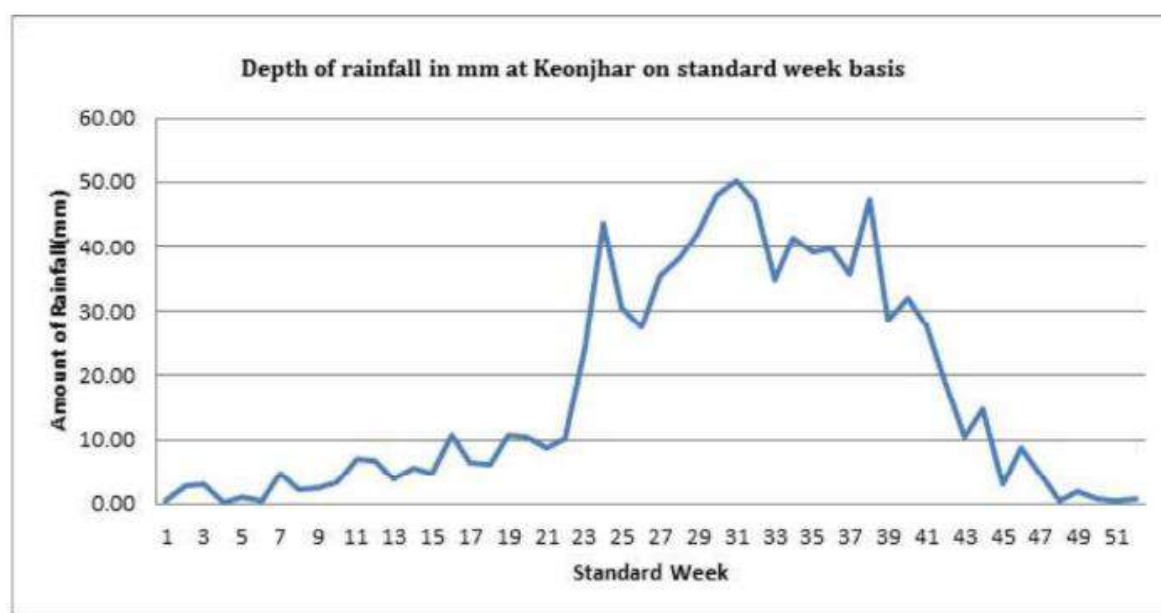
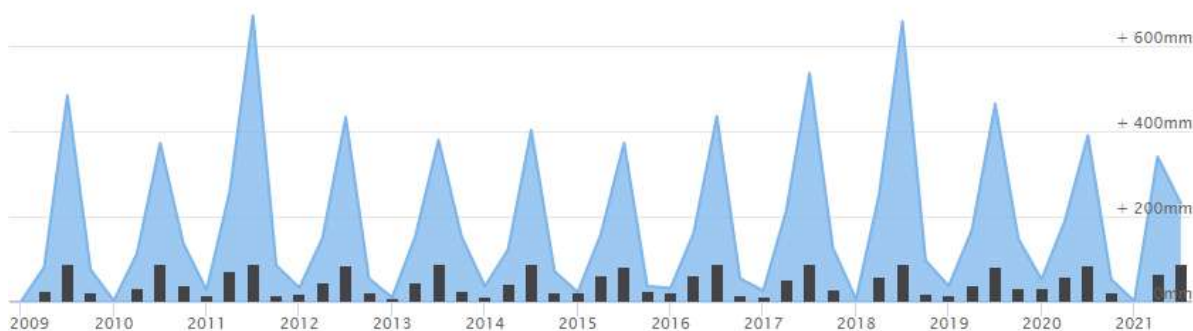
Source: - Directorate of Economics and Statistics, Odisha, Bhubaneswar

Rainfall in mm



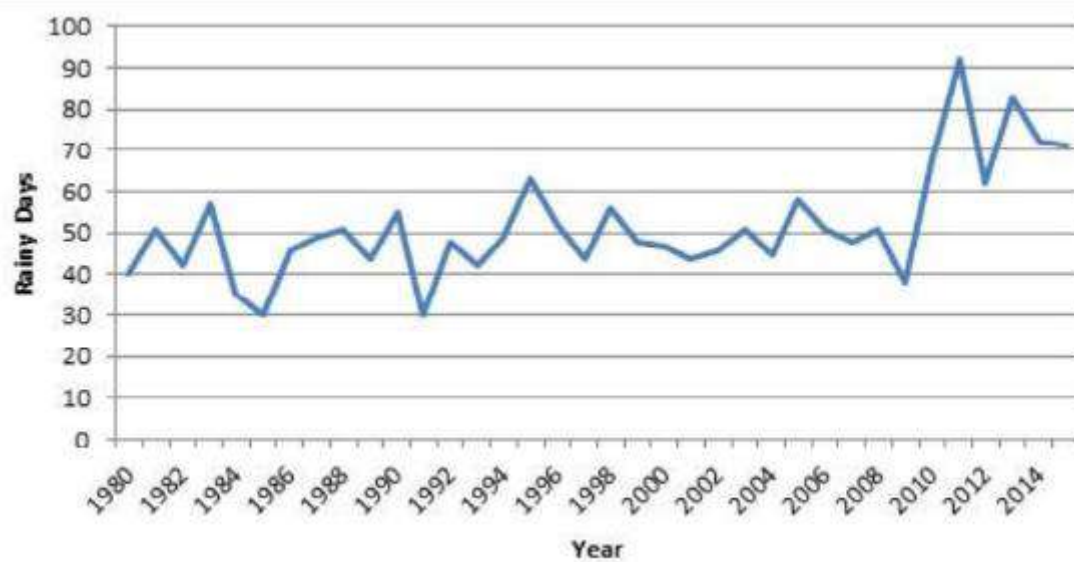
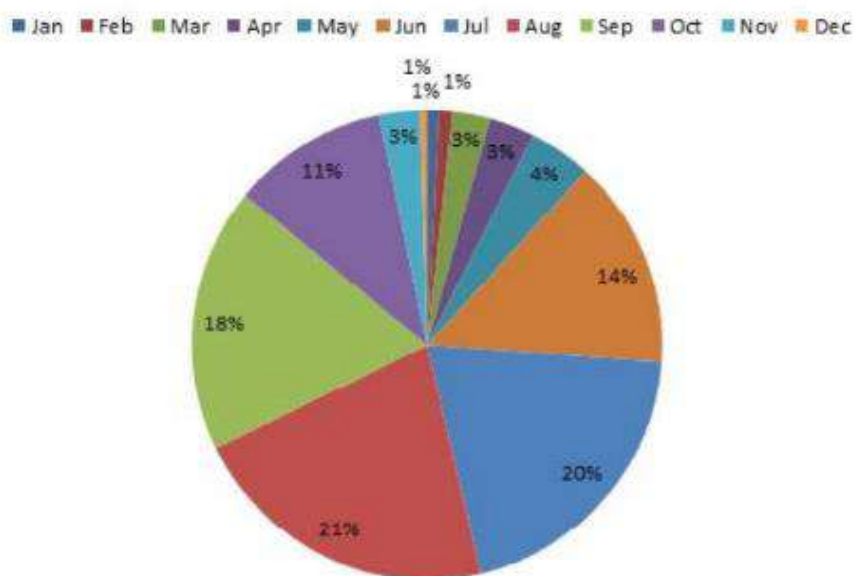


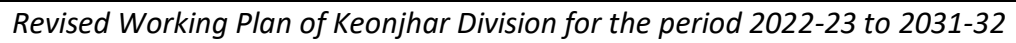
The average rainfall in Keonjhar district is about 1200mm in normal years.

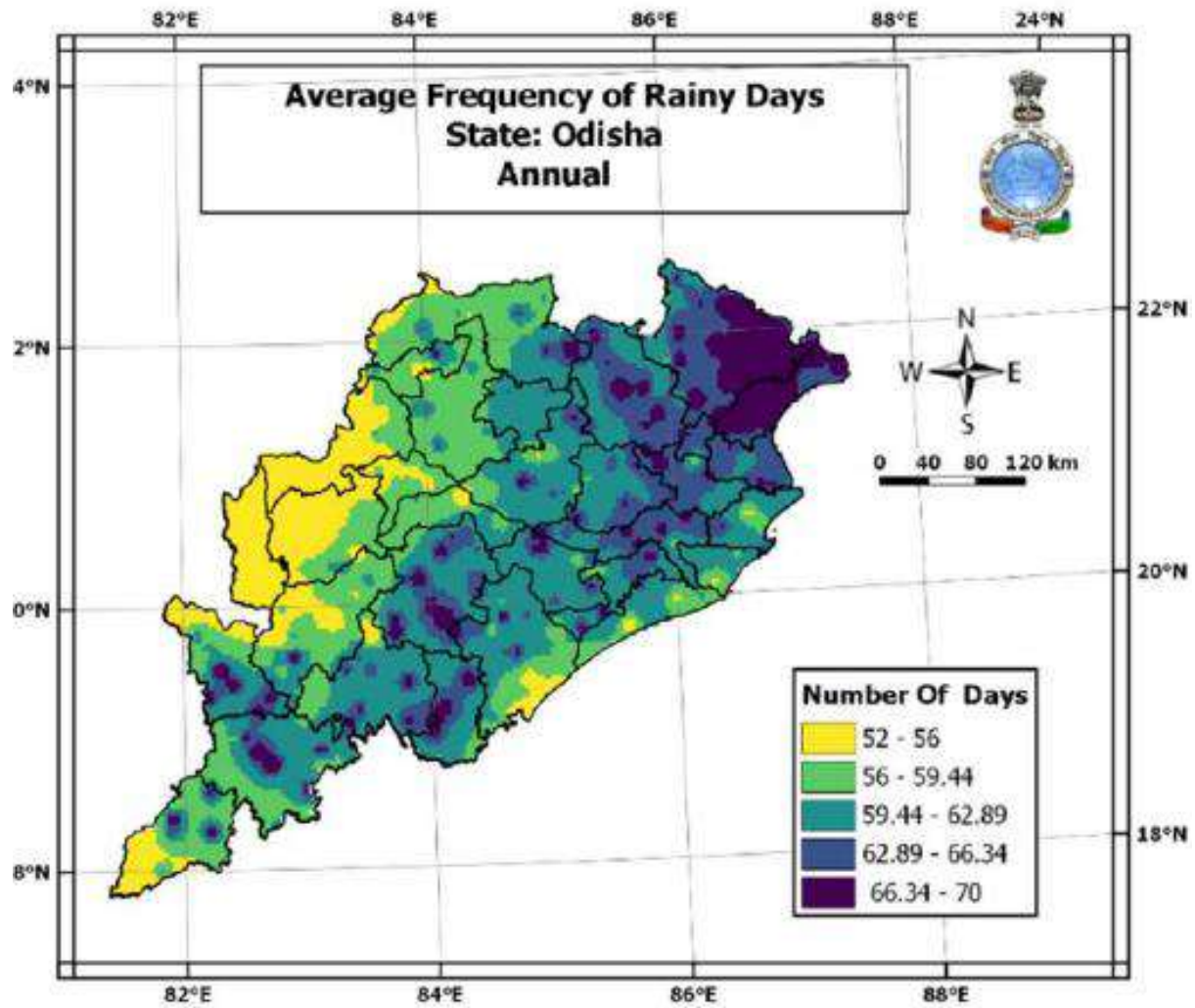


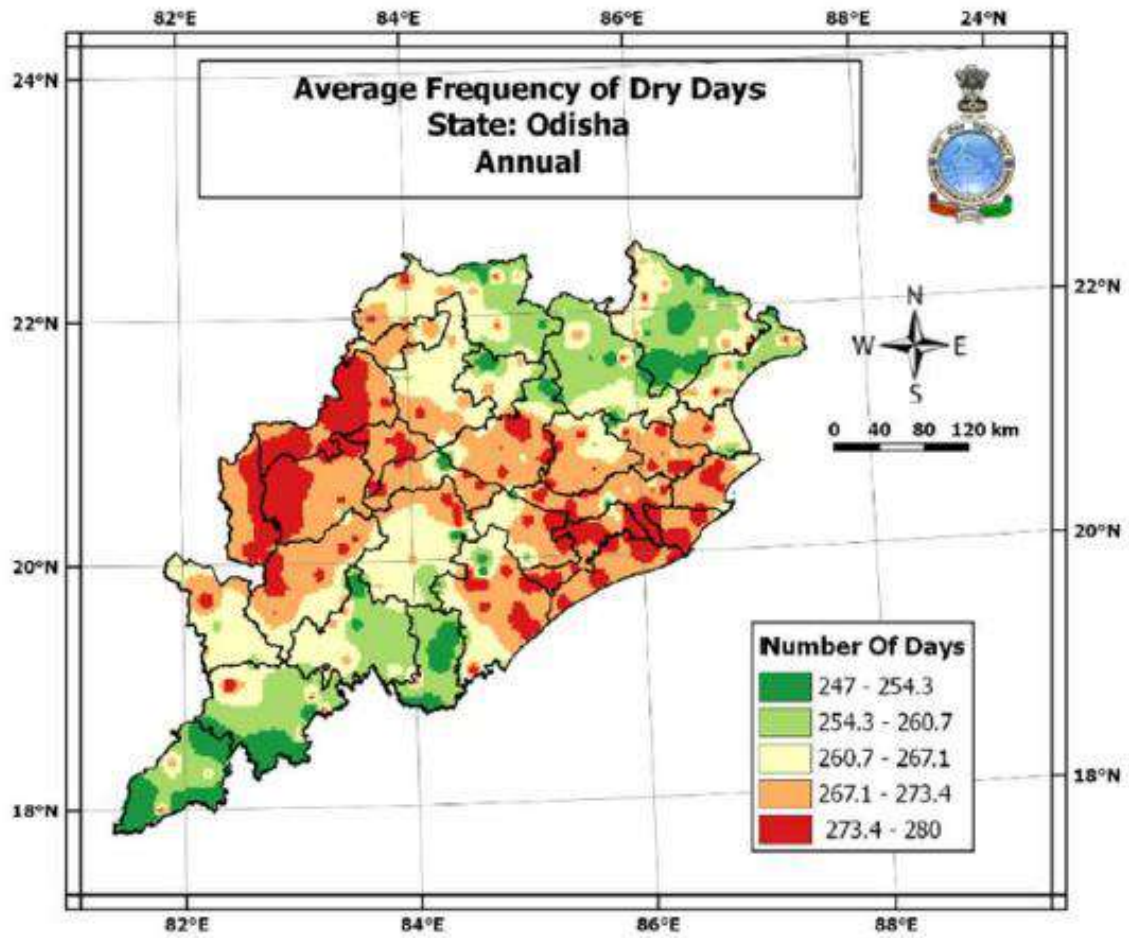


Monthly distribution of Rainfall(mm)



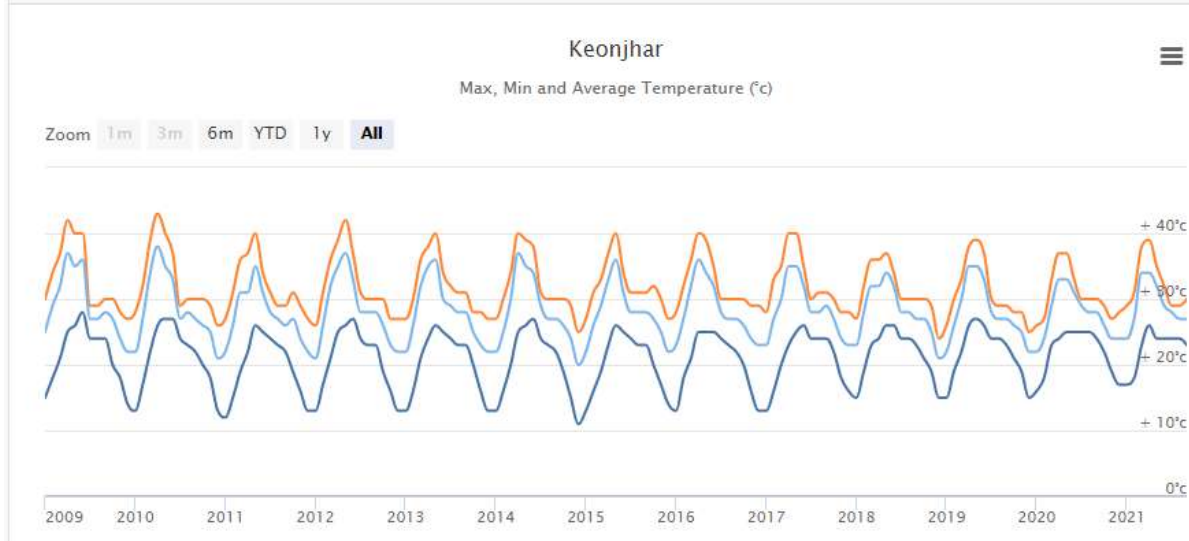




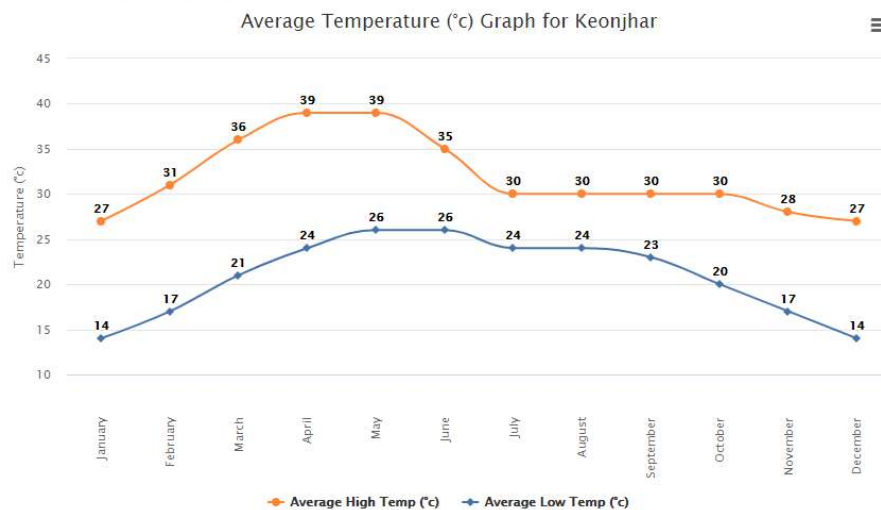




Max, Min and Average Temperature



Monthly Average Temperature



1.4.2 DrainageSystem:

The configuration of Keonjhar district is such that a major portion of land (about 70 %) is sloping towards North and East. About 75% of water is drained out by the river Baitarani. The river Baitarani originates from Gonasika (Guptaganga) Hills near Gonasika of JuangaPirh and flows in a tortuous course and flows as a hill stream up to ChamakpurnearJoda. Then it takes a U turn towards Champua the sub-divisional headquarter of Keonjhar district. At Champua it again turns southwardly and makes the natural boundary line between Keonjhar and Mayurbhanj districts for a distance of about 55.00 K.M. and then again enters in to Keonjhar district. The width of the river increases rapidly and flows down southward forming the boundary of Atai Reserved Forests. The characteristic feature of river Baitarani is observed at Bhimkund, the entry



point at Atai RF where it forms a very big gorge of about 50.00 mt. to 60.00 mt. width and extends up to about 7.00 Km towards south. High flood in river Baitarani causes havoc starting from the boundary in Keonjhar Wildlife Division, Anandapur. It finally leaves Keonjhar Division and enters into Anandapur Wildlife Division.

The south-west portion of Keonjhar District consists of Kaliahata and Charigarh plains. The drainage from this area is mainly through two important rivers i.e. the Ramial and the Samakoi, which are the tributaries of the river Brahmani. The Ramial River originates from the hill ranges of Kalapat Reserve Forest at the north of Kaliahata. It covers around 20 km in Keonjhar Division and enters into Angul Division near Kandhara and finally drains out its water to river Brahmani at Bhuban. The river Samakoi originates from the core of Kalapat Reserve Forests and flows west towards Telkoi with a zigzag course. At Dubulapal, it takes a southerly turn and forms the boundary between Keonjhar Division and Deogarh (T) Division. Finally, it meets the river Brahmani in between Pabitr Nagar and Gaham village of Angul Division.

One of the most important rivers of Odisha is the Salandi, which originates from the hills of Similipal of Mayurbhanj District and enters into Keonjhar District at Satbedi.

A very small portion of the district, situated in the extreme northwest corner and constituting Barbil valleys is drained by Karo River. This river starts in the hills at the back of Koirā in Bonai forest division and flows in a northerly direction towards Gua (Singhbhum) to join river Koel. It finally forms the river Bramhani with river Sankha at Panposh. Its course within Keonjhar district is almost parallel to the interstate boundary between Orissa and Jharkhand.

The major river Baitarani is perennial throughout its course but the flow of water becomes very less in its lower portion during the hot summer months. Most of the hill streams originating in Champua and Barbil areas maintain a continuous flow throughout the year mainly due to the presence of dense vegetative cover and large plateau of laterite soil. The other streams of tributaries contribute flow of water during the summer season to main river Baitarani. The other two important rivers i.e., Ramial and Samakoi dry up much before the arrival of the summer.



1.4.3



**Temperature:**

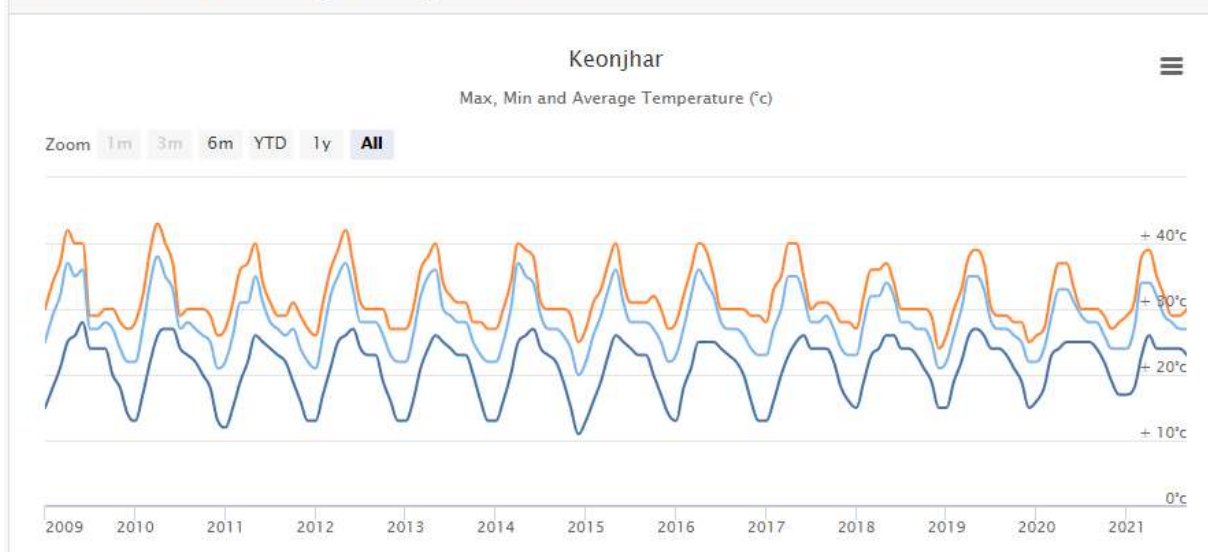
January is the coldest month of the year with the minimum temperature of 5.7⁰Celsius as recorded during the year 2000 and maximum temperature of 42.8⁰ Celsius as recorded during the year 1999. April and May are the hottest months with the maximum temperature going up to of 43.2⁰ Celsius as recorded during the year 1998. The month wise minimum and maximum temperature of this division from 2010 to 2020 are given below

Table No 1.20 Max- Min- Temperture of the district (Month wise)													
Year	Min/max	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011	Min	10.0	13.0	18.0	21.0	25.0	25.0	23.0	23.0	22.0	18.0	13.0	11.0
	Max	26.0	30.0	35.0	36.0	39.0	33.0	31.0	29.0	28.0	30.0	28.0	25.0
	Avg	16.0	20.0	26.0	27.0	31.0	29.0	26.0	25.0	25.0	23.0	19.0	17.0
2012	Min	12.0	15.0	18.0	23.0	25.0	26.0	24.0	23.0	22.0	18.0	15.0	11.0
	Max	25.0	30.0	35.0	38.0	41.0	37.0	30.0	30.0	30.0	29.0	29.0	26.0
	Avg	17.0	22.0	26.0	31.0	32.0	31.0	27.0	26.0	25.0	22.0	19.0	17.0
2013	Min	11.0	15.0	19.0	23.0	25.0	24.0	24.0	23.0	22.0	20.0	14.0	11.0
	Max	26.0	29.0	35.0	37.0	40.0	33.0	31.0	30.0	30.0	27.0	27.0	25.0
	Avg	17.0	21.0	27.0	30.0	32.0	28.0	27.0	26.0	26.0	23.0	19.0	17.0
2014	Min	12.0	14.0	19.0	23.0	25.0	26.0	24.0	23.0	22.0	18.0	14.0	11.0
	Max	26.0	29.0	33.0	39.0	38.0	37.0	31.0	30.0	30.0	29.0	28.0	25.0
	Avg	18.0	21.0	26.0	31.0	31.0	31.0	27.0	26.0	25.0	23.0	20.0	17.0
2015	Min	11.0	13.0	18.0	22.0	25.0	25.0	24.0	23.0	22.0	19.0	15.0	13.0
	Max	25.0	30.0	33.0	36.0	39.0	34.0	30.0	30.0	31.0	31.0	29.0	26.0
	Avg	17.0	21.0	25.0	29.0	31.0	29.0	26.0	26.0	26.0	24.0	21.0	19.0
2016	Min	11.0	17.0	20.0	24.0	25.0	25.0	23.0	23.0	22.0	19.0	14.0	11.0
	Max	37.0	31.0	35.0	40.0	38.0	34.0	29.0	29.0	29.0	29.0	27.0	27.0
	Avg	18.0	23.0	27.0	31.0	31.0	29.0	26.0	26.0	25.0	23.0	19.0	17.0
2017	Min	11.0	13.0	18.0	22.0	25.0	25.0	24.0	24.0	24.0	21.0	17.0	14.0
	Max	27.0	31.0	34.0	39.0	39.0	34.0	30.0	30.0	30.0	29.0	26.0	25.0
	Avg	18.0	21.0	25.0	30.0	31.0	29.0	26.0	26.0	27.0	24.0	21.0	19.0



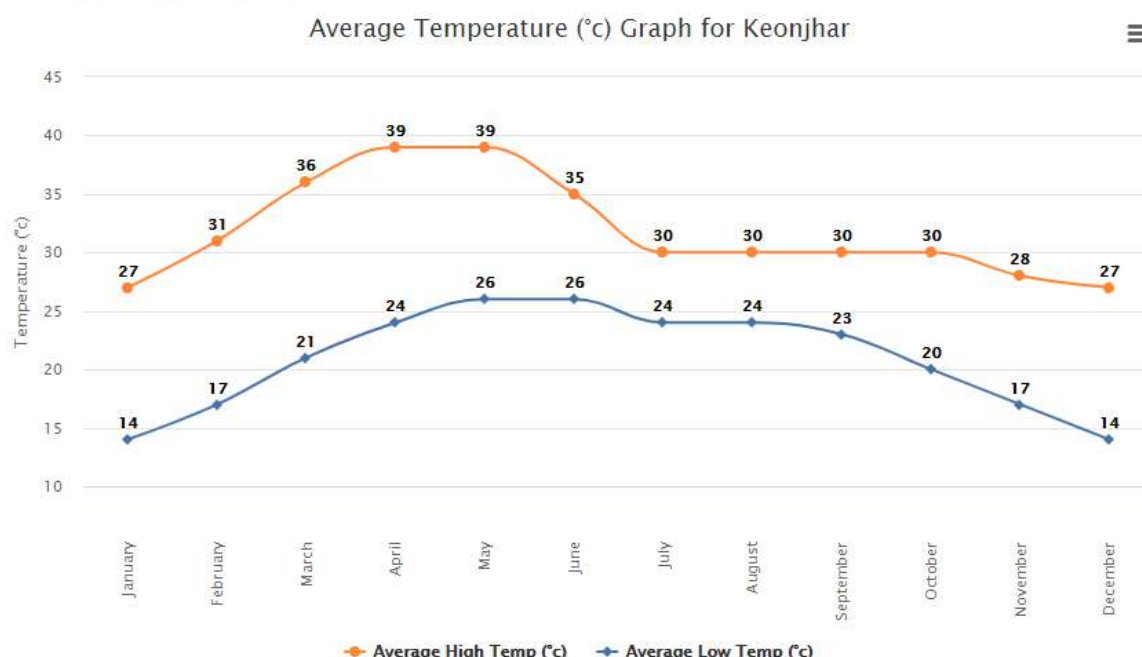
2018	Min	12.0	17.0	21.0	23.0	25.0	25.0	24.0	23.0	23.0	21.0	19.0	15.0
	Max	25.0	31.0	34.0	37.0	37.0	33.0	30.0	29.0	29.0	29.0	28.0	24.0
	Avg	18.0	23.0	27.0	30.0	30.0	29.0	27.0	26.0	26.0	26.0	25.0	20.0
2019	Min	16.0	19.0	22.0	26.0	27.0	26.0	24.0	24.0	22.0	21.0	18.0	16.0
	Max	26.0	30.0	33.0	38.0	39.0	37.0	31.0	29.0	28.0	28.0	28.0	25.0
	Avg	22.0	25.0	29.0	34.0	35.0	33.0	28.0	27.0	26.0	25.0	24.0	21.0
2020	Min	16.0	17.0	22.0	24.0	24.0	25.0	25.0	24.0	24.0	22.0	NA	NA
	Max	26.0	27.0	32.0	37.0	38.0	33.0	31.0	30.0	31.0	29.0	NA	NA
	Avg	21.0	23.0	28.0	33.0	33.0	30.0	28.0	28.0	28.0	26.0	NA	NA

Max, Min and Average Temperature





Monthly Average Temperature



1.4.3 Relative Humidity:

The volume of air contains maximum amount of water during the month of August and minimum during the month of April. In general, minimum humidity is observed from the month of March to May and maximum from the month of July to October. The month wise relative humidity of this area has been displayed in **below**

Table No 1.21 Relative Humidity at Keonjhar (Month Wise)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2005	71	53	48.5	40.5	48.5	57.5	83	80.5	84.5	86.5	64	60.5
2006	54.5	39.5	46.5	43	64.5	72.5	83.5	87	86	72	72.5	59.5
2007	59	62	53.5	46.5	61.5	75.5	83	85	88.5	68.5	70.5	61
2008	61.5	56.5	49.5	46.5	49	82.5	82.5	86	85.5	73	67	67
2009	56	44	34	34	55	49	91	91	81	75	78	66
2010	54	43	37	39	54	64	91	90	89	85	80	68
2011	54	51	43	58	55	72	82	89	89	76	67	61
2012	64	46	32	43	49	61	84	87	85	72	66	58
2013	55	44	31	39	55	74	82	84	84	88	70	62
2014	57	50	41	33	50	61	80	84	83	78	60	53
2015	58	45	45	49	51	70	82	81	77	67	62	63
2016	54	57	47	41	54	69	85	86	88	74	64	59
2017	53	44	43	49	56	70	82	81	80	76	63	53
2018	39	35	33	48	59	66	82	85	82	66	64	59
2019	48	47	49	43	51	62	78	85	86	83	64	59
2020	55	51	50	44	55	72	80	84	81	78	NA	NA



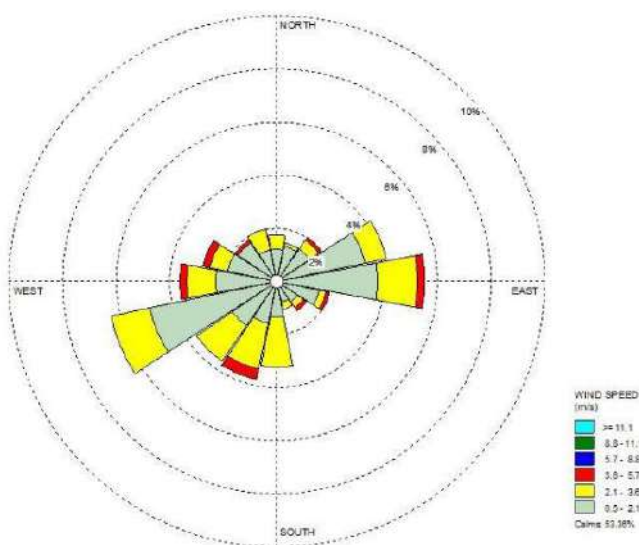
1.4.4 Wind:

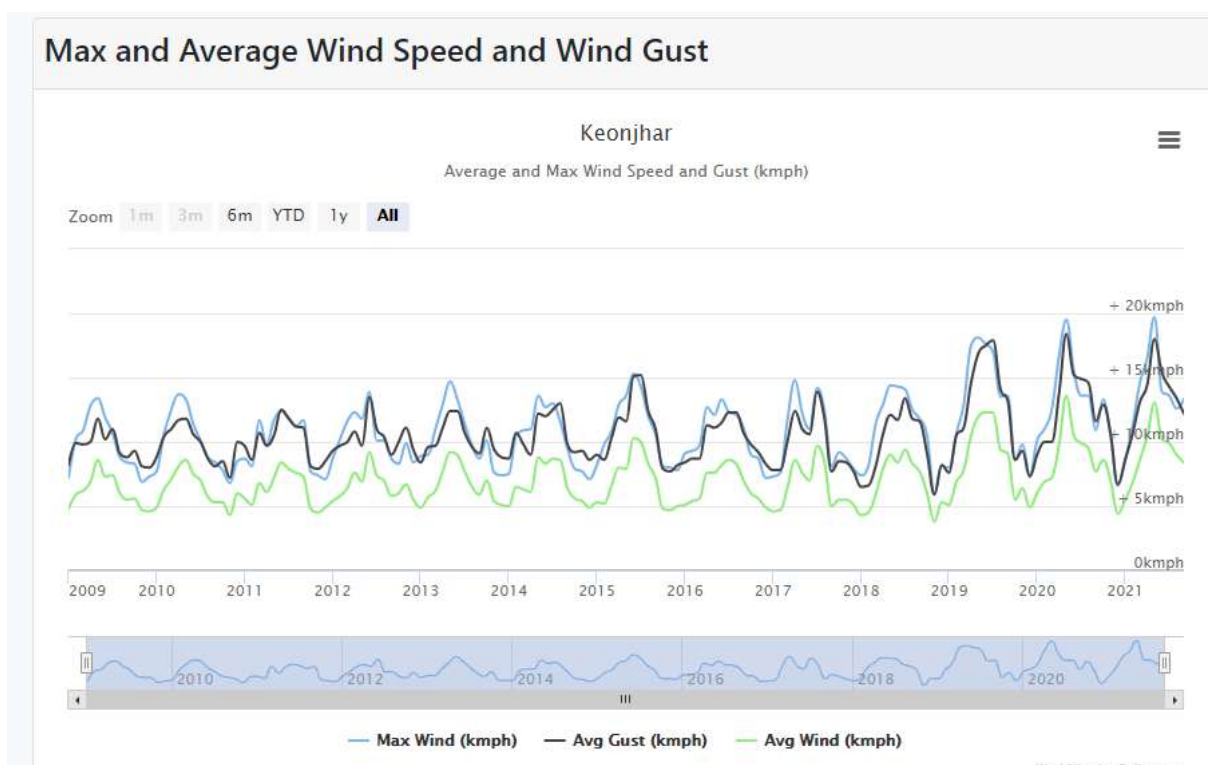
The speed and direction of wind has been analysed in many occasion . The available data on wind direction & speed is furnished below.

Table No 1.22 Wind direction

Wind Speed (M/s)	Maximum	4.6
	Average	0.85
Wind direction (%)	N	1.75
	NNE	1.48
	NE	2.02
	ENE	4.17
	SE	1.34
	SSE	1.08
	S	3.23
	SSW	3.75
	SW	3.62
	WSW	6.32
	W	3.63
	WNW	2.82
	NW	1.88
	NNW	2.02
	CALM	53.36

Wind roses are **graphical charts that characterize the speed and direction of winds at a location**. Presented in a circular format, the length of each "spoke" around the circle indicates the amount of time that the wind blows from a particular direction. Colors along the spokes indicate categories of wind speed.





1.4.5 Drought:

The drought analysis of Keonjhar district based on the deficiency of rainfall shows that out of fifteen years, there was no severe drought occurrence in the region. However, there were 4 mild (2001, 2003, 2005 and 2010) and 5 moderate (2002, 2004, 2006, 2007 and 2009) drought years. The seasonal drought analysis shows the monsoon period contributed around 76% of rainfall, with only 11% during post-monsoon and 13% during premonsoon showers. Therefore, for growing winter season crops during post monsoon season, assured irrigation facilities need to be provided simultaneously with ample emphasis on rainwater harvesting during the monsoon season, as high quantum of runoff is anticipated during rainy seasons. The farmers of this region may depend on monsoon rains for growing rain-fed rice, as there was hardly any drought occurrence.

1.4.6 Frost;

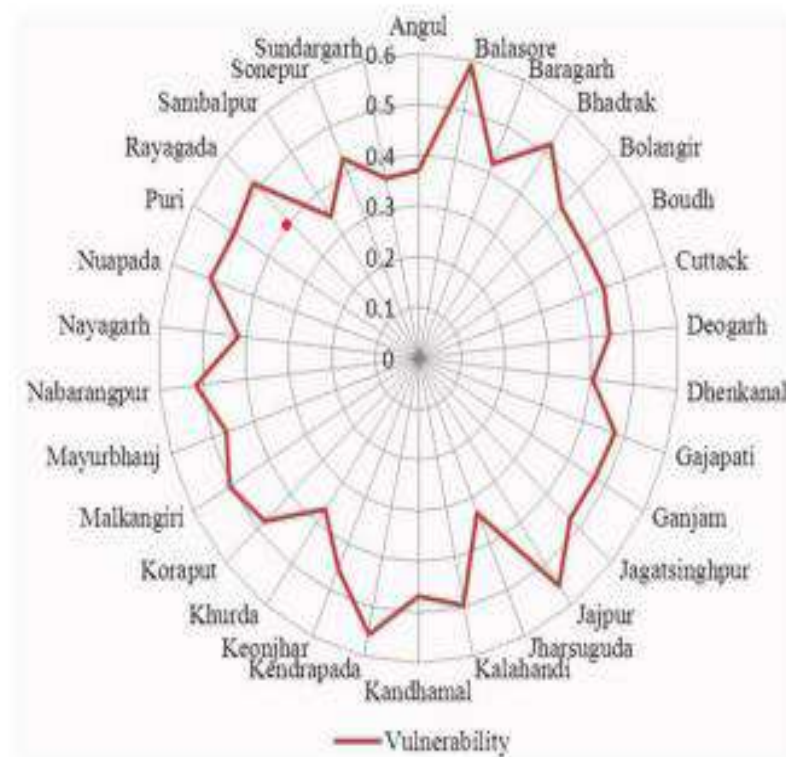
The district / division experience no frost in last decade.

1.4.7 Cyclone/Storm

Keonjhar district experiences cyclonic storm. Any low pressure / depression in Bay of Bengal brings storm with heavy rainfall. **cyclone-prone districts** in the state, which includes six coastal **districts** (Balasore, Bhadrak, Kendrapada, Trends and patterns



of **cyclones** and floods Jagatsinghpur, Puri and Ganjam) and eight non-coastal **districts** (Khurda, Mayurbhanj, Jajpur, **Keonjhar** ...





CHAPTER 2

MAINTENANCE/ INCREASE IN THE EXTENT OF FOREST AND TREE COVER

2.1 Area of forests under different legal classes:

There are Reserved Forests, Proposed Reserved Forests, Demarcated Protected forests, Protected Forests, Villages forests in the division. The details of the Forest blocks are as follows.

2.1.1 Reserved Forests (RF):

There are 77 numbers of Forest Blocks in Keonjhar Division. The name of the Forest Blocks, Notified area, GIS area and Notification number are furnished below. (Table 2.1)

Table No 2.1 Reserved Forests of Keonjhar Division

Sl No	Name of Reserved forests	Area in ha		Notification No & date
	Barbil Range	As per notification)	Area as per GIS	
1	Kandra A	6.6300	6.63	F.S.- 130/79-53191/R dt. 23.7.79
2	Kandra B	136.3800	136.38	F.S.- 126/79-53198/R dt. 23.7.79
3	Kandra C	81.3400	81.34	F.S.- 129/79-53177/R dt. 23.7.79
4	Karo (C1-C22)	5107.7100	5038.2198	No. 10721-12F-42(m/2)58D26/27th March 1958
5	Sidhamatha (C1-C29)	5970.9400	5869.77	F.S.- 127/79-53183/R dt. 23.7.79
6	Thakurani	4679.9500	4679.95	F.S. 58/04 - 41011/R dt. 15.10.05
7	Uliburu	1499.8100	1499.81	F.S.- 125/79-53173/R dt. 23.7.79
Barbil Range Total		17482.7600	17312.0998	
	BJP Range			
8	Anjar	196.4941	196.4941	F.S.- 118/2004-8260/R dt. 23.02.05
9	Gadgadei	218.0103	218.0103	F.S.- 91/2003-58622/R dt. 11.12.03
10	Jagar	155.9472	155.9472	F.S.- 69/2004-7964/R dt. 22.02.05
11	Kanjipani	726.9460	725.9460	F.S.- 72/2004-14884/R dt. 16.04.04
12	Khajurimundi	180.6000	180.6000	F.S.- 62/2004-47953/R dt. 6.12.04
13	Mundala	432.0270	432.0270	F.S.- 56/04-46325/R dt. 24.11.05
14	Saharpur	834.3484	834.3484	F.S.- 14/2003-18296/R dt. 4.4.03
BJP Range Total		2744.3730	2743.3730	



Champua Range				
15	Baitarani-A	2358.9900	2358.9900	No. 10721-12F-42(m/2)58D26/27th March 1958
16	Baitarani - B	1278.4400	1278.4400	
17	Balibandha	920.6900	920.6900	
18	Bardhana	944.5600	944.5600	F.S.- 133/79-52023/R dt. 19.7.79
19	Jyotipur	882.2400	882.2400	No. 10721-12F-42(m/2)58D26/27th March 1958
20	Kalikaprasad	1416.4500	1416.4500	
21	Lakshmiposi	866.8600	866.8600	F.S.- 62/2004-47953/R dt. 6.12.04
22	Mooney	89.0300	89.0300	F.S.- 151/82-81821/R dt. 31.12.82
23	Naibuga	309.8300	309.8300	F.S.- 132/79-52019/R dt. 19.7.79
24	Pedipokhari	1487.2700	1487.2700	F.S.- 130/79-52015/R dt. 19.7.79
25	Ukhunda	946.5900	946.5900	F.S.- 125/79-53173/R dt. 23.7.79
Champua Range Total		11500.9500	11500.9500	
Ghatgaon Range				
26	Atei (P) C-11-49)	16658.8800	16658.88	No. 10721-12F-42(m/2)58D26/27th March 1958
27	Badmasinabila	66.2200	66.22	
28	Balipokhari	1011.7500	1011.75	No. 10721-12F-42(m/2)58D26/27th March 1958
29	Barabanka(P) C4-C14	5694.6800	5694.68	
30	Ghatagaon	810.8100	810.8100	
31	Kalimati	914.6200	914.6200	
32	Masinabila	473.4900	473.4900	F.S 95/78-34478/R dt. 25.5.75
33	Nalapanga(p)	352.8800	352.8800	F.S.- 132/79-52019/R dt. 19.7.79
34	Pipilia	796.0404	771.8600	No. 10721-12F-42(m/2)58D26/27th March 1958
Ghatgaon Range Total		26779.3704	26755.1900	
Keonjhar range				
35	Balabhadrapur	746.6700	746.67	No. 10721-12F-42(m/2)58D26/27th March 1958
	Barabanka(B) C1-3 & C15-17)	2308.6600	2308.66	
36	Basantapur	1187.7900	1187.7900	F.S.- 133/79-52023/R dt. 19.7.79
37	Belda	1059.9000	1059.9000	. F.S.- 287/79-63725/R dt. 31.8.79
38	Jadipada	1329.8400	1329.8400	No. 10721-12F-42(m/2)58D26/27th March 1958
39	Maidankel	872.5300	872.5300	
40	Narayanpur	1702.9750	1644.7800	No. 10721-12F-42(m/2)58D26/27th March 1958
41	Nayagarh	2842.6100	2842.6100	
42	Nelung	624.0400	624.04	
	Nalapanga(B) (C2)	834.1000	834.10	F.S.- 132/79-52019/R dt. 19.7.79
43	Raghunathpur	1273.1808	1221.3800	F.S.- 292/79-80632/R dt. 15.11.79



44	Raikala	690.0100	690.0100	F.S.- 292/79-80632/R dt. 15.11.79
45	Sarupat	317.6800	317.6800	F.S.- 127/79-53183/R dt. 23.7.79
46	Tangarani	594.8971	410.6600	F.S. 58/04 - 41011/R dt. 15.10.05
Keonjhar range Total		16384.8829	16090.6500	
Patna Range				
47	Barbil	17.8600	17.86	F.S.- 133/79-52023/R dt. 19.7.79
	Atei(B) (C1-10)	3967.5500	3967.55	No. 10721-12F- 42(m/2)58D26/27th March 1958
48	Lakshmiposi (P)	30.2900	23.19	F.S.- 288/79-63717/R dt. 31.8.79
49	Baunsuli	629.3000	629.30	No. 10721-12F- 42(m/2)58D26/27th March 1958
50	Belapasi	46.1000	46.10	F.S.- 287/79-63725/R dt. 31.8.79
51	Billa-A	43.0800	43.08	F.S.- 155/82-75567/R dt. 2.12.82
52	Budhikapudi 'II'	21.7100	21.71	. F.S.- 128/79-53183/R dt. 23.7.79
53	Chadheibhol	48.8800	48.88	F.S.- 299/79-80636/R dt. 15.11.79
54	Chemena-A	26.8900	26.89	F.S.- 156/82-75572/R dt. 2.12.82
55	Ninua	60.5800	60.58	F.S.- 289/79-63721/R dt. 31.8.79
56	Padmapur	795.6400	795.64	F.S.- 289/79-63721/R dt. 31.8.79
57	Palaspada	14.7200	14.72	F.S.- 154/82-81836/R dt. 31.12.82
58	Patna	1193.8600	1193.86	F.S.- 10721-12F-42 (m/2) 58d of 26/27 March 1958
59	Poipani	533.7900	533.79	
60	Pradhanpada	21.0600	21.06	F.S.- 153/82-81739/R dt. 29.12.82
61	Purunapani	180.5200	180.52	F.S.- 292/79-80632/R dt. 15.11.79
62	Rasapada	9.9500	9.95	F.S.- 72/83-73774/R dt. 17.11.83
63	Sarasposi	13.4800	13.48	F.S.- 127/79-53183/R dt. 23.7.79
64	Tando	15.5400	15.54	F.S.- 125/79-53173/R dt. 23.7.79
Patna Range Total		7670.800	7663.700	
Telkoi range				
65	Bandhanjhari (C1-5)	2666.5600	2666.5600	No. 10721-12F- 42(m/2)58D26/27th March 1958
66	Benamunda (C1-5)	2783.9300	2783.9300	F.S.- 287/79-63725/R dt. 31.8.79
67	Dhanurjaypur	85.2700	85.2700	F.S. 364/99-53767/R dt. 22.10.99
68	Chhamunda- Golabandha	41.5000	41.5000	F.S. 357/99-12914/R dt. 13.3.2000
69	Jharbeda	1274.8000	1274.8000	No. 10721-12F- 42(m/2)58D26/27th March 1958
70	Kalapat (C1-39)	21488.3500	21488.3500	
71	Kodbil (C1-3)	1558.0900	1558.0900	F.S.- 62/2004-47953/R dt. 6.12.04
72	Krushnapur (C1- 2)	620.0000	620.0000	F.S.- 62/2004-47953/R dt. 6.12.04
73	Mankadchua (C1-3)	682.3200	682.3200	F.S 95/78-34478/R dt. 25.5.75



74	Ranibeda (C1-4)	2868.9100	2868.9100	No. 10721-12F-42(m/2)58D26/27th March 1958
75	SalaikenaSiriabahal-Kalapokhari	89.4599	89.4599	F.S. 42/04 - 7961/R dt. 22.02.05
76	Samakoi	679.8924	620.37	F.S. 42/04 - 7961/R dt. 22.02.05
77	Tamango	1362.6424	1362.6424	F.S. 58/04 - 41011/R dt. 15.10.05
Telkoi Range Total		36201.7247	36142.2023	
Div. Total (77 Block)		118764.8610	118208.1651	

(NB: Atei RF is in Patna and Ghatgaon range, Barabanka RF in Ghatgaon and Keonjhar range, Nalapanga RF in Gahtgaon & Keonjhar Range)

2.1.2 Proposed Reserved Forests (PRF):

The forest blocks declared U/s 4 of the Odisha Forest Act,1972 and at various stages of reservation process are included in this category. There are 24 forest blocks under PRF covering an area of **15286.8573** ha as detailed in Table No 2.2.

Table No 2.2 :List PRF (Keonjhar Division)

SI No	Block	Notified area	GIS Area	Notification No. & date
	B&JP Range			
1	Amuni	50.5987	50.5987	F.S.- 33/78-32757/R dt. 16.5.78
2	Bayakumutia	118.0045	118.0045	F.S207/78-74559/R dt. 13.11.78
3	Champey	363.8651	363.8651	F.S.- 17/78-30525/R dt. 5.5.78
4	Danla	170.7029	170.7029	F.S.- 35/78-32929/R dt. 17.5.78
5	Digachampey	170.0146	170.0146	F.S.- 32/78-35218/R dt. 30.5.78
6	Dumuridiha	501.9573	501.9573	F.S.- 208/78-74579/R dt. 13.11.78
7	Gandhamardan	2295.9907	2295.9907	F.S.- 205/78-74607/R dt. 13.11.78
8	Gonasika	334.3871	334.3871	F.S.- 204/78-74583/R dt. 13.11.78
9	Gouda champey	447.3693	447.3693	F.S.- 26/78-33849/R dt. 23.5.78
10	Lunaghar-I	131.6830	131.6830	F.S.- 22/78-34796/R dt. 27.5.78
11	Lunaghar-II	360.9440	360.9440	F.S.- 28/78-32669/R dt. 16.5.78
12	Raiguda	489.3750	489.3750	F.S.-23/78- 30773//R dt. 5.5.78
13	Suakati-I	475.3921	475.3921	F.S.- 27/78-30511/R dt. 5.5.78
14	Suakati-II	134.9700	134.9700	F.S.- 14/78-30515/R dt. 5.5.78
B& JP Range Total		6045.2543	6045.2543	
	Champua Range			
15	Baitarani East 'A'	154.1400	154.1400	F.S.- 50/78-12079/R dt. 20.2.78
16	Baitarani East 'B'	309.2000	309.2000	F.S.- 70/78-35058/R dt. 29.5.78
Champua Range Total		463.3400	463.3400	
	Keonjhar Range			
17	Khajuribani	3575.4201	3575.4201	F.S.- 34/78-32753/R dt. 16.5.78
	Patna Range			



18	Budhikapudi 'II'	31.0200	31.0200	F.S.- 200/78-74555/R dt. 13.11.78
	Telkoi Range			
19	Dublupal	88.2300	88.2300	F.S.- 73/78-35066/R dt. 29.5.78
20	Godhihudi	78.8700	78.8700	F.S.- 12/78-30785/R dt. 5.5.78
21	Rekuti	275.3000	275.3000	FS 202/78 73202/R dt. 7.11.78
22	Renda	1282.4329	1282.4329	FS 11/78 30896/R dt. 5.5.78
23	Sikheswari	3105.5000	3105.5000	FS 8/78 35254/R dt. 30.5.78
24	Syamanali Koilisuta	341.4900	341.4900	FS 36/78 30777/R dt. 5.5.78
Telkoi Range Total		5171.8229	5171.8229	
Division Total		15286.8573	15286.8573	

2.1.3 Demarcated Protected Forest (DPF):

There are forest blocks demarcated in the field but these blocks are not yet declared under any sections of Odisha Forest Act, 1972 and also not covered in any management practices of previous Working Plan. These blocks are revenue forests but not yet brought to Forest administration fold. Details of such forest blocks at Table No 2.3

Table No 2.3 List of DPF of Keonjhar Forest Division					
Sl. No.	Name of the Range	Name of the D.P.F	Area in Ha.	Submitted to Collector for U/s 4(i) Le no & date	Name of the Tahasil
1	Barbil	Murgabeda	518.23	8016 dt. 22.12.1990	Barbil
Badbil (Total)			518.23		
2	B&JP	Guptaganga	179.1081	8001 dt. 22.12.1990	Telkoi
3	B&JP	Katira	483.7163	3777 dt. 25.04.1994	Telkoi
4	B&JP	Pamdadhar-Bayakumutia	259.439	4846 dt. 22.08.1988	Keonjhar
5	B&JP	Sanaghagara(B)	792.8602	3775 dt. 25.04.1994	Keonjhar
6	B&JP	Sundurua	753.7537	8010 dt. 22.12.1990	Keonjhar
7	B&JP	Taramakanta	417.5775	3780 dt. 25.04.1994	Telkoi
8	B&JP	Kalanda	1060.862	10888 dt. 23.12.1999	Telkoi
9	B&JP	Kakharua	1240.073	10891 dt. 23.12.1999	Telkoi
10	B&JP	Khandadhar	1956.448	4621 dt. 03.07.2018	Telkoi
11	B&JP	Kuanr	2080.6917	6017 dt. 31.10.1987	Telkoi
12	B&JP	Kumundi(B)	88.62	6014 dt. 31.10.1987	Keonjhar
13	B&JP	Sanghagara (A)	583.84	7112 dt. 18.08.1978	Keonjhar
14	B&JP	Siddhamath	1112.6787	7108 dt. 18.08.1978	Keonjhar
BJP (Total)			11009.6682		



15	Champua	Jamirta	313.6505	6213 dt. 01.11.1988	Barbil
16	Champua	Kankana	170.2168	6216 dt. 01.11.1988	Barbil
Champua (Total)			483.8673		
17	Ghatgaon	Kapaspada	80.3289	6497 dt. 14.07.1992	Ghatgaon
18	Ghatgaon	Khajurijuani	95.7075	6450 dt. 14.07.1992	Ghatgaon
19	Ghatgaon	Tara (B)	74.1329	6020 dt. 31.10.1987	Ghatgaon
Ghatgaon (Total)			250.1693		
20	Patna	Machhagarh	14.3668	11204 dt. 24.11.1992	Keonjhar
21	Patna	Mushkhori (A)	50.8829	6506 dt. 14.07.1992	Keonjhar
22	Patna	Mushakhori (B)	72.2146	6509 dt. 14.07.1992	Ghatgaon
23	Patna	Chemena II	23.97	2319 dt. 24.02.1979	Keonjhar
Patna (Total)			161.4343		
24	Telkoi	Binjabahal (A)	18.3531	98 dt. 02.01.1987	Telkoi
25	Telkoi	Binjabahal (B)	19.8303	6273 dt. 24.06.1981	Telkoi
26	Telkoi	Madhyapur	101.5797	7320 dt. 29.08.1978	Telkoi
27	Telkoi	Oriya	161.0948	1963 dt. 22.03.1990	Telkoi
28	Telkoi	Binjabahal (C)	140.83	6579 dt. 26.11.1987	Telkoi
29	Telkoi	Tangurubahal	493.84	6279 dt. 24.06.1981	Telkoi
Telkoi (Total)			935.5279		
G. Total (29 Blocks for Management)			13358.897		
30	B&JP	Karuagarh	690.01	In Process	Telkoi
31	Champua	Nandijhari	1950.65	In Process	Barbil
32	Champua	Rugudi	368.5764	In Process	Barbil
33	B&JP	Thakurani	1027.93	In Process	Keonjhar
34	Champua	Mahaparbat	343.99	In Process	Barbil
35	Ghatgaon	Badajamuposi	32.37	In Process	Ghatgaon
36	Ghatgaon	Katarabeda	91.36	In Process	Ghatgaon
37	Ghatgaon	Mahuldiha	34.5	In Process	Ghatgaon
38	Ghatgaon	Tara (A)	141.74	In Process	Ghatgaon
39	Ghatgaon	Tarinipokhari	3.48	In Process	Ghatgaon
40	Keonjhar	Barach	1211.82	In Process	Ghatgaon
41	Patna	Barigaon (A)	30.62	In Process	Ghatgaon
42	Patna	Barigaon (B)	194.39	In Process	Ghatgaon
43	Patna	Bhandaribilla	20.47	In Process	Ghatgaon
44	Patna	Bhadabahali	40.47	In Process	Ghatgaon
45	Patna	Billa (B)	50.5	In Process	Keonjhar
46	Patna	Billa (C)	44.13	In Process	Keonjhar
47	Patna	Dhanaberi	28.32	In Process	Keonjhar
48	Patna	Dhanurjayapur	44.37	In Process	Ghatgaon
49	Patna	Karanjiapada	13.15	In Process	Keonjhar
50	Patna	Khajuridiha	20.23	In Process	Keonjhar



51	Patna	Kumudabahali	68.27	In Process	Ghatgaon
52	Patna	Nayajagannathpur	42.08	In Process	Keonjhar
53	Patna	Paitamaza	149.73	In Process	Keonjhar
54	Patna	Saharapada	57.66	In Process	Keonjhar
55	Telkoi	Barhagarh	165.92	In Process	Telkoi
56	Telkoi	Bimla-Jharbeda	157.83	In Process	Telkoi
57	Telkoi	Dhenkisarwari	690.01	In Process	Telkoi
58	Telkoi	Kukudiamba	522.06	In Process	Telkoi
59	Telkoi	Kalimasirigida	56.65	In Process	Telkoi
60	Telkoi	Padanga	664.92	In Process	Telkoi
61	Telkoi	Shyamakud- Birabarapur- Nuagaon	182.11	In Process	Telkoi
		Total 61 Block	22499.2134		

NB Out of 61 Blocks mentioned above 29 blocks for which Proposal is under Consideration at Various stages of Govt. have been taken for management. Balance 32 block not taken in to consideration as Proposal is still at DFO, Level.

2.1.4 Village Forests:

The Village Woodlots created under erstwhile Social Forestry Project and declared u/s 30 of the Odisha Forest SAct, 1972. There are 456 blocks covering an area of 2678.341 ha in Keonjhar Division. (Table No 2.4)

Table No 2.4 List of village Forests: Keonjhar Division.			
Sl. No.	Name of Village Forest	Area in ha	Notification No
	B&JP Range		
1	Khuntakata	10	AFFN (SIDA)78/9P(PT)3610/F&E dt. 15.2.92
2	Lunaghar	5.000	
3	Kushakala	11.31	
4	Anklpada	5.000	
5	Khajurimundi	10.000	AFFN(SIDA)78/91-4020 F&E dt. 21.2.92.
6	Suakati	5.000	
7	Karandadihi	10.000	
8	Baitarani Pahada	10.000	
9	Kanengadihi	10.000	
10	Taramakanta	5.000	
11	Balarei	5.220	
12	Jaladiha	5.280	
13	Gopapur	1.168	
14	Sagapada	10.580	
	Total (B&JP Range)	103.558	
	Barbil Range		



15	Putugaon	5.6	No. 19852/F&E Dt. 13.11.1991
16	Aseinkala	5.268	
17	Kudapi	5.736	No.AFFN (SIDA) 3756/F&E dt. 18.2.92
Barbil Range Total		16.604	
Champua Range			
18	Mangalapur	5.5	No.AFFN (SIDA) 3756/F&E dt. 18.2.92
19	Maheswarpur	5.500	
20	Ghodaposi	5.008	
21	Hanjiposi	5.600	
22	Remuli	5.300	
23	Gambharia	6.675	
24	Mukundapur	6.080	
25	Maudi	5.240	
26	Mangalapur	5.000	
27	Sadangi	5.120	
28	Ukhunda	5.000	
29	Sabakdhanurjayapur	5.000	
30	Arsala	6.268	No.AFFN (SIDA) 3756/F&E dt. 18.2.92
31	Chelianal	4.772	
32	Baria	4.694	No.AFFN (SIDA) 3756/F&E dt. 18.2.92
33	Gidhibas	10.516	
34	Sundhimarusuan	2.12	AFFN (SIDA) 3892-24958/F&E dt. 19.10.92
35	Kasipal	0.864	
36	Asanpat	3.548	
37	Manoharpur	7.248	
38	Hastinapur	3.710	
39	Chakulia	5.284	AFFN (SIDA) 91-1977/F&E dt. 28.1.92
40	Sankarpur	3.468	
41	Ankudi	5.750	
42	Nishagadia	9.168	
43	Pokharia	5.248	
44	Kashipal	3.444	
45	Durukulia	5.600	
46	Bala	4.300	
47	Godhuli	0.440	
48	Katulikana	4.100	
49	Sunaposi	7.624	
50	Guludiposi	4.308	
51	Bhanda	5.400	
52	Purudiposi	5.000	
53	Sirikuan	5.170	
54	Maheswarpur	2.620	AFFN (SIDA) 91-1977/F&E dt. 28.1.92



55	Nishagadia	5.020	
56	Khuntapada	5.032	
57	Rajia	5.200	
58	Sadangi	5.020	
59	Dakuaposi	6.044	
60	Kanchandumuria	7.200	
61	Bichitranandapur	8.800	
62	Parbatipur	5.000	
63	Katuilikana	10.000	
64	Talakanda	10.000	
65	Jamudalka	10.000	
66	Rajia	5.000	
67	Mangalpur, Mathhurapur, Sankarpur	25	AFFN (SIDA) 91-1977/F&E dt. 28.1.92
68	Tunutuna	5.000	
69	Murusuan	7.000	
70	Rajabasa	10.000	
71	Mahadevpur	10.000	
72	Durgapur	20.000	AFFN (SIDA) 78/9P(PT)3610/F&E dt. 15.2.92
73	Parbatipur	5.004	
74	Dudukundi	5.000	No. 19852/F&E dt. 13.11.91
75	Gidhibasa	5	
76	Nagarpal	5.000	
77	Teliarsals	5.000	
78	Arsala	5.000	
79	Sabaka Dhanurjayapur	5.000	
80	Balabhadrapur	5.000	
81	Madama	5.000	
82	Jagannathpur	5.000	
83	Sitarampur	5.000	
84	Gidunia	5.000	
85	Barana	5.000	No. 19852/F&E dt. 13.11.91
86	Gopiballavpur	5.000	
87	Chelional	5.000	
88	Kanchandumuria	5.000	
89	Badaposi	5.000	
90	Pichilabeda	5.000	
91	Rasabantala	15.000	
92	Kaunrikala	6.000	
93	Manada	10.000	
94	Andharikhaman	5.000	



95	Mundachauthia	5.000	
96	Gidhibasa	5.000	
97	Nandapur	5.000	
98	Tangarpada	5.000	
99	Madhupur	5.000	
100	Ramachandrapur	10.000	No. 19852/F&E dt. 13.11.91
101	Ukhunda	10.000	
102	Pichhulabeda	5.000	
103	Angulia	5.000	
104	Gundunia	4.000	
105	Badadumuria	10.000	
106	Barkhandia	10.000	
107	Sananeuli	5.000	
108	Tangarsi	5.000	
109	Bhimapur	5.000	
110	Ankudi	5.000	
111	Badanai	5.000	
112	Chamakpur	5.000	
113	Marusuan	5.000	
114	Sankankana	5.000	No. 19852/F&E dt. 13.11.91
115	Ramachandrapur	5.000	
116	Sarei	5.000	
117	Jamudalka	5.000	
118	Kanjiasula	5.000	
119	Chandrasekharpur	5.000	
120	Raruangoda	10.000	
121	Sunariposi	5.000	
122	Badasahi	5.000	
123	Durukulia	5.000	
124	Nayadhanurjayapur	5.000	No. 19852/F&E dt. 13.11.91
125	Kanjiposi	5.000	
126	Mamulijoda	5.000	
127	Hariposi	5.000	
128	Bhagianasa	5.000	
129	Sabakdhanurjayapur	5.000	
130	Pahadpur	5.000	
131	Cheelipa	5.000	
132	Asanpat	5.156	
133	Madhupur	1.720	
134	Nagarpal	4.480	
135	Sitarampur	2.240	
136	Asuki	0.712	



137	Bhubanaposi	2.020	
138	Asuki	4.292	
139	Kalinga	3.156	
140	Badaposi	5.088	
141	Sanneuli	5.096	
142	Bagiabeda	1.696	
143	Baruna	2.508	
144	Hastinapur	5.000	No. 19852/F&E dt. 13.11.91
145	Gidhibasa	5.000	
146	Sarasinga	2.144	
147	Padmakesharpur	6.104	
148	Ramachandrapur	2.848	
149	Kanchandumuria	5.000	
150	Bichitranandapur	5.000	
151	Tukudiha	5.292	
152	Ratnaposi	5.088	
153	Jamunaposi	5.500	
154	Kantiaposi	5.350	No. 19852/F&E dt. 13.11.91
155	Bhaliadipa	3.080	
156	Raruangoda	4.628	
157	Icchinda	9.140	No. AFFN (SIDA) 38/92-3264 F&E dt. 8.2.93
158	Sandhapur	5.000	
159	Tentala	4.92	
160	Gambharia	8.800	
161	Bidyadharpur	1.268	
162	Barkhandia	7.060	
163	Asuki	11.680	
164	Patalaposi	4.568	
165	Sarei	0.680	
166	Urti	5.400	
167	Kalinga	4.536	
168	Kendua	2.06	
Champua Range total		843.32	
Ghatgaon Range			
169	Patabari	3.36	AFFN (SIDA) 3892-24958/F&E dt. 19.10.92
170	Dinabandhupur	4.640	
171	Adakata	0.468	AFFN (SIDA) 91-1977/F&E dt. 28.1.92
172	Kalimati	11.46	AFFN (SIDA) 37561/F&E 18.2.92
173	Marhapur	10.000	No. 19852/F&E dt. 13.11.91
174	Kamarnali	8.000	
175	Patabari	5.000	
176	Kasibeda	5.450	



177	Anklpada	5	
178	Dhogotha	8.85	
179	Jamujodi	6.650	No. AFFN (SIDA) 38/92-3264 F&E dt. 8.2.93
180	Jhadpokhari	5.540	
Ghatgaon range total		74.418	
Keonjhar range			
181	Totagaon	5	
182	Jajaposi	5.100	
183	Sunatangiri	5.000	
184	Nudurpada	2.316	
185	Dhanabeni	1.961	
186	Gohjatangiri	7.000	AFFN (SIDA) 3892-24958/F&E dt. 19.10.92
187	Haladharapur	3.900	
188	Nuabeda	6.000	
189	Gopalabandhu-Kainsi	5.000	
190	Kathakaranjia	5.108	
191	Kathabaunsuli	4.000	
192	Baliabeda	0.4	AFFN (SIDA) 91-1977/F&E dt. 28.1.92
193	Haladharapur	5.100	
194	Khadiadiha	5.200	
195	Keri	6.400	
196	Kempasoda	5.100	
197	Mathuramunduli	5.080	
198	Kendua	10.080	
199	Padmapur	5.120	
200	Nuagaon	5.100	AFFN (SIDA) 91-1977/F&E dt. 28.1.92
201	Nuagaon (Mundasahi)	5.120	
202	Tarakakhaman	5.120	
203	Kathabaunsuli	6.000	
204	Upardiha	4.800	
205	Dungurisahi	5.100	
206	Nuabeda	5.200	
207	Kainsi	5.600	
208	Sahadapur	0.580	
209	Kamposoda	0.300	
210	Bijenitangar	5.200	
211	Bhanua	4.228	
212	Nuasahi	5.147	AFFN (SIDA) 91-1977/F&E dt. 28.1.92
213	Dhanabeni	5.800	
214	Baidanda	5.392	
215	Karanjia	5.000	



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216	Kemendia	5.000	No. 19852/F&E dt. 13.11.91
217	Dhanabeni	5.000	
218	Patalikata	5.000	
219	Nuagaon	5.000	
220	Rutisila	5.000	
221	Buxibarigaon	10.000	
222	Ostaponga	10.000	
223	Baijapada	10.000	
224	Janghira	10.000	
225	Pandapada	10.000	
226	Dharapada	10.000	
227	Jhumukaposi	5.000	
228	Badabarabeda	5.000	
229	Badabarabeda	5.000	No. 19852/F&E dt. 13.11.91
230	Dumuria	5.000	
231	Mahuldiha	5.000	
232	Nuagaon	10.000	
233	Bajinitangar	10.000	
234	Jadipada	5.000	
235	Sunatangiri	5.000	No. 19852/F&E dt. 13.11.91
236	Dhanaberu	6.644	
237	Balidanda	5.100	
238	Gohitangiri	4.000	
239	Patipanga	4.320	
240	Buxibarigaon	5.000	
241	Nuasahi	6.116	
242	Balisahi	5.088	
243	Badamusi	5	
244	Keri	10.000	
245	Daxinaposi	5.000	
246	Jhaliapada	5.000	
247	Badasati(Badasahi)	5.000	No. AFFN (SIDA) 38/92-3264 F&E dt. 8.2.93
248	Jirang	10	
249	Mathuramunduli	5.040	
250	Sirishpal	7.850	
251	Atibudhipada	5.020	
252	Dimiribahal	7.120	
253	Ostaponga	11.320	
254	Budapalasa	8.000	
255	Padmapur	10.300	
Keonjhar range Total		437.470	
Patna Range			



256	Silapada	5.248	AFFN (SIDA) 3892-24958/F&E dt. 19.10.92
257	Kuaposi	6.252	
258	Tainsira	8.800	
259	Nuapada	3.672	
260	Sanajamuposi	3.608	
261	Sabanalibeda	10.132	
262	Lunga	3.848	
263	Tendera	8.556	
264	Balibandha	3.452	
265	Maliposi	2.220	
266	Saraskela	9.856	
267	Kuaposi	2.036	AFFN (SIDA) 3892-24958/F&E dt. 19.10.92
268	Guludiposi	0.652	
269	Patanali	7.512	
270	Rengalbeda	6.900	
271	Nuakhaman	3.140	
272	Aharapada	2.084	
273	Barigaon	11.960	AFFN (SIDA) 78/91(PT) 3610/F&E dt. 15.2.92
274	Aharapada	2.744	
275	Bhalupahadi	5	
276	Bhuduripali	5.000	
277	Daxinaposi	5.000	
278	Kashipur	10.000	
279	Mahisamundi	21.000	
280	Chhatarapani (Barabeda)	7.000	
281	Gojitangiri	4.000	
282	Tangrapada	3.000	No. 19852/F&E dt. 13.11.91
283	Rashiapada	5	
284	Kolhasahi-Irrendei	5.000	
285	Purunapani	5.000	
286	Naranaposi	5.000	
287	Tentela	5.000	
288	Childa	5.000	
289	Angikala	5.000	
290	Kenduiposi	5.000	
291	Bolaniposi	5.000	
292	Shyamasundarpur	5.000	No. 19852/F&E dt. 13.11.91
293	Mirigikhoji	5.000	
294	Bhimapada	5.000	
295	Chandiapada	5.000	
296	Purunia	5.000	



297	Chinamaliposi	5.000	
298	Tentulikhunnti	5.000	
299	Purandarapur	5.000	
300	Dimirigoda	5.000	
301	Kaliaduma	5.000	
302	Begna	5.000	
303	Khajuripat	10.000	No. 19852/F&E dt. 13.11.91
304	Khuntapingu	5.000	
305	Silda	20.000	
306	Bhagaposi	5.000	
307	Manapur	10.000	
308	Sangamharia	10.000	
309	Bolaniposi	5.000	
310	Brahmanideo	10.000	
311	Sangamharia	10.000	
312	Badanuagaoon	10.000	
313	Erendei	5.000	
314	Mangalapur	5.000	
315	Kathaghara	10.000	
316	Rasapada	5.000	
317	Mangalapura	5.000	No. 19852/F&E dt. 13.11.91
318	Kantiapada	5.000	
319	Banamalipura	10.000	
320	Gamabarei	5.000	
321	Beganakhaman	20.000	
322	Khamua	5.000	
323	Sankhamua	5.000	
324	Khireitangiri	5.000	
325	Padakhaman	5.000	
326	Batesahi	5.000	
327	Kumudabahali	5.000	
328	Godipokhari	5.000	No. 19852/F&E dt. 13.11.91
329	Kantiapada	5.000	
330	Ankura	5.000	
331	Ankura	5.000	
332	Mirigikhoji	5.000	
333	Dhanurjayapur	5.000	
334	Bijanalisahi	5.000	
335	Saradhapur	5.000	
336	Silda	5.000	
337	Khuntapada	5.000	
338	Mahisamundi	5.000	



339	Phulapahadi	5.000	No. 19852/F&E dt. 13.11.91
340	Barbil-Nuasahi	5.000	
341	Nuabandha	5.000	
342	Badasahi	5.000	
343	Jamudia	5.000	
344	Jamudia	5.000	
345	Tavasarua	5.000	
346	Suagapur	5.000	
347	Kapundi	5.000	
348	Hariharapur	5.000	
349	Bhandaribilla	5.000	
350	Jarkanibeda	5.000	
351	Medinipur	5.000	
352	Raidiha	5.000	
353	Begana	5.000	No. 19852/F&E dt. 13.11.91
354	Begana	5.000	
355	Godhinali	5.000	
356	Banamalipur	5.000	
357	Panalisahi (Nuagaon)	10.000	No. 19852/F&E dt. 13.11.91
358	Badamahuldiha	5.528	
359	Erendei	5.068	
360	Tangiasahi	4.348	
361	Mundasahi	5.280	
362	Silda	5.264	
363	Tentulikhunti	4.960	
364	Bandhasahi	5.264	
365	Patanali	3.396	
366	Dulang	3.224	
367	Kantiapada	1.816	
368	Chanduapada	3.460	
369	Godhiramapura	3.928	No. 19852/F&E dt. 13.11.91
370	Kumudabahali	6.292	
371	Kantiapada	5.120	
372	Mahisamundi	5.108	
373	Chinamaliposi	1.960	
374	Godhiramapada	5.088	
375	Kumudabahali	6.012	
376	Tentela	4.652	
377	Purandarapur	7.340	
378	Rengalbeda	1.416	
379	Dabarchua	5.06	
380	Machhabhanar	4.020	



381	Junei	5.000	
382	Junei	5.000	
383	Muktapur	5.000	
384	Ramachandrapur	6.500	
385	Gojitangiri	2.272	No. 4020 AFFN(SIDA)78/91F&E dt. 21.2.92
386	Barabeda	3.358	
387	Kakharuabeda	15.636	
388	Tentala	10.008	
389	Sarasposi	4.200	
390	Jharbeda	20.064	
391	Katupada	5.290	
392	Dendra	1.220	
393	Denua	5.000	
394	Atharanalisahi	5.140	
395	Chaturisahi	5.180	
396	Bholapada	0.020	
397	Chhatarapani	4.670	
398	Digiposi	2.650	
399	Telipada	6.220	
400	Ankura	5.768	No. 4020 AFFN(SIDA)78/91F&E dt. 21.2.92
401	Barabeda	9.003	
402	Kiapada	11.480	
403	Kendeiposi	20.880	
404	Sialijoda	5.059	No. AFFN (SIDA) 3756/F&E dt. 18.2.92
405	Khuntapada	5.350	
406	Nischintapur	3.728	
407	Tando	5.008	
408	Purunapani	5.312	
409	Banamahuladiha	2.648	
410	Kumudabahali	2.660	
411	Dianali	4.648	
412	Dasharathapur	5.112	
413	Madhubanasahi	5.368	
414	Kantiapada	2.980	
415	Dhuliasahi	5.452	
416	Jamunaposi	0.988	
417	Hatibari	5.148	
418	Tentela	5.400	
419	Duaghata	4.666	No. AFFN (SIDA) 38/92 3264/F&E dt. 8.2.93
420	Tavasaru	1.156	-do-
421	Dsihigudasahi (Kumudabahali)	5.896	No. AFFN(SIDA) 91-1977/F&E 28.1.92



422	Golasahi (Jamunaposi)	3.472	
423	Bhrungarajposi	4.008	
424	Mursuan	8.192	
425	Godhisahi	10.000	
426	Jamunaposi	10.000	
427	Mangalpur	5.000	
428	Erendei	13.000	
429	Nischintapur	10.000	
430	Budhikapudi	0.002	
431	Tavasaru	20.0	
432	Tavasaru	5.000	
Patna Range Total		1041.088	
433	Saleikana	5.05	AFFN (SIDA) 3756/F&E 18.2.92
434	Dimiria	5.230	
435	Koisisuta	10.526	
436	Kalima	6.560	
437	Golabandha	10.19	AFFN (SIDA) 78/91-4020 F&E 21.2.92
438	Bhimkand	5.170	
439	Sikulabahal	10.980	AFFN (SIDA) 91-1977 F&E 28.1.92
440	Saruali	5.480	
441	Siribahal	5.520	
442	Tangurubahal	10.760	
443	Patatangara	11.760	No. 19852/F&E dt. 13.11.91
444	Bhimkand	5.000	
445	Kantalei	5.000	
446	Saleikena	5.460	
447	Kuladera	6.100	
448	Banabiharipur	5.380	
449	Khuntapada	5.000	
450	Kalima	6.000	
451	Saruali	5.320	
452	Nuadiha	5.360	
453	Patatangara	5.380	
454	Dimiria	5.180	
455	Dandumunda	5.000	
456	Golabandha	10.480	
Telkoi Range Total		161.886	
Division Total		2678.341	

**2.15. Protected Forests (PF)**

These Forest blocks / land selected for Compensatory afforestation Purpose and subsequently declared under Section 33 of the Odisha Forest Act,1972. There are 44 blocks / sites in Keonjhar Division as detailed in Table No 2.5

Sl. No.	Name of Forest Block	Notified Area in Ha	Area used otherwise in ha (De-reserved area in ha/ Diverted/ Handed over to ST & OTFD)
	B&JP Range		
1	Anasuan-i	44.3210	10 F (DIV)/39/2011-9686/F& E dt. 26.03.2011
2	Anasuan-ii	55.0840	10 F (CONS)/12/2020-1223/F& E dt. 16.01.2020
3	Anasuan(A)	0.1959	10F(CON)/206/2015-13605/F& E dt. 31.07.2015
4	Baragoda	276.30	7887/F&E dated 02.05.2012
5	Benidihi	22.1000	10 F (DIV)/08/2010-19208/F& E dt. 24.08.2010
6	Benidihi(A)	38.3300	10 F (DIV)/40/2011-10556/F& E dt. 08.06.2011
7	Champajhar-i	31.00	10 F (DIV)/35/2012-17426/F& E dt. 21.08.2013
8	Champajhar(A)	20.3619	10 F (CON)/187/2014-20563/F& E dt. 11.11.2013
9	Champajhar-ii	2.4500	10 F (CONS)/123/2020-13516/F& E dt. 04.09.2020
10	Champajhar-iii	2.5000	10 F (CONS)/12/2020-1230/F& E dt. 16.01.2020
11	Champajhar-B	3.1400	10 F (CONS)/13/2019-3368/F& E dt. 15.02.2019
12	Dhaladihi	159.9685	10 F (DIV)/04/2007-14337/F& E dt. 20.08.2009
13	Fhuljhar-C	24.6000	10 F (DIV)/04/2008-14227/F& E dt. 20.08.2009
14	Guptaganga	38.9050	10 F (DIV)/15/2007-14332/F& E dt. 20.08.2009
15	Jantari	22.8392	10 F (DIV)/05/2009-13475/F& E dt. 03.08.2009
16	Jatra-i	14.3625	10 F (DIV)/03/2010-10486/F& E dt. 05.06.2010
17	Jatra-ii	117.9648	10 F (CON)/398/2012-8904/F& E dt. 27.04.2013
18	Kadalibadi	43.8900	10 F (CON)/283/2016-21838/F& E dt. 25.11.2016
19	Kalanda (Kha)	94.4965	10 F (DIV)/03/2010-10516/F& E dt. 05.06.2010
20	Kendughati	39.5046	10 F (DIV)/08/2010-10522/F& E dt. 05.06.2010
21	Lungajhar-i	31.4081	10 F (DIV)/29/2012-8962/F& E dt. 19.05.2012
22	Lungajhar-ii	32.7186	FE-DIV-FLD-0006-2021-6650/F&E dt. 26.03.2021
23	Lungajhar-A	15.277	16137/F&E dated 25.08.2012
24	Phuljhar-D	34.6500	10 F (CON)/25/2015-7360/F& E dt. 05.05.2015
25	Podadihi	120.8380	10 F (CONS)/26/2018-16523/F& E dt. 21.10.2020
26	Raidiha(A)	20.3200	10 F (DIV)/33/2011-7473/F& E dt. 27.04.2011
27	Sikulapada	9.6900	10 F (DIV)/18/2009-14237/F& E dt. 20.08.2009
28	Sukodola-i	85.5500	10 F (DIV)/17/2009-14347/F& E dt. 20.08.2009
29	Sukodola-ii	348.0119	10 F (DIV)/03/2010-10510/F& E dt. 05.06.2010
30	Tala Baitarani	13.4800	10 F (DIV)/13/2007-13450/F& E dt. 03.08.2009
31	Tana	64.3320	10F(CON)/37/2015-10594/F& E dt. 22.06.2015
32	Tentuli	28.6000	10 F (DIV)/25/2007-14222/F& E dt. 20.08.2009
33	Tentulikhunti-i	287.0685	10 F (DIV)/03/2010-10504/F& E dt. 05.06.2010



34	Tentulikhunti-ii	45.3220	10 F (CON)/476/2012(Pt)-8889/F& E dt. 27.04.2013
35	Upparabirikala-i	3.228	15796/F&E dated 20.07.2018
36	Upparabirikala -ii	12.69	21961/F&E dated 11.10.2018
	BJP Range Total	2205.4980	
	Champua Range		
37	Chhatia	59.7082	10F(CON)/188/2014-21081/F& E dt. 19.11.2013
38	Kaliapal	165.7930	10 F (CONS)/101/2019-21370/F& E dt. 06.11.2019
39	Kasia-i	105.3960	10 F (DIV)/15/2010-24379/F& E dt. 19.11.2010
40	Kasia-ii	7.6220	10 F (CON)/476/2012(Pt)-8895/F& E dt. 27.04.2013
	Champua Range total	338.5192	
	Keonjhar Range		
41	Hunda	82.5560	10 F (DIV)/03/2010-10468/F& E dt. 05.06.2010
	Telkoi Range		
42	Dandargauni	34.0000	10 F 77/2020-8099/F& E dt. 28.05.2020
43	Kaliapani	13.7978	FE-DIV-FLD-0067-2021-10901/F&E dt. 22.06.2021
44	Rangamatia-A	3.7000	FE-DIV-FLD-0088-2021-10894/F&E dt. 22.06.2021
	Telkoi Range total	51.4978	
	Division Total	2678.071	

2.1.6 Unclassed Forest:

There are land under administrative Control of Forest department but con declared under any sections of Odisha Forest Act,1972 are termed as “Unclassed Forests”. These include land under Offices, Nursery, Rest Houses etc. The details are at Table No 2.6

Table No 2.6 Unclassed forest of Keonjhar Division				
Sl. No.	Name of the Tahasil	Name of the Range	Name of Un-classed Forests	Area in ha
1	Champua	Champua	N.F.School	3.270
2			Range Office Cum residence	0.400
3			Fr. Qr. Champua	0.100
4			Ukunda Forester	0.120
5			Clerk Barrack	0.100
6			Balibandha Fr. Qr.	0.380
7			Champua FG Shed	0.060
8			Kalikaprasad FG shed	0.040
9			Laxmiposi FG shed	0.090
10			Jyotipur FG shed	0.080
11			Ukhunda FG shed	0.110
12			Banika FG shed	0.080
13			Champua Basti Jagya	0.040



Table No 2.6 Unclassed forest of Keonjhar Division				
Sl. No.	Name of the Tahasil	Name of the Range	Name of Un-classed Forests	Area in ha
14			JhumpuraGhara	0.040
15			Joda Fr. Qr. &F.G.Qr.	0.200
16			Chipindo FG shed	0.040
17			Jurudi FG shed	0.080
18	Keonjhar	Keonjhar	Keonjhar Range Office,Qr, Fr. Qr, F.G.Shed	0.300
19			Keonjhar Range Qr.	0.070
20			MaidankelF.G.Shed	0.140
21			BeldaF.G.Shed	0.140
22			Naranpurfr.Qr and F.G.Shed	0.240
23			ParjunpurF.G.Shed	0.300
24			A.C.F. Qr., Keonjhar	0.590
25			Clerk Qr. Kjr. 1 set	0.590
26			Clerk Qr. Kjr. 1 set	0.590
27			Clerk Qr. Kjr. 1 set	0.590
28			Clerk Qr. Kjr. 1 set	0.590
29			Clerk Qr. Kjr. 2 set	0.060
30			KJR FG shed Nijgarh	0.310
31			KJR FG shed Nijgarh	0.310
32			Division Office Compound, Keonjhar	0.250
33			BhalukipatlaGharabari PS Sadar	0.060
34			Badadera (Gharabari) PS Sadar	0.060
35			Nijgarh (Gharabari) PS Sadar	0.200
36			BalabhadrapurF.G.shed	0.250
37			JanghiraF.G.shed	0.900
38	Ghatagaon	Ghatagaon	Deobandha Fr. Qr.	0.370
39			ManapurF.G.Shed	0.180
40			GhatgagaonF.G.Shed	0.060
41			Ghatgaon Fr. Qr.	0.040
42			Ghargaon Range	0.050
43			Ghatgaon Range	0.600
44			DhenkikoteF.G.Shed	0.200
45			BaiganpalF.G.Shed	0.100
46			BalipokhariF.G.Shed	0.080
47			KadabahaliF.G.Shed	0.050
48	Ghatagaon	Ghatagaon	MasinabilaF.G.Shed	0.070
49			MelanF.G.Shed	0.010



Table No 2.6 Unclassed forest of Keonjhar Division				
Sl. No.	Name of the Tahasil	Name of the Range	Name of Un-classed Forests	Area in ha
50			Pipilia F.G. Shed	0.100
51	Telkoi	Telkoi	Telkoi range	0.460
52			Talapada Fr. Qr.	0.400
53			Kaliahata Fr. Qr.	0.200
54			Bimala Fr. Qr.	0.400
55			Bimala Check gate	0.080
56			Rekuti Check Gate	0.030
57			Patakholi F.G. Shed	0.030
58			Ranibeda F.G. Shed	0.040
59			Benamunda F.G.	0.010
60	Keonjhar	B&JP	Gandijoda F.G.	0.060
61			Bayapandadhar	0.200
62			Suakati Fr. Qr.	0.200
63			Anjar Beat House	0.200
64			Tentuli (Ghara) PS	0.215
65			Kanjipani FG shed	0.200
66			Gonasika FG shed	0.200
67			Nayakote Marking shed	0.100
68			Bansapal F.G. shed	0.040
69		Patna	Khireitangiri Fr. Qr.	0.430
70			Tinda FG shed	0.140
71			Poipani FG shed	0.080
72			Machhagarh FG shed	0.060
73			Gorandijodi FG shed	0.100
74			Saharpada (Ghara)	0.040
75			Rajnagar (Gharabari)	0.100
76			Chemena PS Turumunga	2.210
77			Udayapur PS Patna	0.060
78			Jamunaposi FG shed	0.160
79			Patna Fr. Qr.	0.100
80			Maliposi FG shed	0.060
81	Barbil	Barbil	Barbil Fr. Qr.	0.310
82			Nalda Fr. Qr.	0.610
83			Purusottampur F.G. Shed	0.230



Table No 2.6 Unclassed forest of Keonjhar Division				
Sl. No.	Name of the Tahasil	Name of the Range	Name of Un-classed Forests	Area in ha
84			BarbilFGShed	0.360
85			Uliburu FG shed	0.050
86			Karo FG shed	0.060
87			Balita FG shed	0.060
88			Murga FG shed	0.040
	Total			22.0050

2.1.7 DLC Forest:

District Level Committee (DLC) was constituted during the year 1997 in each district under the Chairmanship of the District Collector as per the Orders passed by the Hon'ble Supreme Court of India in W.P.(C) 202/1995 to identify all forest areas under the administrative control of F&E Department /Revenue Department and Forest land / Plantations belonging to private persons. After necessary scrutiny of the DLC Reports by the State Level Expert Committee, the details of such Forest land were submitted before the Hon'ble Apex Court in shape of an affidavit. All such Forest Lands which found place in the final DLC reports are to be regulated under the provisions of the Forest (Conservation) Act, 1980.

Instruction has been issued by the Government of Odisha, Revenue and Disaster Management Department vide letter No RDM/-LRGEA.POLICY – 0018-23784/ R&DM Dated 30.06.2018 (**Annexure- III**) to enter this DLC Forest land in the BHULEKH DATA BASE. However for ready reference of the Forest staff, it is felt necessary to compile the DLC Report of the Division and annexed to this Working Plan.

There are total 10 Tahasils in Keonjhar division. The abstract of Tahasil wise DLC area of Keonjhar Division is is furnished at **Table No 2.7. the detail list of DLC land is at PART-III.**



Table No 2.7 Abstract of DLC Forest Keonjhar Division

Sl No	Name of the Tahasil (as during 2002)	Area		Total area in Ha.
		In Hectare	In Acre	
1	Champua	1975.2800		1975.2800
2	Barbil	15266.2000		15266.2000
3	Keonjhar	10160.137	1340.13	10702.48760
4	Telkoi	1330.3338	31.89	1343.23970
5	Ghatgaon	2660.1868	213.96	2746.77640
6	Patna	18.4160	143.82	76.62000
	Total	31410.5536	1729.8000	32110.6037
Conversion factor 1 Acre = 0.4047 ha.				

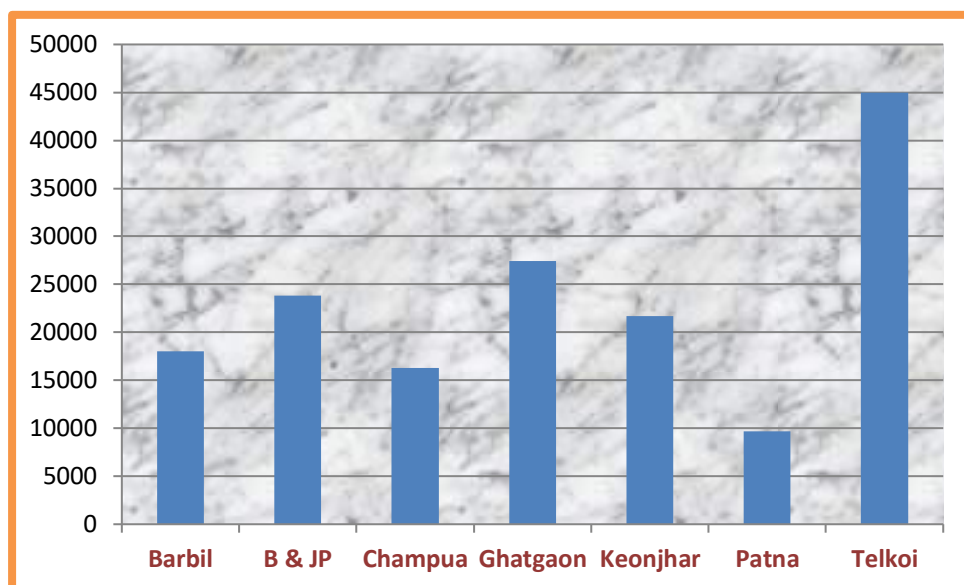
2.1.8 Abstract of Forest in Keonjhar Division



Table No 2.8 Abstract of Forests (RF/ PRF/DPF/PF/ VF) in Keonjhar Division.

Range	RF		PRF		DPF		VF		PF		Total	
	No	Area	No	Area	No	Area	No	Area	No	Area	No	Area
Barbil	7	17482.76	0	0	1	518.23	3	16.604	0	0	11	18017.594
B & JP	7	2744.373	14	6045.3	15	12728	14	103.558	36	2205.498	86	23826.2915
Champua	11	11500.95	2	463.34	5	3147.1	151	843.317	4	338.5192	173	16293.2099
Ghatgaon	9	26779.37	0	0	8	553.62	12	74.418	0	0	29	27407.4077
Keonjhar	14	16384.883	1	3575.4	1	1211.8	75	437.47	1	82.556	92	21692.149
Patna	19	7670.8	1	31.02	18	965.82	177	1041.088	0	0	215	9708.7323
Telkoi	13	36201.725	6	5171.8	13	3375	24	161.886	3	51.4978	59	44961.9593
Total	80*	118764.861	24	15286.8573	61	22499.2134	456	2678.341	44	2678.071	665	161907.3437

(NB: Atei RF is in Patna and Ghatgaon range, Barabanka RF in Ghatgaon and Keonjhar range, Nalapanga RF in Gahtgaon & Keonjhar Range)



2.2. Forest Area under different Working Circle/Management Plan

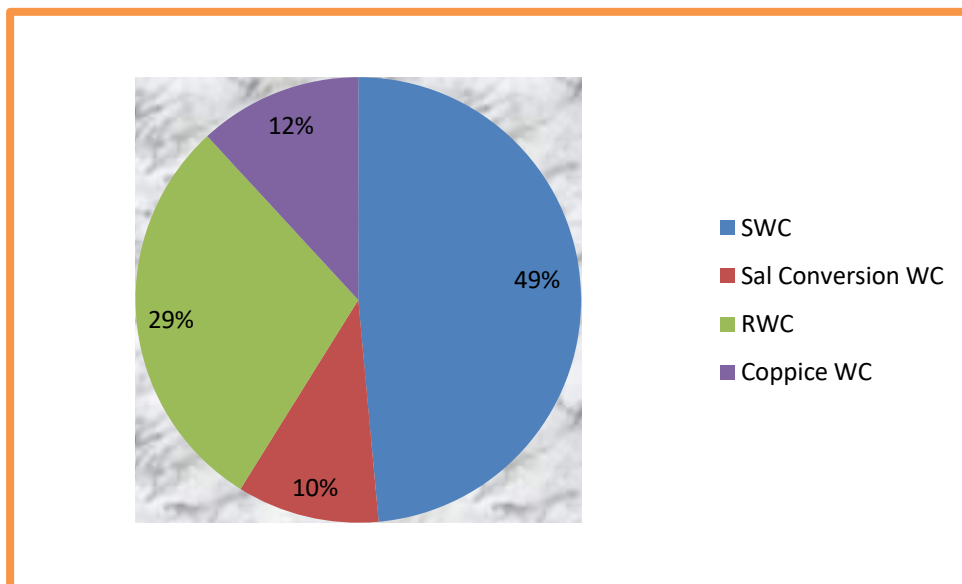
Constitution of Working Circles: The Working Plan prepared by Sri B.C. Mohapatra, IFS for the period from 1984-85 to 1993-94 is the only approved working plan prior to this plan. After Sri Mohapatra's plan, one plan was prepared by Sri Narayan Samal, OFS (I) for Keonjhar Division and Keonjhar (WL) Division for the period from 2007-08 to 2016-17. It got conditional approval for three years only i.e. from 2011-12, 2012-13 and 2013-14. In subsequent years, coupe workings were carried out on the basis of schemes submitted by the Divisional Forest Officer and approved by the competent authority.

2.2.1 Constitution of Working Circle in Mohapatra Plan:

Sri Mohapatra, IFS had constituted four Working Circles considering all forests of undivided Keonjhar Division. Excluding the areas of Keonjhar (WL) Division, the constitution of Working Circle in his plan is furnished below in **Table No. 2.9**.

Table No. 2.7

Table no 2.9 Constitution of Working Circle during Mohapatra Plan					
Name of the Range	SWC	Sal Conversion WC	RWC	Coppice WC	Total
Champua	0	9871.16	12072.16	5730.45	27673.77
Ghatagaon	4211.54	0	26149.71	4030.78	10247.71
Keonjhar	8003.35	0	13895.36	1569.64	23468.35
Telkoi	34172.09	0	0	0	34172.09
Total	46386.9800	9871.1600	27972.9100	11330.8700	95561.9200
%	48.54	10.33	29.27	11.86	100



2.2.2 Constitution of Working Circle in Samal's Plan:

While constituting Working Circles, Sri Samal took due care to fragment the areas of Keonjhar Division and Keonjhar (WL) Division according to the respective need. As per the recommendation of the Working Plan Committee, 07 numbers of Working Circles were constituted in his Plan for Keonjhar Division. According to the recommendation, and provisions of the National Working Plan Code, 2004, areas had been distributed as per the field realities.

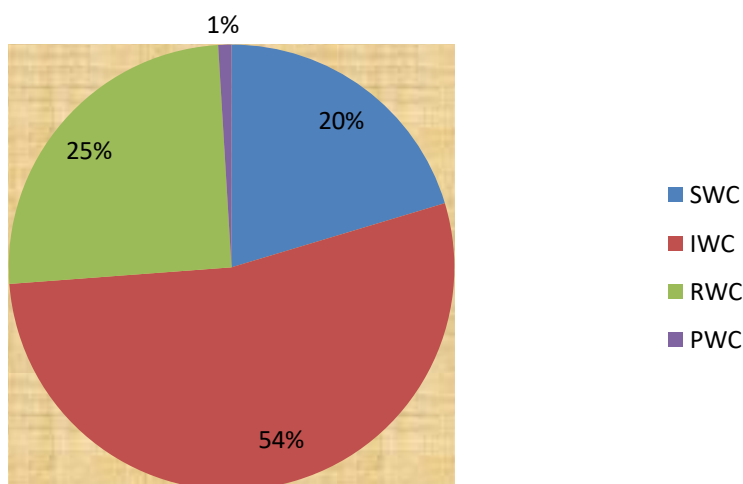
2.2.2.1 Allocation of Area to different Working Circles in Samal's Plan:

The field realities necessitate constitution of seven working circles as discussed above encompassing 79 Reserved Forests and 24 Proposed Reserved Forests of Keonjhar division. **Table 2.10** shows the detail distribution of the areas of different R.F. and P.R.F. into different Working Circles during Samal Plan.



Table No 2.10 Distribution of the areas of different R. Fs and P.R. Fs into different Working Circles

Range	Area	SWC	IWC	RWC	PWC	NTPF (O) WC	Wildlife(O) WC
Reserved Forests							
Barbil	16847.3117	0	8141.1191	7474.1375	1232.0551	16847.3117	16847.3117
BJP	2886.9556		730.1353	2156.8204		2886.9557	2886.9557
Champua	10865.2105		6528.0252	4337.1853		10865.2105	10865.2105
Ghatgaon	26283.902		16382.0177	9901.8843		26283.902	26283.902
Keonjhar	15532.6744		13984.8511	1547.8234		15532.6745	15532.6745
Patna	7438.6864		5086.0664	2352.6200		7438.6864	7438.6864
Telkoi	35900.4896	24944.6688	10955.8206			35900.4894	35900.4894
Total	115755.2302	24944.6688	61808.0354	27770.4709	1232.0551	115755.2302	115755.2302
Proposed Reserve Forests							
Barbil	0						
BJP	5319.5516		640.6044	4678.9472		5319.5516	5319.5516
Champua	555.8752		555.8752			555.8752	555.8752
Ghatgaon	0						
Keonjhar	3565.9209		3565.9209			3565.9209	3565.9209
Patna	15.7156		15.7156			15.7156	15.7156
Telkoi	3410.7763	1229.8612	2180.9151			3410.7763	3410.7763
Total	12867.8396	1229.8612	6959.0312	4678.9472		12867.8396	12867.8396
G. TOTAL	128623.0698	26174.5300	68767.0666	32449.4181	1232.0551	128623.0698	128623.0698
Percentage		20.3	53.5	25.2	1.0	100.0	100.0



**2.3 Percentage of forest with secured boundaries:****2.3.1 Position of Boundary Pillars:**

The forest Boundaries of all forest blocks (RF, PRF and DPF) were inspected during working plan preparation. The status of boundary maintenance is as furnished at table no---

Table No 2.11: Boundary Pillar Position						
Sl. No	Name of Forest Block	Boundary Length in Km.	Boundary Pillars			
			Notified	Good	Damaged	Missing
Reserve forests						
1.	Anjar	9.3682	74	48	22	4
2.	Atei	88.200	277	180	83	14
3.	Badamasinabilla	5.5016	32	21	9	2
4.	Baitarani (A)	131.6500	280	182	84	14
5.	Baitarani (B)	40.5000	138	90	41	7
6.	Balabhadrapur	17.0000	43	32	8	3
7.	Balibandha	27.4000	169	110	51	8
8.	Balipokhari	46.2500	126	82	38	6
9.	Bandhanjhari	41.0000	181	118	54	9
10.	Barabanka	95.5000	686	445	205	36
11.	Barbil	1.9100	12	7	4	1
12.	Bardhana	39.9400	212	137	64	11
13.	Basantapur	18.1500	62	40	19	3
14.	Baunsuli	37.5500	306	199	92	15
15.	Belda	31.8800	193	125	58	10
16.	Belposi	5.4020	42	27	13	2
17.	Benamunda	24.6000	134	87	40	7
18.	Billa(A)	3.6532	36	23	11	2
19.	Budhikapudi - II	2.1920	16	10	5	1
20.	Chadheibhol	4.3892	37	24	11	2
21.	Chamunda-Golabandha	4.0190	35	22	11	2
22.	Chemna(A)	3.3556	25	16	8	1
23.	Dhanurjayapur	4.4536	37	24	11	2
24.	Gadagadei	7.6520	65	42	20	3
25.	Ghatgaon	19.3200	190	180	10	0
26.	Jadipada	38.9900	102	66	31	5
27.	Jagar	6.5812	49	32	15	2
28.	Jharbeda	30.5000	132	85	40	7
29.	Jyotipur	26.8000	147	96	44	7
30.	Kalapat	107.1200	765	497	230	38
31.	Kalikaprasad	85.0000	198	129	59	10
32.	Kalimati	18.4500	136	88	41	7

**Table No 2.11: Boundary Pillar Position**

Sl. No	Name of Forest Block	Boundary Length in Km.	Boundary Pillars			
			Notified	Good	Damaged	Missing
33.	Kandara (A)	1.0230	11	7	3	1
34.	Kandara (B)	6.9442	45	29	14	2
35.	Kandara (C)	6.2186	53	34	16	3
36.	Kanjipani	17.6118	174	113	52	9
37.	Karo	53.2000	389	253	117	19
38.	Khajurimundi	6.3426	51	33	15	3
39.	Kodbil	28.8200	163	106	49	8
40.	Krushnapur	30.1600	156	101	47	8
41.	Laxmiposi	29.5200	182	118	55	9
42.	Laxmiposi	3.3036	25	16	8	1
43.	Maidankela	19.8500	91	59	27	5
44.	Mankadachua	17.9300	112	73	34	6
45.	Masinabilla	26.5500	145	94	44	7
46.	Mooney	6.0080	40	26	12	2
47.	Mundula	18.3938	170	111	51	9
48.	Naibuga	9.9020	99	64	30	5
49.	Nalapanga	29.4200	92	59	27	6
50.	Narayanpur	26.9600	121	79	36	6
51.	Nayagarh	28.4400	190	124	57	10
52.	Nelung	12.4800	84	55	25	4
53.	Ninua	4.5360	25	16	8	1
54.	Padmapur	48.5000	356	231	107	18
55.	Palasapada	1.6898	15	10	5	1
56.	Patna	60.3300	368	239	110	18
57.	Pedipokhari	16.3162	179	116	54	9
58.	Pipilia	34.8500	235	153	71	12
59.	Poipani	40.4000	299	194	90	15
60.	Pradhanpada	3.0532	28	18	8	1
61.	Purunapani	13.3460	108	70	32	5
62.	Raghunathpur	31.3900	302	196	91	15
63.	Raikala	48.0000	243	158	73	12
64.	Ranibeda	36.2500	234	152	70	12
65.	Rasapada	1.3710	13	8	4	1
66.	Saharpur	22.8136	148	96	44	7
67.	Salaikena-Siriabahal	6.1716	54	35	16	3
68.	Samakoi	37.3700	169	110	51	8
69.	Sarasposi	1.6194	9	6	3	0
70.	Sarupat	10.9700	101	66	30	5
71.	Siddhamath	71.1700	439	285	132	22



Table No 2.11: Boundary Pillar Position						
Sl. No	Name of Forest Block	Boundary Length in Km.	Boundary Pillars			
			Notified	Good	Damaged	Missing
72.	Tamanga	20.4680	228	148	68	11
73.	Tangarani	31.7800	136	88	41	7
74.	Thakurani	53.1000	304	198	91	15
75.	Tando	2.5900	18	12	5	1
76.	Ukhunda	30.1200	127	83	38	6
77.	Uliburu	45.2500	161	105	48	8
	Total (RF)	2076.8100	11629	7611	3441	577
PRF						
1	Amuni	5.6180	38	25	11	2
2	Baitarani East (A)	8.5152	77	50	23	4
3	Baitarani East (B)	9.6718	79	51	24	4
4	Bayakumutia	5.0482	42	27	13	2
5	Champey	13.1960	92	60	27	5
6	Danla	5.5242	52	34	15	3
7	Digchampey	6.3600	50	33	14	3
8	Dubulapal	4.2346	34	22	10	2
9	Dumuridiha	14.7548	105	68	32	5
10	Gandhamardan	35.1574	239	155	72	12
11	Godhihudi	6.8322	60	39	18	3
12	Gonasika	9.6784	76	49	23	4
13	Goudachampey	15.1028	105	68	32	5
14	Khajuribani	67.2982	233	151	70	12
15	Lunaghar(I)	6.5772	67	44	20	3
16	Lunaghar(II)	12.0400	104	68	31	5
17	Raigoda	13.3750	118	77	35	6
18	Rekuti	10.5718	80	52	24	4
19	Renda	22.9400	157	102	47	8
20	Shyamanali-Koilisuta	17.8234	140	91	42	7
21	Sikheswari	29.2550	197	128	59	10
22	Suakati (I)	18.2768	157	102	47	8
23	Suakati(II)	5.4306	40	26	12	2
24	Budhikapudi I	2.6986	24	16	7	1
	Total (PRF)	345.9802	2366	1538	708	120
	Div Total RF+PRF	2422.79	13995	9149	4149	697
	Percentage			65.37	29.65	4.98

At From the above field study, it is seen that out of 13995 boundary pillars, 9149 pillars are in good condition which constitutes 65%. Some portions of pillars are either missing



or damaged. The boundary position is satisfactory and it can be inferred as **“Forest boundary is secured.”**

(The boundary of DPF, PF, and VF has not been surveyed. It needs a complete survey & maintenance)

2.3.2 Boundary Maintenance Cycle

In order to have a better and secured forest boundary a boundary maintenance cycle of five years is suggested. The year wise maintenance of pillars of forest blocks is furnished at Table no 2.12 below.

Table no 2.12 Boundary maintenance cycle		
Year of Boundary Maintenance	RF	PRF
2022-23 & 2027-28	Anjar, Balabhadrapur, Barbil, Belposi, Chamunda-Golabandha, Jadipada, Kalikaprasad, Kanjipani, Laxmiposi, Mooney, Nayagarh, Patna, Purunapani, Saharpur, Siddhamath, Ukhunda	Amuni Danla Godhihudi Lunaghar(II) Sikheswari
2023-24 & 2028-29	Atei, Balibandha, Bardhana, Benamunda, Chemna(A), Jagar, Kalimati, Karo, Laxmiposi, Mundula, Nelung, Pedipokhari, Raghunathpur, Salaikena-Siriabahal, Tamanga, Uliburu	Baitarani East (A) Digchampe Gonasika Raigoda Suakati (I)
2024-25 & 2029-30	Badamasinabilla, Balipokhari, Basantapur, Billa(A), Dhanurjayapur, Jharbeda, Kandara (A), Khajurimundi, Maidankela, Naibuga, Ninua, Pipilia, Raikala, Samakoi, Tangarani	Baitarani East (B) Dubulapal Goudachampe Rekuti Suakati(II)
2025-26 & 2030-31	Baitarani (A), Bandhanjhari, Baunsuli, Budhikapudi – II, Gadagadei, Jyotipur, Kandara (B), Kodbil, Mankadachua, Nalapanga, Padmapur, Poipani, Ranibeda, Sarasposi, Thakurani.	Bayakumutia Dumuridiha Khajuribani Renda Budhikapudi I
2026-27 & 2031-32	Baitarani (B), Barabanka, Belda, Chadheibhol, Ghatgaon, Kalapat, Kandara (C), Krushnapur, Masinabilla, Narayanpur, Palasapada, Pradhanpada, Rasapada, Sarupat, Tando.	Champe Gandhamardan Lunaghar(I) Shyamanali- Koilisuta

**2.4. Land use, land use change and forestry (LULUCF)**

Land use, Land use Change and Forestry (LULUCF) refers to the way humans manage land, how that use changes and forestry. Human alteration of landscapes from natural vegetation to any other use typically results in habitat loss, degradation and fragmentation, all of which can have devastating effects on biodiversity.

2.4.1 Land Use Pattern:

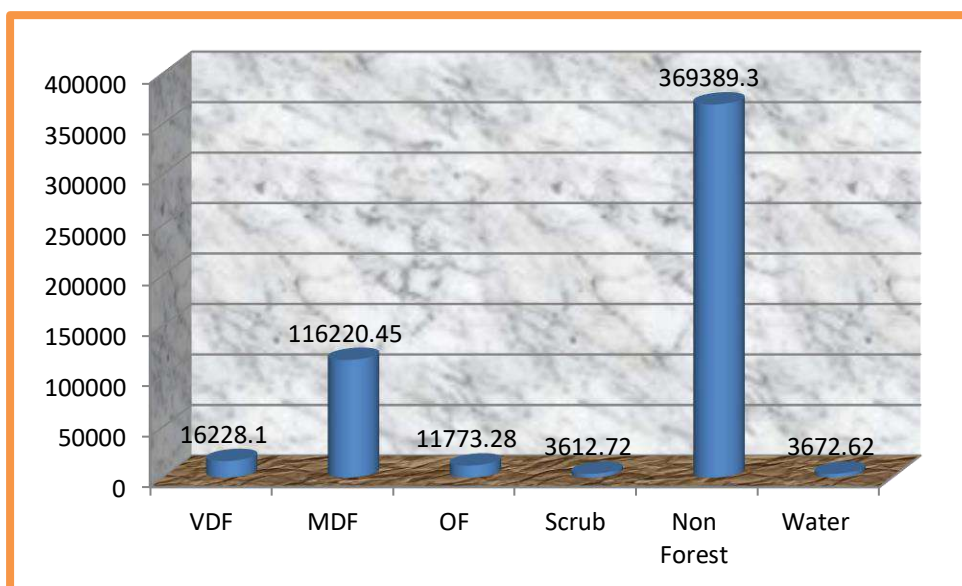
The gross cropped area, net sown area and area sown more than once are 383437 ha, 272919 ha and 110518 ha respectively. The cropping intensity of the district is 140.49. The forest area of the district is 311717 ha and the area under wasteland is 20096 ha. The land-use pattern of the district is given in **Table No. 2.13**.

Table No. 2.13: Land use Pattern of Keonjhar District (in ha.							
Name of District	Total Geographical Area	Area under Agriculture			Area under Forest	Area under Wasteland	Area under other uses
		Gross cropped Area (1)	Net Sown Area (2)	Area sown more than once (1-2)			
Keonjhar	831000	383437	272919	110518	311717	20096	226268

Source -DDA, Keonjhar

As for FRI Report for the period 2015-2019 the land use pattern for Keonjhar Division is as follows.

Table No 2.13 (A) land use pattern of the division as guven by FSI			
Sl No	Land Use pattern	Area in Ha	Percentage
1	VDF	16228.10	3.1
2	MDF	116220.45	22.3
3	OF	11773.28	2.3
4	Scrub	3612.72	0.7
5	Non Forest	369389.30	70.9
6	Water	3672.62	0.7
	Total	520896.47	100.0



2.4.2 Land use categories:

Six broad categories of land may be considered as top-level categories for representing land areas within Keonjhar district. The names of these land categories are a mixture of land cover (e.g., Forest land, Crop land, Grassland, Wetlands) and land use (e.g., Crop land, Settlements) classes. For convenience, they are here referred to as land- use categories as follows:

2.4.2.1 Forest land:

This category includes all land with woody vegetation consistent with thresholds used to define forest land sub-divided into managed and unmanaged, and also by ecosystem type. It also includes systems with vegetation that currently fall below, but are expected to exceed, the threshold of the forest land category.

2.4.2.2 Crop land:

This category includes arable and tillage land, and agro-forestry systems where vegetation falls below the thresholds used for the forest land category.

2.4.2.3 Grassland:

This category includes hill range lands and pasture land that is not considered as cropland. It also includes systems with vegetation that fall below the threshold used in the forest land category and is not expected to exceed, without human intervention, the threshold used in the forest land category. The category also includes all grassland from wild lands to recreational areas as well as agricultural and silvicultural systems.



2.4.2.4 Wetlands:

This category includes land that is covered or saturated by water for all or part of the year and that does not fall into the forest land. It includes reservoirs, natural rivers and lakes.

2.4.2.5 Settlements:

This category includes all developed land, including transportation infrastructure and human settlements of any size.

2.4.2.6 Other land:

This category includes bare soil, rock, and all unmanaged land areas that do not fall into any of the other five categories. The broad categories listed above provide the framework for the further sub-division by activity, management regime, climatic zone and ecosystem type. Although about 25.76% of geographical area in this Division is under forest cover, still it is rich in floral and faunal biodiversity with vast deposit of Iron, Manganese and other valuable mineral resources. On account of the high percentage of minerals in the division, emphasis has shifted to large-scale mining as well as industrial and infrastructural development in the last two decades. As a result, several companies have taken up mining and setting up industries in Joda, Barbil, Bolani and Suakati areas. Even though mining is restricted to smaller areas, ecological repercussions of such interventions are felt across vast expanses affecting other production systems.

Many parts of the Keonjhar District are covered under the above six categories out of which mining activities, encroachment and shifting cultivation has contributed a lot in the land use change. The ongoing mining activities in Joda, Barbil and Suakati area are a major concern in the division.

2.4.3 Encroachment:

The most serious land use and land use change in Keonjhar Division is the encroachment into the forest land mainly for cultivation and human settlement and mining activities. The tendency of forest land encroachment by the local people is increasing day by day for agricultural purpose and human settlement. The cases booked against ineligible encroachers and the extent of forest land encroached in pre-1980 and post-1980 is given in Annexure-IVA and Annexure-IVB respectively. Range-wise Pre-80 & Post-80 Encroachment has been furnished in below **Table No. 2.14**.

**Table No 2.14 List of Enchroachment: Keonjhar Division.**

Sl No	Range	Name of the Forests	Comp. No	Area under encroachment
1	Barbil	Karo RF	10	4.2525
2	Barbil	Sidhamath RF	2	3.969
3	Barbil	Thakurani RF		0.6075
	Barbil Total			8.8290
4	B & JP	Anjar RF		0.405
5	B & JP	Saharpur RF		0.405
6	B & JP	Lunaghar-I PRF		1.3932
	BJP Total			2.2032
7	Patna	Atai RF	3	16.848
8	Patna	Purunapani RF		0.4658
	Patna Total			17.3138
9	Champua	Baitarani-A RF		6.48
10	Champua	Bardhana RF		12.1703
11	Champua	Jyotipur RF		0.81
12	Champua	Pedipokhari RF		1.215
13	Champua	Ukhunda RF		0.81
14	Champua	Kalikaprasad RF		81.0851
	Champua Total			102.5704
15	Ghatgaon	Barabanka RF	14	0.81
16	Ghatgaon	Masinabila RF		4.0905
17	Ghatgaon	Nalapanga RF	1	8.3025
18	Ghatgaon	Atai RF	12	75.7958
	Total Ghatgaon			88.9988
19	Keonjhar	Belda RF		34.992
20	Keonjhar	Jadipada RF		33.4125
21	Keonjhar	Barabanka RF	15	2.835
22	Keonjhar	Basantapur RF		3.4425
23	Keonjhar	Maidankel RF		1.215
24	Keonjhar	Nalapanga RF	2	4.455
25	Keonjhar	Narayanpur RF		3.2805
26	Keonjhar	Nelung RF		4.9977
27	Keonjhar	Raikala RF		0.4253
28	Keonjhar	Tangarani RF		0.2228
	Total Keonjhar			89.2783
29	Telkoi	Bandhanjhari RF	1	1.7415
30	Telkoi	Benamunda RF	1	7.6748



31	Telkoi	Kalapat RF	14	25.11
32	Telkoi	Rekuti PRF		2.1749
	Telkoi Total			36.7012
	Total			345.8947

Encroachment takes place mainly in the peripheries of the all the Reserved Forests blocks adjacent to the human habitat. The encroachment affected forest blocks are mainly Palaspada, Jyotipur, Sarupat, Raghunathpur, Balbhadrapur, Basantpur, Kalimati, Masinabilla, Pipilia, Bandhanjhari, Krushnapur, Ranibeda, Jharbeda, Uliburu etc. Major Encroachments in the Reserved Forests also noticed in Thakurani RF, Baitarni-A RF, Nalapanga RF, Benamunda RF, AteiRF, Bardhana RF, Kalikaprasad RF, Belda RF, Jadipada RF, Somakoi RF and Kalapat RF. It is also noticed prominently in the industrial and mining belt of Joda and Barbil of Barbil Range and Suakati area of BJP Range. Large chunk of encroachments is also found in Karo Reserved Forests in compartment No. 1 to 7, 10 and 11, Thakurani Reserved Forests near Hirakud Colony, Soyabali village and along Barbil - Bhadrasahi road. Heavy encroachments are noticed in Baitarani 'A' and 'B' Reserved Forests. These encroachments are mainly due to settlement of colonies of mining workers and to some extent for agricultural purpose. In Kalapat Reserved Forests, encroachments are noticed in comp. 17, 18, 22 near Kanteisuani, Kodbil, Kulan, Benamunda, Haldipani and Alani village. In Bandhanjhari Reserved Forests, encroachment is noticed at Malanda village.

Irregular maintenance of boundary line and inadequate supervision has led to massive encroachment inside the Reserved Forests near the boundaries. Different projects undertaken by the Government in the district like Kanjhari Irrigation project, Hadagarh, Hanumantia, Khajuria, Dandadhar etc. has activated the encroachers indirectly to settle inside Atei, Barabanka and Kalapat RF. The mining activities in the district has also supplement the desire among the people for encroachment. Thakurani, Uliburu, Baitarani, Karo and Siddhamath Reserved Forests are heavily affected in this respect. Even the core areas of the Reserved Forests like Baitarani, Thakurani and Uliburu have not escaped from the encroachers. All the encroachers are not landless. Most of them are migrants from nearby Jharkhand areas and many are labourers engaged in mining work. It appears that such encroachment is a continuous process.

Physical removal of encroachers, in the beginning stage itself is the most effective measure against the encroachments. The field staff specially the forest guards should regularly inspect the area so that encroachments will be detected at the initial stage and there will be a psychological impact on the land grabbers not to dare to encroach the forest land. At least once in a month the position of encroachments should be reviewed at Range level in the presence of all the field staff. The sub-ordinate staff should give an

undertaking to the effect that there is no fresh encroachment and if there is any encroachment, steps should be taken to evict the encroachers immediately.

2.5 Threats to the forest:

The forest crop of Keonjhar Division is susceptible to various threats as narrated in the foregoing paragraphs for which major proportion of forest crop has devastated with further in the process of devastation. The major causes of threats to forests are as under.

2.5.1 Threats from Natural calamities:

The threats from natural calamities are from

I) Cyclone storm

Keonjhar division experience cyclonic storm which usually originate from Bay of Bengal. Lot of damage is being caused due to cyclonic storm.

II) Heavy flood:

Keonjhar district drains to Baitarani River and partly to Brahmani River. Though flood occurs in both the rivers it does not affect the division as it is partly a table land.

III) Drought:

The Division experiences drought in a cycle of 3-4 years interval. Due to climatic change, irregular rainfall brings drought like situation. No mass damage due to drought has been reported.

2.5.2 Threat from Biotic factors

The forest are under very much pressure due to population rise and increase in demand for land, recreation, forest produce, grazing etc. The threats from biotic factors are

I. Biotic interference: This is one of the major causes responsible for devastation of forests. It results an irreparable loss to the forest. This biotic interference includes illicit felling, grazing, forest fire, mining activities, shifting cultivation, encroachment, sweeping of the forest floor, lopping and pollarding of the trees.

A. Illicit Felling: Illicit felling is the major threats to the forest and is mostly the prime cause of depletion of forest cover in the division. Four major reasons play a vital role for causing illicit felling in the forests.

(a) Thickly populated villages are located in and around the forest and the villagers are fully dependent upon the forest for their livelihood. They usually cut the trees for small timber and firewood for their own consumption. They collect their fencing materials and agricultural implements from these forests. It sometime tempts the local people to earn quick and easy money by supplying timbers to



the nearby towns. Because of such regular removal of timber, poles, fire wood and tooth sticks un-authorizedly many forest areas are now treeless and having bushes only e.g.Siddhamatha, Suakati, Anjar, Gandhamardan, Bayakumutia, Sanaghagara,Belda, Narayanpur, Nelung, Patna, Atei, Ghatagaon, etc.

- (b) At present, the carpentry units and sawmills have been shut down without providing any alternative means for sawing. Unemployment is a common phenomenon everywhere. On the contrary, such unemployment supplements the establishment of illegal sawmills and carpentry units in the small and big towns as well as in rural areas. This has reached its maximum at Joda, Barbil and Keonjhar etc. Further, thousands and thousands of trucks are involved in iron and Manganese ore transportation in this district. For construction of new body and repair of the old ones, huge quantity of sal timber is being used un-authorisedly. These are mainly smuggled from Kalapat and Atei. Due to such activity the valuable species like Sal, Bija, Sisoo, Kurum, Gambhar etc are gradually vanishing from the forests.
- (c) Further, the neighbouring areas i.e.Bhadrakh, Jajpur and Cuttack district are having no forest. These coastal areas are highly populated. The vast populations of the adjoining districts are fully dependant for their timber requirements on the forests of Keonjhar District. Around 2500-3000 iron ore loaded trucks are plying from Joda-Barbil and Suakati areas to Paradeep port in the state and other port like Haladia every day by N.H 49 and 220. Massive quantity of fuel wood is being occasionally transported to Panikoili, Chandikhol areas by these trucks. The entire route devoid of forest check gates and it is not possible to detain the trucks and to check those thoroughly.
- (d) The major forest of Baitarani, Thakurani, Nayagarh and Uliburu R.F.s which are close to the vicinity of the industrial and mining belt of Barbil and Joda areas are now almost treeless and are having mainly bushes and saplings. Hardly 10 to 15% of the forest contains pole crops. This is mainly due to huge human settlement. The increasing population of these areas are also dependant on these forests for their fuel wood and preparation of huts etc.

B. Uncontrolled Grazing:

Grazing is another factor, which plays a major role in the depletion of forests. With the increase in human population, the population of cattle has also increased massively. These large herds of cattle and buffalos are kept by the villagers not only for agricultural implements purposes but also for carts, milk, and to get more dung for use in their agricultural fields. Severe damage is caused to the plantations and young regenerations



by grazing and browsing by domestic animals, leading to replacement of good forest tracts of mesophytic flora by relatively more xerophytic, dry and thorny ones. Heavy grazing is noticed almost all Reserve Forests so also in all 'B' class Reserved Forests.

C. Forest fire:

These divisions are situated in the tropical zone and leaf shedding starts from mid-February and the dried leaves cover the forest floor, which is highly susceptible to fire. Fire is the main factor responsible for inadequate regeneration and spoiling the recruits and small saplings. During last part of February to first part of April, fire incidence occurs in the entire division. Most of the Forest fires are man-made and restricted to ground surface. The Forest blocks, which are worst affected, are Atei, Santoshpur, Bhuyan&JuangPirhs, Karo, SiddhamathKalapat, Bandanjhari, Ranibeda, Barabank, Balabhadrapur, Nalapanga, Sarupat, Basantpur etc. As per the field observation, the incidence and intensity of forest fire in different areas is reflected in **Chapter-4**

D) Insects:

The quantitative data on the damage caused by the insects is not available. However, during the course field inspection, the following insects have been noticed causing damage to the plants.

- i) ***Hoplocerambyxspinicornis*** (Sal heart wood borer): This sal heartwood borer is found to attack the felled un-barked logs and sickly sal trees particularly during rainy season. This type of damage is noticed in Atei, Rebena, Ranibeda, Bandhanjhari and Kalapat areas.
- ii) ***Haplomachaelis*** (teak skeletoniser): This type of insects cause damage to the teak leaves. It eats up the entire pulpy portions except the mid-ribs and veins of the leaves. Generally, it occurs towards the end of rainy season particularly during the period from September to November.
- iii) ***Hyblaepueurea*** (Teak defoliator): These types of insects attack the teak leaves. Due to its attack the leaves become yellowish and restrict photosynthesis and ultimately fall down. Because of such affect, the growth of the tree hampered and cause loss of timber value.
- iv) ***Scolytid beetles***: These insects attack the sal seeds, which fell down prematurely. Further defoliation of sal tree is also noticed which is caused by the larvae of a moth during summer season. The occurrence of such damage is of minor nature.

E) Diseases caused by Fungi and Parasites:

Many Fungi and Parasites have been found to be adversely affecting the crop, which are as follows.



- i) ***Loranthusscurrula***: Loranthus is found in the comparatively moist forest of Karo, Siddhamath, valleys of Kalapat and Rebena. It grows on the top of the sal trees and slowly causes damage to the host tree. The extent of damage to the host tree has not yet been assessed exactly. Though its presence will not kill the host plant, but will make it unsound.
- ii) ***Polyporusshoreae***: This fungus normally attacks the root portion of the sal trees. Gradually it destroys the root system and makes the tree incapable of drawing water and nutrients from the soil. After some time when a major portion of the root system is damaged, a normal wind is enough to uproot the tree. Infection of the roots can easily be seen in such uprooted trees. This type of incidence is seen in Bandhanjhari, Ranibeda, Kalapat, Karo forests.
- iii) ***Fomesfastuosus***: This fungus is a heart rot of sal particularly in the butt region. When injury is caused to the plant by forest fire and coppicing, the basal area of the plant is susceptible to be attacked by these fungi. At the initial stage of attack, the heartwood of the plants shows dark brown stains in smaller patches. It gradually develops into small pockets and decay of the butt end starts from this stage. When decay further continues the pockets get filled with white decayed fibres. On further disintegration in subsequent stages, empty brown pockets are created. The growth of the tree is badly hampered. This is noticed in Ateir.F.
- iv) ***Hymenochaeterubiginosa***: This fungus attacks sal heartwood. Due to such attack, the tissues become white and fibrous surrounded by brown wood. Externally, sporophorus appears in tiers, one above the other, in close clusture from the stem of affected trees. Its occurrence is sporadic in nature and found in good sal forests of these divisions.
- v) ***Ganoderma lucidum***: It is a very notorious fungus. These fungi normally attack sisoo plantations. One of such incidences was experienced in Keonjhar Division earlier and confirmed by Forest mycologist, F.R.I. Dehradun who had recommended the removal of the diseased trees to arrest its spreading. These fungi normally attack and kill the bark of the tree and cause white spongy rot in the sapwood.
- vi) ***Fomes Caryophylli***: It is heart rot of sal and commonly seen in all the forest patches where sal is the predominant species. Decay due to this fungus is commonly known as Sambar Akshi, the affected patch appears like a pox mark or eyes of a Sambar deer. In the very early stage of attack, heartwood is stained slightly dark to brown. Then ring rot is caused. Gradually the decayed wood turned to spongy and finally the fungus emerges outside through the sapwood and bark. The bark in the



affected portion is gradually shed off. A considerable damage is caused to the valuable heartwood and the tree loses completely its economic timber value and only produces firewood. At times, epicormic branches appear but they do not always indicate heart rot.

2.6 Distribution of different forest types:

2.6.1 Basis of Classification:

The forests can be classified into forest types on the basis of

- (i) **Physiognomy** - Physiognomy means the general appearance of a forest community and, therefore, forms an easy basis for rough differentiation of very broad classes. It is described by dominant growth-form (e. g., trees, shrubs, grasses, etc.), the seasonal changes (e. g., evergreen and deciduous habit) and such other features as may be associated with very dry or very wet sites.
- (ii) **Structure** - Structure of a forest is described by stratification (i.e., the way in which different species are aligned in different layers of the forest) and dimensions of trees including height and spacing. It is generally observed that more favorable the site to tree growth the greater is the number of strata and the less favourable the site, the lesser is the number of strata in which the forest is divided. Therefore, structural stratification gives good basis for classifying forest types.
- (iii) **Function**- Function refers to the most common morphological characters of the species such as leaf character, leaf size, stem and root characters, e.g., buttress formation development of stilt roots, etc., which form the basis of classification.
- (iv) **Floristic**--Floristic refers to the species present in a particular forest. While this forms an important basis, for delimiting a forest type, there is a great difference of opinion as to whether the frequency of the species should be used as a basis or not. However, this can be used to distinguish subtypes.
- (v) **Dynamics**—As a result of interaction between vegetation and the site, there is continual change between the two. This results in succession and development of climax communities. Though the general view favours Whittaker's theory of vegetation gradients, it is convenient for the time being to classify the relatively stable types as climax, those still developing as seral, the stable community resulting from the special soil peculiarities as edaphic climax and that resulting from the biotic interference as biotic climax.



- (vi) **Habitat**—Habitat refers to the effective environmental conditions in which a forest community exists. Thus, climate and edaphic factors often form the basis of classifying forest vegetation.
- (vii) **Physiography**—Physiography refers to the natural features of the earth surface. As it modifies the micro climate and results in different vegetation occurring in the same climate on different aspects of the hill slope, it forms a good basis for classifying vegetation.
- (viii) **History**- History refers to past biotic influences on a site and its vegetation. Though these are very important in determining the present condition and future potentialities in vegetation communities, it is often difficult to assess these factors correctly.

2.6.2 Forest Types:

The forest types observed in this division as per **Revised Champian & Seth Classification** are as follows.

Table No 2.12 Name of Major Group – Tropical Forest				
Name of Group	Name of Sub-group	Name of Type	Name of Sub-type	Name of Varieties
Tropical moist deciduous Forest - 3	North Indian tropical moist deciduous Forest – 3C	Moist sal-bearing forest – 3C / C ₂	Moist peninsular sal – 3C / C _{2e}	Moist peninsular low level sal – 3C / C _{2e(ii)}
				Moist peninsular valley sal – 3C / C _{2e(iii)}
Dry deciduous forest – 5	Northern tropical dry deciduous forest – 5B	Dry sal-bearing forest – 5B / C ₁	Dry peninsular sal – 5B / C _{1c}	
				Northern dry mixed deciduous forest – 5B / C ₂
				Moist Mixed Scrub Deciduous Forest - 5/DS ₁
				Lateritic Semi-evergreen forest - E4

2.6.3 Description of Forest Type & Composition:

The description of forest type is furnished below.

3C/C_{2e(ii)} Moist Peninsular low level Sal Forest:

This forest type is confined in few pockets in this Division on flat or nearly flat ground, valleys and lower slopes, where Sal is principal species. In favorable areas it is found in pure patches The principal associates of Sal are *Terminalia tomentosa*, *Halanda cordifolia*, *Schleicheraoleosa*, etc. There are other species found in top canopy are



Dalbergia latifolia, *Pterocarpus marsupium*, *Bridelia retusa*. The middle story consist of *Mangifera indica*, *Terminalia belerica*, *Terminalia chebula*, *Anogeissus latifolia* *Cassia fistula*, *Mitragyna perviflora*, *Malotus sp.* The scrubby undergrowth is generally found observed. In some tract it is dense. Sal regeneration is moderate to fair.

5B/C_{1c} Dry Peninsular Sal:

This sub-type of forest found extensively throughout forests of this Division. It is seen in almost all the Blocks and regressing towards Dry Mixed Deciduous Forests. The main species in the top canopy are Sal, Piasal, Asan, Dhaura, and Sisoo. The middle story comprises of Bahada, Kusum, Chara, Mai, Rai, Kumbhi, Kendu, Karada, Amla and Bela. Fire and grazing is the common phenomenon in the above areas. Sal regeneration is quite high. But it is adversely affected by biotic pressure. Though the regeneration of Sal is sufficient, its establishment became difficult due to annual ground fire and grazing.

5B/C₂ Northern dry mixed forest.

This subtype is found in degraded forest blocks and miscellaneous species are replacing the Sal due to heavy biotic pressure and fire. The canopy height is about 15 to 20 Mtrs of uneven canopy. Sal contributes to 10-15 percent of the crop available. *Dentrocalamus strictus* is observed extensively. The top canopy consists of *Anogeissus latifolia*, *Terminalia tomentosa*, *Madhuca indica*, *Buchanania lanzan*, *Diospyros melanoxylon*, *Vridelia retusa*, *Cleistanthus collinus*, *Phyllanthus emblica*, *Lagerstroemia sp.* *Combretum decadrum*, *Smilex macrophylla*, *Butea* climbers are encountered during field visit. Regeneration of useful species is generally inadequate and adversely affected. Grazing and fire is common phenomena in major forest blocks.

2.6.4 Forest Blocks & Forest Type.

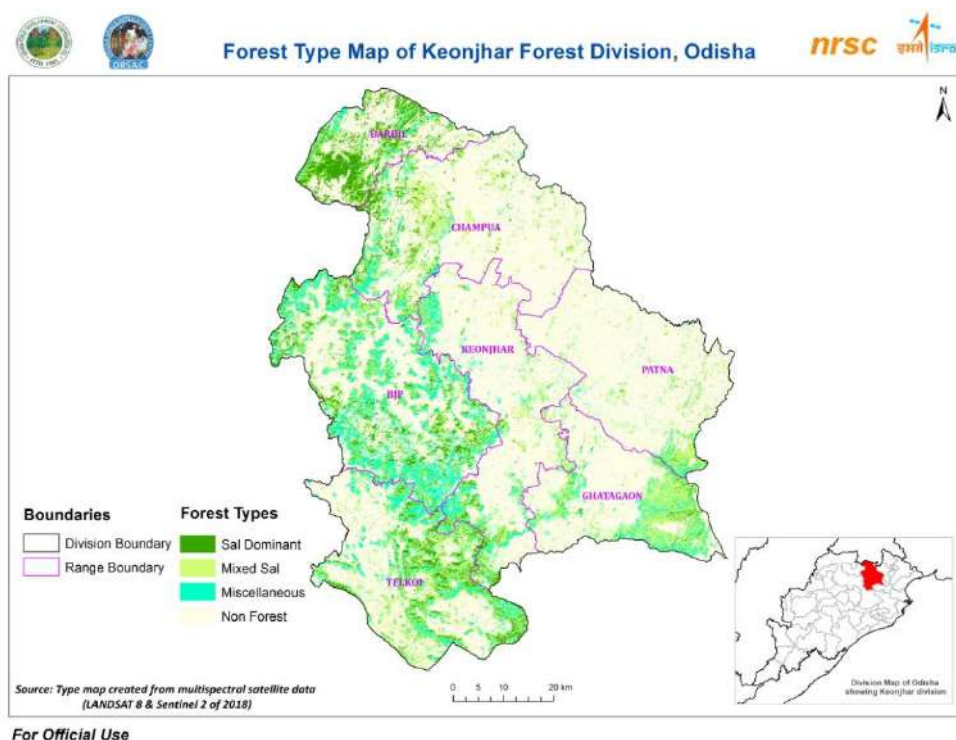
The above described forest types are observed in various forest blocks of the division. The distribution is furnished below (Table No 2.13).

**Table No. 2.13: Distribution of different forest area according to forest types**

Sl. No.	Group/Sub-group	Forest Block
1.	3C/C2e (iii)Moist Peninsular Valley Sal	Baitarani A, Baitarani B, Bandhanjhari, Benamunda, Jharbeda, Kalapat (P), Karo (P), Ranibeda, Siddhamath, Thakurani(P), Uliburu.
2.	3C/C2e (ii) Moist Peninsular Low-level Sal	Amuni, Anjar, Bayakumutia, Digchampe, Dubulapal, Dumurudiha, Gadagadei, Gandhamardan (P), Gaudachampe, Godhihudi, Gonasika, Jagar, Kanjipani (P), Khajurimindi, Kodbil (P), Lunaghara (I), Lunaghara (II), Mundula, Raigoda, Saharpur, Saleikena-Siriabahal, Samakoi, Suakathi (I) & (II).
3.	5B/C ₁ c Dry Peninsular Sal Forest	Atei (P), Badamasinabilla, Baitarani East A, Baitarani East B, Balabhadrapur, Balibandha, Balipokhari, Barabanka (P), Barabanka(K), Badbil, Bardhana, Basantapur, Baunsuli, Belposi, Billa A, Budhikapudi I, Budhikapudi II, Chadheibhol, Chemena A, Golabandha, Dhanurjayapur, Ghatgaon, Jadipada (P), Jharbeda (P), Jyotipur(P), Kalapat (P), Kalikaprasad, Kalimati, Kodbil (P), Laxmiposi (P), Laxmiposi, Maidankel, Mankadachua, Masinabilla, Mooni, Naranpur (P), Nelung (P), Ninua, Padmapur, Patna(P), Pipilia, Poipani (P), Raghunathpur, Raikala (P), Rasapada, rekuti, Sarupat, Shyamanali-Koilisuta, Sikheswari, Tamango(P), Tando, Ukhunda (P).
4.	5B/C2 Northern Dry Mixed Deciduous Forest	Atei (P), Barabanka (P), Kalapat (P), Karo (P), Krushnapur, Naibuga, Nayagarh, Pedipokhari, Renda, Tamango (P), Thakurani (P).
5.	E4 Lateritic Semi-ever Green Forest	Kalapat (P)



6.	5/DS1 Mixed Deciduous Forest	Moist Shrub Forest	Atei, Brahmanipal, Champei, Danla, Gandhamardan (P), Jadipada (P), Jyotipur (P), Kandara A, Kandara B, Kanjipani (P), Laxmiposi (P), Nalapanga (K), Nalapanga (P), Naranpur (P), Nelung (P), Palaspada, Patna (P), Poipani (P), Pradhnpada, Purunapani, Raikala (P), Saharpur (P), Sarasposi, Tangarani, Ukhunda (P). Khahuribani, Kandara-C, Belda



2.7 Tree cover outside forest area

Tree cover is defined as all tree patches of size less than 1 ha occurring outside the Recorded Forest Area (RFA). Tree cover includes trees in all formations including scattered trees. Tree outside Forest (TOF) refers to all trees growing outside RFA irrespective of patch size which could also be larger than 1ha. Thus, tree cover becomes a subset of TOF. Tree cover is estimated using a sampling-based methodology where in high resolution satellite imagery is used for stratification. TOF by definition consist of tree formations with varied functions and arrangements, making classification difficult. FAO also recognized three distinct TOF types as TOF on agricultural, urban and non-urban non-agriculture land. TOF on urban land are trees and/or shrubs growing in gardens, parks, parking lots, along streets and others. TOF on agriculture land include trees and/or shrubs growing on lands under agricultural land use. Agro-forestry systems,



non-forestry tree crop plantations and orchards are included in agricultural land use. Trees growing on natural lands like grasslands, tree line in mountainous areas and peat lands are categorized as TOFs other than urban and agricultural lands. TOFs on non-agricultural/non-urban land have trees and/or shrubs growing on lands other than agricultural or urban land use, i.e., outside forests. TOFs growing isolated or scattered, in groups and linearly, are categorized based on spatial arrangement. TOFs are also classified functionally like production (food, fodder, and firewood), protection (windbreaks, erosion checks), ornamental and aesthetic purposes.

The ecosystem services and economic benefits associated with these trees have begun to attract more attention towards them. The trees fix atmospheric nitrogen in the soil and aid in nutrient cycling through litter fall, increasing fertility and thus crop yield. Trees help to retain moisture in soil and topsoil by reducing soil evaporation, checking erosion and reducing water flow. Trees regulate and maintain watershed-building materials. Trees act as a live fence in form of windbreaks and shelterbelt performing protection function. Interest is growing among researchers and policymakers to promote green spaces in urban areas to curb negative impact of urbanization on biodiversity and humans.

They form important green region in urban and industrial areas. An important feature of urban landscape is its trees growing along the roadside or streets. These trees give aesthetic beauty to an urban surrounding providing psychological harmony to the urban residents. Several studies also have highlighted these trees as an important feature of rural landscapes. These trees are useful timber resources that will alleviate the pressure on native forests; nutrient cycling and CO₂ sink. The consequences are reducing the pressure on natural forest in one way and C enhancement and species diversity in other way. This satisfies the objective of reducing emission from deforestation and forest degradation (REDD+) mechanism. Therefore, forest and TOF are considered as two faces of a coin in relation to their capacity for C stock and biodiversity. Urban trees and plantation along the road and canal side can act as sink for pollutants; reduce urban O₃ levels; check dust flow, fly ash and noise pollution; cool air temperature; and provide aesthetic beauty to the urban landscape. TOFs are ecologically important for urban localities as they fix atmospheric C in their biomass, modify microclimate, fix airborne pollutants and control storm water runoff. Road side trees are more efficient to fix particulate matter than other trees and thus are critical in controlling point source pollution. Their importance is recognized now due to biodiversity loss, desertification and poverty alleviation. These plantations have the potential to provide ecosystems services in the form of preventing soil erosion, removing air pollutants, modifying



microclimate and soil properties, nutrient and water cycling, regulating water flows, biodiversity conservation, pest control, food or fodder and wood products.

TOF (Tree cover Outside the Forests) has been developed / enriched due to Avenue Plantation, Plantations by Forest and other departments like Horticulture, Soil Conservation etc. Farm Forestry has also contributed in creation of forest in back yard and on field bonds. The plantations created by Forest department are listed below.

The Avenue Plantations created are at **Table No 2.14.**

2.7.1 Avenue plantation:

Table No 2. 14 List of Avenue Plantation Keonjhar Division.			
Year	Range	Location Block/ Compt	Avenue in RKM
2013-14	Patna	Kendeiposi-Patna RD Road	20.00
2013-14(Total)			20.00
2014-15	BJP	Baragoda-Taramakanta	20.00
2014-15	Champua	Balibandh-Hundula	10.00
2014-15	Telkoi	Telkoi-Halpudi	4.00
2014-15	Telkoi	Telkoi-Panasanasa	11.00
2014-15(Total)			45.00
2015-16	Ghatgaon	Dhangadiha - Barachakulia	3.60
2015-16	Ghatgaon	Rajpat- Manata- Tara	7.60
2015-16	Ghatgaon	Haladharpur - Medinipur	8.80
2015-16(Total)			20.00
2016-17	Champua	Bholabeda (Gurubeda)	4.00
2016-17	Champua	Sana Kalimati	4.00
2016-17	Champua	Jaypur, Jamitra, Kamalpur	12.00
2016-17	Ghatgaon	Badajamposi-Bhimkund	4.00
2016-17	Ghatgaon	Dubulabeda-Balipokhari	16.00
2016-17	Keonjhar	Chak Nuasahi to Basudevpur	8.00
2016-17	Patna	Rajnagar to Childa	10.00
2016-17	Patna	Kendeiposi to Baunsuli	10.00
2016-17	Patna	Kundala-Patna	10.00
2016-17	Patna	Billa to Duaghat	10.00
2016-17	Telkoi	Damadargauni to Tentulikhunti	6.00
2016-17	Telkoi	Dubulapal to Chandrasekharpur	8.00
2016-17	Telkoi	Kaliahata to Rekuti	10.00
2016-17	Telkoi	Deuldiha to Akul	16.00
2016-17(Total)			128.00
2017-18	Champua	Jajaposi - Jyotipur	10.0
2017-18	Champua	Jyotipur-Silipung	10.0



2017-18	Patna	Tangarpada- Poipani	20.0
2017-18	Ghatgaon	Baneswar-Khuntapada	10.0
2017-18	Ghatgaon	Kundapitha-Rengalbeda	10.0
2017-18	Telkoi	Kaliahata- Bramhanikans	8.0
2017-18	Telkoi	Kaliahata-Karangapal	8.0
2017-18	Telkoi	Rugudi-Kakudiamba	8.0
2017-18	Telkoi	Katarapali-Dimiria	6.0
2017-18	Telkoi	Damodargouni-Jansanpur	6.0
2017-18	Telkoi	Golabandha- Namposi	4.0
2017-18	BJP	Singhpur-Kuskala	8.0
2017-18	BJP	Kuskala-Chandposi	10.0
2017-18	Champua	Kasipal - Chipinda	12.0
2017-18	Champua	Malda - Kasia	8.0
Total 2017-18			138.00
2018-19	Telkoi	Kudbil-Tangiri	10.0
2018-19	Telko	Jagmohanpur-Tungurubahal	6.0
2018-19	Champua	Radhikadeipur-Jally	10.0
2018-19	Champua	Jally-Nandapur	10.0
2018-19	Ghatgaon	Katarabeda-Bholabeda	10.0
2018-19	Patna	Jharbeda-Jajaposi	10.0
2018-19	Total		56.00
2019-20	Telkoi	Deuladiha to Ragada	14.00
2019-20	Telkoi	Udayagiri to Karadangi	14.00
2019-20	Keonjhar	Bauripada to Sendkap	6.00
2019-20	Keonjhar	Chandposi to Rutisila	10.00
2019-20	Ghatagaon	Poiyamuda Chhaka to Palabani Sahi	10.00
2019-20	Patna	Khiretangir to Hiraposi	10.00
2019-20	Patna	Putulia-Khajuripani	10.00
2019-20	Total		74.00
2020-21	BJP	Kanjipani to Gonasika	10.0
2020-21	Keonjhar	Budhakhman to Panasia	10.0
2020-21	Keonjhar	Padmapur to Hatikucha	10.0
2020-21	Keonjhar	Rutisila to Badabarbeda	5.0
2020-21	Patna	Dhanbeni to Saharpada	20.0
2020-21	Patna	Saradhapur to Bhanrpur	20.0
2020-21	Telkoi	Podanga to Kantalsuan	10.0
2020-21	Telkoi	Kateniposi to Biripal	10.0
2020-21	Total		95.0
Div. Total			576.0RKM

**2.7.2 Plantations outside the forest area: (Misc. Plantation)**

Plantations have been raised under various schemes outside the Forest area under Management practices. In total 1862.90 ha plantation has been raised during 2007-8 to 2016-17. The list of Plantation is furnished below (Table No 2.15)

Table No 2.15 Miscellaneous Plantations Raised Outside the Forest Area under various schemes.				
Sl. No.	Year	Range	Location Block/ Compt	Area in Ha. (AR)
1	2007-08	Barbil	Nuagaon	48.00
2	2009-10	BJP	Baitani Bhuinya	12.46
3	2008-09	BJP	Bargoda	55.00
4	2007-08	BJP	Bargoda	176.30
5	2010-11	BJP	Golabandh-Raidiha	45.00
6	2010-11	BJP	Golabandh-raidiha	82.84
7	2010-11	BJP	Narasinghapur	25.60
8	2013-14	BJP	Panasuan	35.00
9	2009-10	BJP	Talaraigada	70.00
10	2008-09	Champua	Basantpur & Naibuga	50.00
11	2013-14	Champua	Lease Area	1.66
12	2016-17	Champua	Lease Area	4.63
13	2011-12	Champua	Mining Area	0.31
14	2011-12	Champua	Mining Area	0.71
15	2011-12	Champua	Mining Area	29.60
16	2008-09	Ghatgaon	Kundapitha	2.56
17	2011-12	Keonjhar	Kasira Patna KF	15.00
18	2011-12	Champua	Sarai KF	15.00
19	2012-13	Champua	Sarai KF	30.00
20	2013-14	Champua	Sarei KF	30.00
21	2015-16	Ghatgaon	Kundapitha	15.00
22	2015-16	Champua	Gambhaia	10.00
23	2015-16	Keonjhar	Mathuramandali	15.00
24	2015-16	Telkoi	Golabandha	20.00
25	2016-17	Keonjhar	Pithagola	20.00
26	2016-17	Champua	Dalki	15.00
27	2016-17	Ghatgaon	Kundapitha	10.00
28	2016-17	Ghatgaon	Masinabilla	10.00
30	2016-17	Champua	Godhuli	20.00
31	2010-11	Champua	Jamudalak KF	20.00
32	2010-11	Champua	Kankadajudi K.F	30.00
33	2010-11	Keonjhar	Panasia KF	62.00
34	2010-11	Patna	Gopinathpur KF & VF	33.23
35	2007-08	BJP	Dumurinali KF	10.00
36	2007-08	BJP	Nippo VF	10.00
37	2007-08	BJP	Uchamandi VF	10.00



38	2007-08	BJP	Uperraidiha VF	10.00
39	2016-17	Keonjhar	Pattulikotha KF	5.00
41	2014-15	Patna	Rajanagar	20.00
42	2014-15	Telkoi	Hingulasahi	5.00
43	2014-15	Champua	Bankia VF	6.50
44	2014-15	Champua	Godhuli VF	6.50
45	2015-16	Champua	Jamudalak	6.50
46	2014-15	Ghatgaon	Kundapitha VF	20.00
47	2014-15	Ghatgaon	Tikira	10.00
48	2013-14	Keonjhar	Padmapur VF	35.00
49	2014-15	Patna	Jumein VF	10.00
50	2014-15	Patna	Tribindha VF	12.00
51	2015-16	Telkoi	Akul KF	16.25
52	2014-15	Telkoi	Akul KF	13.00
53	2015-16	Telkoi	Samakuda KF	6.25
54	2014-15	Telkoi	Similipal K.F	25.00
55	2014-15	Telkoi	Sinkulabahal K.F	25.00
56	2015-16	Telkoi	Talapada KF	50.00
57	2008-09	BJP	Banspal	7.00
58	2010-11	BJP	Bayapandadar DPF	5.00
61	2010-11	BJP	Kumundi	5.00
62	2010-11	BJP	Taramakanta DPF	5.00
63	2010-11	BJP	Tarmakanta DPF	5.00
64	2010-11	Keonjhar	Baiganposi	9.00
65	2010-11	Patna	Bada Dhanurjaypur	4.00
66	2009-10	Patna	Bada Dhanurjaypur DPF	7.00
67	2010-11	Patna	Chemena KF	40.00
68	2010-11	Patna	Musakhori KF	25.00
70	2010-11	Patna	Mushakhori KF	20.00
71	2010-11	Patna	Mushakhori KF	35.00
72	2010-11	Patna	Nuangaon	35.00
73	2010-11	Patna	Paitamaja KF	25.00
74	2010-11	Patna	SaharpadaKF	25.00
75	2009-10	Telkoi	Barhagad DPF	30.00
76	2008-09	Telkoi	Barhagad DPF	70.00
77	2010-11	Telkoi	Nuagaon DPF	7.00
78	2016-17	Barbil	Anseikala	10.00
79	2016-17	Barbil	Jagudidhara	5.00
80	2016-17	Barbil	Karansahi (Bileipada)	10.00
81	2009-10	Telkoi	Ahigola KF	10.00
82	2017-18	Barbil	Balita	4.00
83	2019-20	BJP	Karuagoda	7.00
84	2019-20	Patna	Kothaghar	10.00
85	2019-20	Patna	Erendei	10.00



86	2019-20	Patna	Ankura	10.00
87	2019-20	Patna	Kapundi	5.00
88	2019-20	Patna	Udayapur	5.00
89	2019-20	Champua	JRLI (Jaroli)	2.294
90	2020-21	BJP	Upaer Birikala	3.228
91	2020-21	Ghatgaon	Sagadia	10.00
92	2020-21	Patna	Baunsuli VSS	5.00
93	2020-21	Barbil	Putugaon KF near Baitaranii River	10.00
94	2020-21	Keonjhar	Balabhadrapur	10.00
95	2020-21	BJP	Bayapandadhar	10.118
Division Total			Total	1817.54

Year Wise Abstract of Plantation (Misc)			
Year	Area in Ha	Year	Area in Ha
2007-08	264.3	2014-15	153.00
2008-09	184.56	2015-16	139.00
2009-10	129.46	2016-17	109.63
2010-11	543.67	2017-18	4.00
2011-12	60.62	2019-20	49.294
2012-13	30.00	2020-21	48.346
2013-14	101.66	Total	1817.54

2.7.3 Teak Plantation;

Teak plantations have also been taken up in out side forest area. The details are as given below (Table No 2.16)

Table No 2.16 List of Teak Plantations (TOF)				
Sl No	Year	Range	Location	Area in Ha
1	2008-09	Telkoi	Barhagarh DPF	70.00
2	2009-10	B & JP	Kuanra DPF	50.0
3	2009-10	Telkoi	Barhagarh DPF	30.0
4	2010-11	Patna	Chemena KF	10.0
5	2010-11	Patna	Chemena KF	10.0
6	2010-11	Patna	Chemena KF	20.0
	Total			190.0



(NB: DPFs are not included in the management practices of this Plan)

2.7.4 Seedling Distribution:

Seedling distribution (Farm Forestry) is an important component in increasing tree cover outside the forest area. The year wise seedling distributed since 2011-12 is furnished below (**Table No 2.17**).

Table No 2.17 Year wise Seedling distribution in Keonjhar Division			
Sl No	Year	Seedling distributed under FF in lakh	Appx. Area covered (@1600/ ha)
1	2011-12	5.0	312.5000
2	2012-13	5.0	312.5000
3	2013-14	7.40	462.5000
4	2014-15	7.40	462.5000
5	2015-16	7.40	462.5000
6	2016-17	3.0	187.5000
7	2017-18	1.77	110.6250
8	2018-19	2.55	159.3750
9	2019-20	3.65	228.1250
10	2020-21	14.115	882.1875
	Total	57.285	3580.3125

2.8 Shifting Cultivation (Jhumming)

Shifting cultivation, a primitive system of agriculture, the first step in transition from food gathering and hunting to food production is nearly 9000 years old agricultural practice and believed to have started during Neolithic period. It is prevalent not only in India but in other continents like Asia, Africa, South America and Australia. This is extensively practised by the tribal throughout the tropical and subtropical region. Conventionally, shifting cultivation has been interpreted as an inefficient and destructive form of agriculture. Since the British period of ruling, the shifting cultivators have been a target for the government, environmentalists, anthropologists and the policy makers to give an alternative livelihood to the practitioners of so called “unethical”, “anti-environmental”, “anti-development” and “anti-social” primitive form of agriculture. More recently, shifting cultivation is viewed as an inflexible static system ill-suited for adapting to changes brought about by modernity. In the recent studies and policies, almost all the question and issues raised revolve around to major issues, firstly, population, productivity and deforestation and secondly, development project and displacement of the tribal groups practicing shifting cultivation. It is also proved that shifting cultivation and poverty has a vice versa relationship.



2.8.1 Shifting Cultivation- Meaning and Extent:

As different from settled cultivation, shifting cultivation involve traditionally established conventionality and rituals. The shifting cultivation is generally practiced in the following sequence:

1. Selection of a forest patch and clearing the vegetation normally in December and January,
2. Burning of the vegetation in February and March,
3. Sowing of seeds, by dibbling, generally of cereals, vegetables and oil seed in April-May,
4. Continuation of cultivation for a few years,
5. Abandonment of the cultivated site and shifting to other forest site and returning to the former site, and once again practice in hilly terrains, especially amongst the tribal communities.

In Odisha, shifting cultivation is an age-old practice, which is locally known as the Podu cultivation. A number of tribes inhabiting different areas of the state are practicing shifting cultivation. In Keonjhar Forest Division Juanga and Pauri (Paudi) tribes are involved in this practice. Many festivals and other such rituals revolve around the Podu fields, because the tribal view Podu cultivation not just as a means of their livelihood, but as a way of life.

Different tribes of Orissa practicing shifting cultivation have different names for this kind of subsistence activity. These are usually expressed by the name given by different categories of land under cultivation. The Juang of keonjhar call it Toilachasa and their brother tribe, the PaudiBhuyan identify it by Tolia.

2.8.2 Ownership Right:

The type of ownership of cultivation varies among the tribes from individual ownership by tribal customary rules. Among the Juang and PauriBhuyan of Keonjhar district; the land under shifting cultivation is the communal property owned by all the villagers in common. Every year in the month of Magha (January-February) the village headman and the priest select the land for cultivation. Generally, the patch which has completed its rotation cycle and is sufficiently covered with trees and bushes is considered suitable to be cleared for shifting cultivation. After the patch is selected, the headman demarcates the boundary lines by putting mark on trees by axe and the land is subdivided into several plots which are allotted to the households. The ownership of land after allotment is transferred to the head of the households for a period of 2 to 3 years till, he cultivates it actively.



2.8.2.1 Paudi Bhuyan: The Paudi Bhuyan, a primitive section of the Bhuyan tribe inhabit a contiguous mountainous pocket called Bhuyanpirh in Keonjhar district, and also found in Bonai and Pallahara sub-divisions of Sundergarh and Dhenkanal districts respectively. The total Bhuyan population according 2011 census was 2,07,792.

The economic life of the Paudi Bhuyan mainly revolves round shifting cultivation. It is supplemented by collection of minor forest produce and to some extent by wet and dry cultivation, hunting and fishing.

Among the Paudi Bhuyan shifting cultivation in general is known by the name Toilachasa, the field under first year of cultivation is known as biringa, the second year as Kaman and the third year as Guda, The Podu land are located on the hill slopes, hill-tops and at foot hills between 5-to-12-degree slope.

After cultivating a patch for three years the fallow period is observed for 5 to 7 years for recuperation. The reduction in recuperative cycle is chiefly on account of increase of population and shortage of land. The swiddens are owned communally and distributed among individual families according to their need and capacity.

The first year shifting cultivation involves several stages such as selection of hill slopes in the month of December-January, tree felling and bush clearing February-April, drying up of felled trees and firing in April-May, sowing in July, ploughing and hoeing in July, weeding and clearing bushes in September-October, guarding the crops grown in the first year are Kulthi, Biri, Rasi and various type of vegetables, pulses and creepers.

During the second year the main crop grown are short duration paddy and Jawar, the former sown in the middle of the plot and the latter on the borders. Beside they cultivate Kada, Mandia, Kangu and various types of vegetables in the second year. If a crop fetches good harvest in the second year, then it is continued for the third year (Guda), and only Rasi is cultivated. The same patch can be brought under cultivation for the fourth year in case there is a good harvest in the third year.

2.8.2.2 Juanga: The Juang Tribe are found in the district of Keonjhar and Dhenkanal. As per 1911 census their population was 30,871. Shifting cultivation is the mainstay of Juang subsistence economy. In addition, they resort to hunting and food gathering. A patch of clear-felled burnt field is called Tolia. A patch of land is cultivated for two or three consecutive years and there after it is left fallow for 5-6 years. The first-year cultivation is called Tolia, second year, 'Ekan' and third year and fourth year 'Nata'.

The traditional village council traditionally owns the tolia lands located on hills within the village territory. During Puspune festival, under the leadership of the village priest, the village elder and family heads select and distribute plots among themselves after



performing rituals. Then cleaning and felling of trees begins by the respective persons. The next phase involves firing the dried vegetations. The rain water helps in spreading the ashes all over the field which serves as manure. The toila field is then ploughed with the help of bullocks and where ploughing is not possible, they work the soil with the help of hand axe.

They sow Rassi, Biri, Kolotha and dibble seeds of beans near the standing dried trees. When the crop is about to ready for harvesting, they watch their field to ward off wild animals. After harvesting, the food grains are stored in bamboo baskets for future use.

In the second year the site is called ekan. Along with paddy, in Ekan, a variety of other crops and vegetables including Kalort, Akoyanglinjani, Kasalak, Pumpkin gourd, Saru, Khangra, Juani and Khude are also grown. Besides gourd and cucumber seeds are also planted near the dried trees which provide support.

The Podu land under third year of cultivation is known as Nala, where they sow paddy or Rassi. After the third-year cultivation, if the lands still have some fertility left, it is again brought under the fourth-year cultivation.

2.8.2.3 Evils of Shifting Cultivation: The shifting cultivation is considered devastating and disadvantageous as it not only causes harm to the eco-system but also exerts negative impact on economy. Some of the evil effects of such cultivation are:

- a) Helps the springs to dry up,
- b) Results in soil erosion,
- c) Destroys valuable timber,
- d) Responsible for causing very heavy floods, and
- e) Silting of the tanks and fields and damage to crops.

2.8.2.4 Sustainability of the practice of Shifting Cultivation: The land under Shifting Cultivation loses its nutrients and the top soil. With reduction in crop yield, the families start moving to other virgin areas. Frequent Shifting from one land to the other has affected to the ecology of these regions, declined the area under natural forest causing fragmentation of habitat and disappearance of indigenous species including invasion by exotic weeds. Repeated short-cycle of podu has created forest-canopy gaps, which can be seen as thin forests from a distance. In Shifting Cultivation, once the fertility of the land is declined. It is abandoned and another area is selected for clearing and farming. The former area is reverted to forests and remained uncultivated for years together. Though the tribal agro-ecosystem are well satisfied in Shifting Cultivation and efficiency of Shifting Cultivation in term of energy and economy is superior so that of settled



agriculture provided it is done in 15-20-year cycle. Podu cultivation in short cycle has been detrimental to the ecosystem.

Though Shifting Cultivation is considered as an evil agricultural practice, the cost-benefit analysis shows that the livelihood, food security and socio-cultural events of the concerned communities have a wider edge than the environmental issues associated with it.

Many Reserved Forests like Atei, Karo, Sidhamatha, Barabanka and Kalapat etc. are subjected to the old practice of shifting cultivation (Podu) since last more than 100 years. Shifting cultivation has reduced considerably during the last 20 years but it is still in practice. The original tribes of Bhuyan and Juangas are still adopting 'Podu' cultivation. The worst affected area is the Bhuyan and Juangpirha area, which extends from Judiaghati to Barhadabata in the foothill of Kanjipani forest block. The hill slopes are completely barren and exposed rocks are there. This area is now under the process of reservation in patches. Due to such type of shifting cultivation the river Baitarani and its tributaries, which originate from these Bhuyan-Juangpirha areas causes flash floods but remains partial dry in the summer season. This is mainly due to high run-off and less water holding capacity of the catchments area.

2.8.3 Extent of area affected:

The forest are affected by Shifting Cultivation as recorded by field staff is as follows (Table No 2. 18).

Table No 2.18 Podu cultivation in Keonjhar Forest Division			
Sl No.	Name of the Range	Name of Forest Block	Approxment Area (in Ha)
1	BJP	Gargadei RF	17.00
2	BJP	Kanjipani RF	50.00
3	BJP	khajurimundi RF	20.00
4	BJP	Mundula RF	50.00
5	BJP	Bayakumutia PRF	5.00
6	BJP	Champai PRF	20.00
7	BJP	Gonasika PRF	80.00
8	BJP	Gouda champei PRF	60.00
9	BJP	Lunghar(I) PRF	20.00
10	BJP	Lunghar(II) PRF	50.00
11	BJP	Raigoda PRF	60.00
12	BJP	GuptaGanga DPF	10.00
13	BJP	Katira DPF	20.00
14	BJP	Pandadhar-Bayakumutia	20.00



15	BJP	Kalanda DPF	65.00
16	BJP	Kakharua DPF	275.00
17	BJP	Karuagarh DPF	80.00
18	BJP	Khandadhar DPF	85.00
19	BJP	Kuanar DPF	150.00
20	BJP	Thakurani DPF	65.00
21	Keonjhar	Khajuripani RF	15.00
22	Telkoi	Barahgarh DPF	20.00
23	Telkoi	Tamang RF	10.00
24	Telkoi	Renda PRF	4.00
25	Barbil		0
26	Champua		0
27	Ghatagaon		0
28	Patna		0
	Total		1251.00

From the above it is observed that BJP range is mostly affected by Shifting Cultivation (*Podu Chasa*). Remedial measures are required to be taken to rehabilitate the podu ravaged area.





CHAPTER-3

MAINTENANCE, CONSERVATION AND ENHANCEMENT OF BIODIVERSITY

3.1 Forest Composition and Distribution:

The tract dealt with this division lies in the Northern tropical Zone. Based primarily on temperature, tropical zone has been characterized as having mean annual temperature over 24.0°C and mean January temperature over 18.0°C and with no frost. It has all these characteristics & has typical vegetation of tropical zone. The tract is situated partly in the moist deciduous and partly in the dry deciduous zones of Indian vegetation as per diagrammatic representation of Indian Forest Types in “the Forest Types of India” by Champion & Seth. Consequently, a drier type of vegetation is met with locally with the moist deciduous. Irrespective of the type changes, sal is the predominant species all over the forest except small patches of moist mixed deciduous type.

The forest of Keonjhar Division comes under the major group Tropical Forest on the basis of “Champion and Seth” revised classification. Two Varieties of sub-type 3C/C_{2e} (Moist peninsular sal) occur in different blocks and compartments. Three Types of sub-group 5B (Northern tropical dry deciduous forest) occur in different forest blocks and compartments. The sub type E4 lateritic Semi-ever Green Forest and 5/DS₁ Moist Mixed Shrub Deciduous Forest are also seen in this division.

Varieties of large woody perennial plant having a single well-defined stem and more than 6m height are sporadically distributed in all forest blocks. The present condition and floristic composition of the principal species available in the division are Sal, Asan, Bandhan, Sisoo, Piasal, Dhaura, Bahada etc with the associated species having floristic composition of Siali, Kasi, Amla, Harida, Mai, Khakada, Atundi, Gurudu etc. The age of the principal species attending the exploitable girth varies from 60 to 80 years. The average health of the principal species is good. The quality of principal species varies from Class III to Class IV.

3.1.1 Classification of types of Forest:

As per the revised classification of the forest types of India by Champion and Seth, the forest of Kendujhar district can be classified into the following two major forests types.

- (1) Group 3C: Northern Tropical Moist Deciduous Forests.
- (2) Group 5B: Northern Tropical Dry Deciduous Forests.



Within these two main groups, several variations occur due to edaphic and biotic factors and as such, the forests are further divided into sub-group as under.

- (a) 3C/C_{2e(iii)}-Moist peninsular valley saland 3C / C_{2e(ii)}-Moist peninsular low level sal.
- (b) 5B/C_{1c} Dry peninsular sal forests.
- (c) 5B/C₂ (iii) Northern Dry mixed deciduous Forests.

Apart from the above three main sub-group there are some small forest blocks containing Dry sal forests which can be clubbed under 5B/C₂ type, some forest blocks can be taken as a separate sub-type like E-4 Lateritic semi-evergreen forests and DSI-Dry deciduous scrub forests. Most of the forest blocks in the plain areas of Champua and Kendujhar Range which are influenced by biotic factors and in the secondary seral stage.

The vast unsurveyed forest area of Bhuyanpira and Juangpira which extends up to Telkoi Tahsil on the west of Kendujhargarh need a special mention. This beautiful patch of forest has been continuously subjected to shifting cultivation and the aboriginal tribes of the area ruthlessly cut down the trees in the steep hill slope for Podu (Jhooming) cultivation every year. In this process most of the valuable species like Sal, Asan, Bija, Sisoo and Gambhar have been taken out of the forest and presently the main associates commonly met with are *Terminalia tementosa (alata)* *Hymenodictyon excelsum*, *Mitragynaparvifolia*, *Diospyros melanxylon* and profuse sal rooted waste. The middle storey consists of *Cleistanthus collinus*, *Dalbergia paniculata*, *Syzygium cumini*, *Dilleniapentagyna*, *Mallotus philippinensis*, *Careya arborea* and *diospyros species*. Sporadic bamboo clumps (*D. strictus*) are also seen with undergrowth of *Clerodendron viscosum*, *Woodfordia fruticosa* and climbers like *Combretum decandrum*, *Bauhinia vahili* and *Butea species*.

Table No.3.1: Classification of Forests: Major Group – Tropical Forest

Name of Group	Name of Sub-group	Name of Type	Name of Sub-type	Name of Varieties
Tropical moist deciduous Forest - 3	North Indian tropical moist deciduous Forest – 3C	Moist sal-bearing forest – 3C / C ₂	Moist peninsular sal – 3C / C _{2e}	Moist peninsular low level sal – 3C / C _{2e(ii)}
				Moist peninsular valley sal – 3C / C _{2e(iii)}
Dry deciduous forest – 5	Northern tropical dry deciduous forest – 5B	Dry sal-bearing forest – 5B / C ₁	Dry peninsular sal – 5B / C _{1c}	
			Northern dry mixed deciduous forest – 5B / C ₂	
			Moist Mixed Scrub Deciduous Forest - 5/DS ₁	
			Lateritic Semi-evergreen forest - E4	



The approximate area under various forest types as per the stock map is indicated in bracket along with a short description of the forest in the following paragraphs.

Variety 3C / C_{2e} (iii) Moist Peninsular Low-level Sal(7050.7848 ha. appx.): Moist peninsular low level sal is fairly extensive in the middle and lower slope of Amuni, Anjar, Bayakumtia, Digchampe, Dubulapal, Dumurudiha, Gadagadei, Gandhamardan(P), Gaudachampe, Godhihudi, Gonasika, Jagar, Kanjipani (P), Khajurimindi, Kodbil (P), Lunaghara (I), Lunaghara (II), Mundula, Raigoda, Saharpur, Saleikena-Siriabahal-Kalapokhari, Samakoi, Suakathi (I) and Suakathi (II) forest blocks. In this area, sal ascends to an elevation of 400 mt above mean sea level and occurs as almost pure crop. The quality of the sal varies from Q-III to Q-IV. The area is free from frost and regeneration is adequate. The floristic composition of this variety is given in the table below.

Table No.3.2: Floristic composition of Variety 3C/C _{2e} (ii)				
Name of Forest block	Top storey	Middle storey	Under growth	Climber / Grass
Amuni	Sal, Asan,	Kumbhi, Salai,	Petmuri,	Latapalas, Atundi,
Anjar	Bahada, Bija,	Jamu, Rai,	Mohana,	Siali, Duba,
Bayakumtia	Kasi, Haldu,	Kendu, Sisoo,	Girdi,	Mardalai, Muturi,
Digchampe	Dhaura, ,	Karada,	Ranikathi	Sincula
Dhublapal	Mundi,	Kamalagundi,		
Dumurudiha	Semal,	Amla, Bamboo		
Gadagadei	Gambhari			
Godhihudi				
Gandhamardan				
Gaudachampe				
Jagar				
Gonasika				

Variety 3C / C_{2e} (iii) Moist Peninsular Valley Sal(22014.1900 Ha. appx.):

This type embraces all the good sal forests of the Division and extends over a large tract of the district. This type is met with mainly in Karo, Sidhamatha, Uliburu, Thakurani, Baitarani, parts of Kalapat blocks and all plain forest of Telkoi range i.e. Bandhanjhari, Samakoi, jharbeda, krushnapur, Kodbil, Benamunda and Ranibeda R.Fs.

The geological formation in Kalapat and Charigarh plains are quite suitable for the growth of sal which therefore is the dominating species in the region. It is generally more aggressive than any of its associates and constitutes 70 to 80% of the top canopy. There is hardly any middle storey in the crop. The quality of sal varies from All India quality II to quality IV, the former being confined to valley while quality III occurs on the hill slopes of moderate gradient and quality IV on the ridges. Quality I sal is almost absent in the forest of the Division.



The principal associates of Sal in this type of forest are *Terminalia tomentosa (alata)*, *T. belerica*, *Lagerstroemiaparviflora*, *Anogeissuslatifolia*, *Syzygiumcumini*, *Mangiferaindica*, *Schleicheraoleosa* etc. The most striking feature in this type of forest is the presence of *Ardisiasolenacea* (Bantala), *desmodium species*, *Millettiaauriculata* (climber), *Combretum decandrum* and profuse regeneration of sal, both coppice as well as of seedling origin. There are small patches of Dhaura (*Anogeissuslatifolia*) with other Xerophytic miscellaneous species seen in Thakurani and Baitarani blocks but the extent of such are so insignificant that they can hardly be carved out from the main type to be kept under a separate forest type.

The best sal forests of the Division are on the plateau around Barbil and Joda in Champua Range which is an extension of the best sal forests of West-Singbhum, Jharkhand. The prevalence of pole to middle aged sal in the area indicates the incidence of shifting cultivation in the past and the crop can, therefore, be considered to be of secondary origin but the secondary moist deciduous forests replacing primary forests of the same type is not differentiated, as almost all the primary forests have been practically influenced by human interference.

Table No.3.3: Floristic composition of Variety 3C/C_{2e(iii)}-Moist Peninsular Valley Sal

Name of block	Top story	Middle story	Under drowth	Climber / Grass
Baitarani A	Sal, Arjun,	Kumbhi,	Ranikathi,	Atundi, Mardalai,
Baitarani B	Asan, Bija,	Chadeidudi,	Girili,	Muturi, Siali
Bandhanjhari	Semal, Haldu,	Kasi, Bandhan,	Salaparni,	
Benamunda	Amba	Senha,	Palua	
Jharbeda		Bamboo		
Kalapat(P)				
Karo (P)				
Ranibeda				
Siddhamath				
Thakurani(P)				
Uliburu				

Sub-type 5B / C_{1c}Dry Peninsular Sal(66287.1938 Ha. appx.):

This sub-type of forest covers a large tract of the Division. Most part of Atai, Barabanka, parts of Sidhamath, Ghatgaon, Pipilia, Poipani, Masinabilla, Balipokhari, Nalapanga, Balabhadrapur, Basantpur, Kalimati, Sarupat, Patna, Naranpur, Raghunathpur, Belda and Maidankel RF are included in this type sub-types. Sal is predominant in this type of forests but of poor-quality having associates like *Terminalia tomentosa (alata)*, *Anogeissuslatifolia*, *Pterocarpus marsupium*, *Diospyros melonxylon*, *Adina cordifolia*, *Terminalia chebula*, *Terminalia belerica*, *Lagerstroemia parviflora*,



Buchananialanza, *Lanneacoromandelica* and *Dalbergia latifolia* etc. The common plants are *Wendlandia* species, *Embllica officinalis*, *Cassai fistula*, *Morindatinctoria*, *Antidesma* species, *Randia* species, *Symplocosracemosa* and *Cleistanthuscollinus*. The common undergrowth in these forests is *Flemingiachappar*, species, *Strobilanthes* species. *Banakhajuri*(*Phoenix acaulis*) are frequently met with in parts of Atai and Barabanka blocks. The common climbers in these forests are *Bauhinia vahili*, *Smilax* species while *Combretum decandrum* occurs in vally and ravines.

These forests are rarely having more than 20m height in average and the canopy is irregular with badly shaped sal trees where hollowness occurs even at a very young age. Though the percentage of sal in these forests is more than 50 with more common associates of *Anogeissuslatifolia* and *Buchananialanza*. The site quality varies from IV to V. The hill slopes generally support a dry type of growth.

Dry Peninsular Sal forests are found on shallow soil overlying crystalline or metamorphic rocks, where moisture condition is unfavourable for good growth. Sal does not grow well in this area but generally attains quality IV. Regeneration of sal is inadequate and high percentage of unsoundness of trees of all girth class in higher slope is found. This is due to poor soil, regular annual ground fire, uncontrolled selective felling and leaving unsound stem. Sal forms almost a pure crop. The growth is poor stunted and many are found malformed. This may be due to frequent annual fire and drought prevailing in the area. Varying proportion of miscellaneous species is also found with Sal as principal species. The floristic composition of this Sub-type is given in the table below.



Table No.3.4: Floristic composition of Sub-type 5B / C_{1c}.Dry peninsular sal Forests.

Name of block	Top story	Middle story	Under drowth	Climber / Grass
Atei (P)	Sal, Asan, Arjun,	Achhu, Ankula,	Arakha,	Atundi, Gila, Dantari,
Badamasinabilla	Bija, Bahada,	Amla, Agasti,	Asadhua,	Kaincha, Siali, Dungi,
Baitarani East A	Chatian, Dhaura,	Buro, Bela,	Basanga, Gila,	Broom, Duba
Baitarani East B	Harida, Haldu,	Bheru, Chara,	Girili, Kantei,	
Balabhadrapur	Jamu, Kasi,	Dhatuki, Palas	Ghurudu,	
Balibandha	Kochila, Lodha,		Jajangi	
Balipokhari	Rohini, Semal,			
Barabanka (P)	Sidha, Sisoo,			
Badbil	TetuliKendu,			
Bardhana	Mahul			
Basantapur				
Baunsuli				
Belposi				
Belda				
Billa A	Sal, Asan, Arjun,	Achhu, Ankula,	Arakha,	Atundi, Gila, Dantari,
Barang (P)	Bija, Bahada,	Amla,	Asadhua,	Kaincha, Siali, Dungi,
Budhikapudi I	Chatian, Dhaura,	Agasti,Buro,	Basanga, Gila,	Broom, Duba
Budhikapudi II	Harida, Haldu,	Bela,Bheru,	Girili, Kantei,	
Chadheibhol	Jamu, Kasi,	Chara,	Ghurudu,	
Chemena A	Kochila, Lodha,	Dhatuki,Palas	Jajangi	
Chhamunda-	Rohini, Semal,			
Golabandha	Sidha, Sisoo,			
Dhanurjayapur	TetuliKendu,			
Dhanurjayapur	Mahul			
Ghatgaon				
Jadipada (P)				
Jharbeda (P)				
Jyotipur(P)				
Kalapat (P)				
Kalikaprasad				
Kalimati				
Khajuribani				
Kodbil (P)				
Laxmiposi (P)				
Laxmiposi				
Maidankel				
Mankadachua				
Masinabilla				
Mooni				



Naranpur (P)				
Nelung (P)				
Ninua				
Padmapur				
Patana(P)				
Pipilia				
Poipani (P)				
Raghunathpur				
Raikala (P)				
Rasapada				
Rebena (P)				
Rekuti				
Sarupat				
Shyamanali-Koilisuta				
Sikheswari				
Tamango(P)				
Tando				
Ukhunda (P)				

Type 5B / C₂Northern Dry Mixed Deciduous Forest (27961.0850 Ha. appx.):

Northern Dry Mixed Deciduous Forest is scattered throughout the hill tracts having poor humus contain soil. This Type of forest occurs in all most all blocks towards the southern part of the division. The culmination stage of plant succession is noticed in this locality, where the existing sal crop has been replaced by miscellaneous species owing to excess illicit felling, fire and over grazing. The crop is less open and trees are stunted. The trees remain leafless for a longer period and the forests give a desolate look in summer season.

This type of forest is usually met with in parts of Atai, Barabanka, Pedipokhari, Naibuga, Mankadchua, parts of Kalpat R.F. on steeper hill slopes and southern aspects. These forests usually have poor vegetation with upper canopy often broken and irregular. The trees have a relatively short bole, spreading crown, poor form and height rarely over 15 to 20 m. The main reasons attributed for such type of vegetation is topography, aspect and the shallowness of the soil coupled with hot weather condition and exposure of soil to varied climatic condition. The typical site quality of this type of forest is III/IV to IV and regeneration condition is fair but slow.

Dhaura (*Anogeissus latifolia*) is often seen in groups on the southern aspects on steep hills. Sal is almost absent in this type of forests while other species seen in common are Asan (*Terminalia tomentosa*), Bhada (*T. belerica*), Bija (*Pterocarpus marsupium*), Kurum (*Adina cordifolia*), Harida (*T. chebula*), *Bowellia serrata*, *L. parviflora*, *B. suberosa*. Middle



storey consists of *Cleistanthus collinus*, *Emblia officinalis*, *Cassia fistula*, *Gardenia latifolia* and sparingly *Salia Bamboo (Dendrocalamus strictus)* of very poor quality.

Gangasiuli (*Nyctanthes arbour-tristis*) however is seen in abundance. The undergrowth is usually rare and consists of shrubs like *Phoenix species*, *Holarrhena* with grasses of *Aristida setacea*, *Cymbopogon martini* and climbers like *Butea superba*. The floristic composition of this type is given in the table below.

Table No.3.5: Floristic composition of Type 5B / C₂-Northern dry mixed deciduous forests.				
Name of block	Top story	Middle story	Under drowth	Climber / Grass
Atei (P)	Sal, Genduli,	Amla, Chara,	Kurei, Dhatuki,	Salia, Dungi, Dantari,
Barabanka (P)	Salai, Kendu,	Khair,	Khurudu	Siali, Kaincha
Kalapath (P)	Dhaura,	Bamboo		
Kandara C	Mahula,			
Karo (P)	Dhuben, Sisoo,			
Krushnapur	Ashan, Gahira			
Naibuga				
Nayagarh				
Pedipokhari				
Renda				
Tamango (P)				
Thakurani (P)				

Sub- Type E4 Lateritic Semi-Ever Green Forest (3459.1000 Ha. appx.):

This sub-type comes under Group 2 Tropical Semi-ever Green Forest, Sub Group 2B Northern Tropical Semi-Evergreen Forest and type General edaphic and Seral types of Semi-Evergreen Forest. This is an edaphic variation and can be classified as E4 Lateritic semi-evergreen Forests as per Chamion and Seth. The small portion of Kalapat R.F. along the border of Sukinda and Dhenkanal can be taken under this sub-type. The rainfall in this area is comparatively high and the forests have a moist tendency because of proximity to sea. The soil is lateritic and the forest is characterised by the presence of kangada (*Xylixylcarpa*) which forms a sizable proportion in the crop composition. The average height of *Xylixylcarpa* in these forests is around 12 metre and girth is around 90 cm.

The main associates in this type of forests are *Pterocarpus marsupium*, *Careya arborea*, *Strychnos nux-vomica*, *Anogeissus latifolia*, *Lagerstroemia parviflora*, *Lannea coromandelica*, *Diospyros melanoxylon*, *Buchnanian lanzan*, *Bridelia retusa*, *Mangifera indica*, *Trewia nudiflora*, *Macaranga peltata*, *Terminalia tomentosa* spp. The common undergrowths found in this type of forests are *Adhatodavasisa*,



Holarrhenaantidysenterica, *Murrayapaniculata*, *Clerodendron spp.*, Boorm grass and stray bamboo clumps (*Bambusaaurundinacea*). *Butea superba* and *Combretum decandrum* are the common climbers found in these areas.

The other associates commonly seen in these areas are *Brideliaretusa* commonly seen in these areas are *Berideliaretusa*, *Mangiferaindica*, *Trewianudiflora*, *Bursera serrata*, *Macaranga peltata*, *Alstoniascholaris*, *Oroxylumindicum*, *Artocarpuslacoocha*, *Diospyrosmmontana*, *Anogeissuslatifolia* and *Terminalia species*. The common undergrowths are *Adhatodavasica*. *Holarrhenaantidysenterica*, *Muraya*, *Clerodendron*, Broom grass and stray bamboo clumps (*B. aurundinacea*) “Nai-palas” and Atundi are the common climbers

The density varies from 0.4 to 0.6. The typical site quality of these types of forests is Q III to Q IV. The regeneration of all species is profuse. Because of biotic interference the intensity of *Shorearobusta* is decreasing which promote the intensity of *Xylixylcarpa*.

Sub-Type 5/DS1 Moist Mixed Scrub Deciduous Forest (9297.6400 ha. appx):

This sub-type is commonly seen throughout the dry deciduous forest zone of India and is the result of various local factors. The existence of this dry deciduous scrub or law forests is not because of adverse climatic condition but due to continuous maltreatment to the original dry peninsular sal forests of 5B/C1c sub type. The present stage of degradation is due to repeated fire, over grazing, irregular and over feeling by the nearby villagers and unscrupulous timber smugglers. The soil condition in most of these forest blocks is rather quite good and very much suitable for tree growth. In fact, most of the good agricultural land in the district lies within the vicinity of these forests. Due to uncontrolled grazing, repeated fire, and illicitfelling these forests have been reduced into a scrub jungle with practically no regeneration and developed into ravines which accelerate erodion.

This degradation stage is seen in many forest blocks of the division. It is remarkable in the forest blocks like Atei (P), Champei, Danla, Gandhamardan (P), Jadipada(P), Jyotipur (P), Kandara A, Kandara B, Kanjipani (P), Laxmiposi (P), Nalapanga, Naranpur (P), Nelung (P), Nunia, Palaspada, Patna (P), Poipani (P), Pradhanapada, Purunapani, Raikala (P), Saharpur (P), Sarasposi, Tangarani, Ukunda(P).

The main species found in this type of forests are *Shorearobusta*, *Terminalia alata*, *Cleistanthuscollinus*, *Madhucaindica*, *Diospyros montana*, *Diospyros melanoxyton*, *Soymbidafebrifuga*, *Chloroxylonsvietenia*, *Emblica officinalis*, *Woodfordiafruticosa*. Many of the shrubs found in this type of forests are either distasteful to the cattle or thorny and these are usually *Holarrhenaantidysenterica*, *Randiadumetorum*, *Carrissaspinarium*, *Diospyros ferrea*, Climbers are not common in these forest blocks but heavy growth of *Combretum decandrum* is found in Atei blocks in comparatively moist

area. Sal is the predominant species in these degraded shrubby forests and exists in rooted waste form. It needs special protection and proper tending operations by which, ultimately it can develop in to a beautiful Sal forest and can be brought back to 5B/C_{1c} category. Some of the forest area like Siddhamath, Sanghagara, Guptaganga, Taramakanta, Thakurani etc. have also reached this stage.

The density hardly reaches 0.2. The typical site quality of these types of forests is hardly Q V. The regeneration from seed origin is very poor. Coppice shoots are coming up from the felled stumps but not establishing due to heavy biotic interference.

3.2 Plant Species Diversity:

3.2.1 Principles of Biodiversity Index Calculation:

A **diversity index** (also called **phylogenetic or Simpson's Diversity Index**) is a quantitative measure that reflects how many different types (such as species) there are in a dataset (a community) and that can simultaneously take into account the phylogenetic relations among the individuals distributed among those types, such as *richness*, *divergence* or *evenness*. These indices are statistically representations of biodiversity in different aspects (richness, evenness and dominance).

Richness R simply quantifies how many different types the dataset of interest contains. For example, species richness (usually noted S) of a dataset is the number of different species in the corresponding species list. Richness is a simple measure, so it has been a popular diversity index in ecology, where abundance data are often not available for the datasets of interest. Because richness does not take the abundances of the types into account, it is not the same thing as diversity, which does take abundances into account. However, if true diversity is calculated with $q = 0$, the effective number of types (${}^0D$) equals the actual number of types (R).

3.2.2 Shannon Index:

The Shannon index has been a popular diversity index in the ecological literature, where it is also known as Shannon's diversity index, the Shannon–Wiener index, the Shannon–Weaver index and the Shannon entropy. The measure was originally proposed by Claude Shannon to quantify the entropy (uncertainty or information content) in strings of text. The idea is that the more different letters there are, and the more equal their proportional abundances in the string of interest, the more difficult it is to correctly predict which letter will be the next one in the string. The Shannon entropy quantifies the uncertainty (entropy or degree of surprise) associated with this prediction. It is most often calculated as follows:

$$H' = - \sum p_i \ln p_i$$

Where p_i is the proportion of characters belonging to the i^{th} type of letter in the string of interest. In ecology, p_i is often the proportion of individuals belonging to the i^{th} species in the dataset of interest. Then the Shannon entropy quantifies the uncertainty in predicting the species identity of an individual that is taken at random from the dataset.

Although the equation is here written with natural logarithms, the base of the logarithm used when calculating the Shannon entropy can be chosen freely. Shannon himself discussed logarithm bases 2, 10 and e , and these have since become the most popular bases in applications that use the Shannon entropy. Each log base corresponds to a different measurement unit, which have been called binary digits (bits), decimal digits (decits) and natural digits (nats) for the bases 2, 10 and e , respectively. Comparing Shannon entropy values that were originally calculated with different log bases requires converting them to the same log base: change from the base a to base b is obtained with multiplication by $\log_b a$.

It has been shown that the Shannon index is based on the weighted geometric mean of the proportional abundances of the types, and that it equals the logarithm of true diversity as calculated with $q = 1$:

$$H' = - \sum_{i=1}^R p_i \ln p_i = - \sum_{i=1}^R \ln p_i^{p_i}$$

This can also be written

$$H' = -(\ln p_1^{p_1} + \ln p_2^{p_2} + \ln p_3^{p_3} + \dots + \ln p_R^{p_R})$$

which equals

$$H' = -\ln p_1^{p_1} p_2^{p_2} p_3^{p_3} \dots p_R^{p_R} = \ln \left(\frac{1}{p_1^{p_1} p_2^{p_2} p_3^{p_3} \dots p_R^{p_R}} \right) = \ln \left(\frac{1}{\prod_{i=1}^R p_i^{p_i}} \right)$$

Since the sum of the p_i values equals unity by definition, the [denominator](#) equals the weighted geometric mean of the p_i values, with the p_i values themselves being used as the weights (exponents in the equation). The term within the parentheses hence equals true diversity ^1D , and H' equals $\ln(^1D)$.

When all types in the dataset of interest are equally common, all p_i values equal to $1/R$, and the Shannon index hence takes the value $\ln(R)$. The more unequal the abundances of the types, the larger is the weighted geometric mean of the p_i values, and the smaller the corresponding Shannon entropy. If practically all abundance is concentrated to one type, and the other types are very rare (even if there are many of them), Shannon entropy approaches zero. When there is only one type in the dataset, Shannon entropy exactly equals zero (there is no uncertainty in predicting the type of the next randomly chosen entity).

3.2.3 Renyi entropy:

The Renyi entropy is a generalization of the Shannon entropy to other values of q than unity. It can be expressed:

$${}^qH = \frac{1}{1-q} \ln \left(\sum_{i=1}^R p_i^q \right)$$

which equals

$${}^qH = \ln \left(\frac{1}{\sqrt[q-1]{\sum_{i=1}^R p_i p_i^{q-1}}} \right) = \ln({}^qD)$$

This means that taking the logarithm of true diversity based on any value of q gives the Rényi entropy corresponding to the same value of q .

3.2.4 Simpson Index:

The Simpson index was introduced in 1949 by Edward H. Simpson to measure the degree of concentration when individuals are classified into types. The same index was rediscovered by Orris C. Herfindahl in 1950. The square root of the index had already been introduced in 1945 by the economist Albert O. Hirschman. As a result, the same measure is usually known as the Simpson index in ecology, and as the Herfindahl index or the Herfindahl–Hirschman index (HHI) in economics.

The measure equals the probability that two entities taken at random from the dataset of interest represent the same type. It equals:

$$\lambda = \sum_{i=1}^R p_i^2,$$

Where R is the richness i.e. the total number of types in the dataset. This equation is also equal to the weighted arithmetic mean of the proportional abundances p_i of the types of interest, with the proportional abundances themselves being used as the weights. Proportional abundances are by definition constrained to values between zero and unity, but it is a weighted arithmetic mean, hence $\lambda \geq 1/R$, which is reached when all types are equally abundant.

By comparing the equation used to calculate λ with the equations used to calculate true diversity, it can be seen that $1/\lambda$ equals ${}^2D$, i.e. true diversity as calculated with $q = 2$. The original Simpson's index hence equals the corresponding basic sum.

The interpretation of λ as the probability that two entities taken at random from the dataset of interest represent the same type assumes that the first entity is replaced to the dataset before taking the second entity. If the dataset is very large, sampling without replacement gives approximately the same result, but in small datasets the difference can be substantial. If the dataset is small, and sampling without replacement is assumed, the probability of obtaining the same type with both random draws is:

$$\ell = \frac{\sum_{i=1}^R n_i(n_i - 1)}{N(N - 1)}$$

where n_i is the number of entities belonging to the i th type and N is the total number of entities in the dataset. This form of the Simpson index is also known as the Hunter–Gaston index in microbiology.

Since mean proportional abundance of the type's increases with decreasing number of types and increasing abundance of the most abundant type, λ obtains small values in datasets of high diversity and large values in datasets of low diversity. This is counterintuitive behavior for a diversity index, so often such transformations of λ that increase with increasing diversity have been used instead. The most popular of such indices have been the inverse Simpson index ($1/\lambda$) and the Gini–Simpson index ($1 - \lambda$).¹Both of these have also been called the Simpson index in the ecological literature, so care is needed to avoid accidentally comparing the different indices as if they were the same.

3.2.5 Inverse Simpson index

The inverse Simpson index equals:

$$\frac{1}{\lambda} = \frac{1}{\sum_{i=1}^R p_i^2} = {}^2D$$

This simply equals true diversity of order 2, i.e. the effective number of types that is obtained when the weighted arithmetic mean is used to quantify average proportional abundance of types in the dataset of interest.

The index is also as a measure of the effective number of parties.

3.2.6 Gini–Simpson index:

The original Simpson index λ equals the probability that two entities taken at random from the dataset of interest (with replacement) represent the same type. Its transformation $1 - \lambda$ therefore equals the probability that the two entities represent different types. This measure is also known in ecology as the probability of inter-specific encounter (*PIE*) and the Gini–Simpson index. It can be expressed as a transformation of true diversity of order 2:

The Gibbs–Martin index of sociology, psychology and management studies, which is also known as the Blau index, is the same measure as the Gini–Simpson index.

The quantity is also known as the expected heterozygosity in population genetics.

3.2.7 Berger- Parker Index:

The Berger–Parker index equals the maximum p_i value in the dataset, i.e. the proportional abundance of the most abundant type. This corresponds to the weighted generalized mean of the p_i values when q approaches infinity, and hence equals the inverse of true diversity of order infinity ($1/\infty D$).

3.2.8 Effective number of Species or Hill numbers:

When diversity indices are used in ecology, the types of interest are usually species, but they can also be other categories, such as genera, families, functional types or haplotypes. The entities of interest are usually individual plants or animals, and the measure of abundance can be, for example, number of individuals, biomass or coverage. In demography, the entities of interest can be people, and the types of interest various demographic groups. In information science, the entities can be characters and the types the different letters of the alphabet. The most commonly used diversity indices are simple transformations of the effective number of types (also known as 'true diversity'), but each diversity index can also be interpreted in its own right as a measure corresponding to some real phenomenon (but a different one for each diversity index).

Many indices only account for categorical diversity between subjects or entities. Such indices however do not account for the total variation (diversity) that can be held between subjects or entities which occurs only when both categorical and qualitative diversity are calculated.

True diversity, or the effective number of types, refers to the number of equally abundant types needed for the average proportional abundance of the types to equal that observed in the dataset of interest (where all types may not be equally abundant). The true diversity in a dataset is calculated by first taking the weighted generalized

mean M_{q-1} of the proportional abundances of the types in the dataset, and then taking the reciprocal of this. The equation is:

$${}^qD = \frac{1}{M_{q-1}} = \frac{1}{\sqrt[q-1]{\sum_{i=1}^R p_i p_i^{q-1}}} = \left(\sum_{i=1}^R p_i^q \right)^{1/(1-q)}$$

The denominator M_{q-1} equals the average proportional abundance of the types in the dataset as calculated with the weighted generalized mean with exponent $q-1$. In the equation, R is richness (the total number of types in the dataset), and the proportional abundance of the i th type is p_i . The proportional abundances themselves are used as thenominal weights. The numbers are called Hill numbers of order q or effective number of species.

When $q = 1$, the above equation is undefined. However, the mathematical limit as q approaches 1 is well defined and the corresponding diversity is calculated with the following equation:

$${}^1D = \frac{1}{\prod_{i=1}^R p_i^{p_i}} = \exp \left(- \sum_{i=1}^R p_i \ln(p_i) \right)$$

Which is the exponential of the Shannon entropy calculated with natural logarithms (see above). In other domains, this statistic is also known as the perplexity.

The value of q is often referred to as the order of the diversity. It defines the sensitivity of the diversity value to rare vs. abundant species by modifying how the weighted mean of the species proportional abundances is calculated. With some values of the parameter q , the value of M_{q-1} assumes familiar kinds of weighted mean as special cases. In particular, $q = 0$ corresponds to the weighted harmonic mean, $q = 1$ to the weighted geometric mean and $q = 2$ to the weighted arithmetic mean. As q approaches infinity, the weighted generalized mean with exponent $q-1$ approaches the maximum p_i value, which is the proportional abundance of the most abundant species in the dataset. Generally, increasing the value of q increases the effective weight given to the most abundant species. This leads to obtaining a larger M_{q-1} value and a smaller true diversity (${}^qD$) value with increasing q .

When $q = 1$, the weighted geometric mean of the p_i values is used, and each species is exactly weighted by its proportional abundance (in the weighted geometric mean, the

weights are the exponents). When $q > 1$, the weight given to abundant species is exaggerated, and when $q < 1$, the weight is given to rare species. At $q = 0$, the species weights exactly cancel out the species proportional abundances, such that the weighted mean of the p_i values equals $1 / R$ even when all species are not equally abundant. At $q = 0$, the effective number of species, ${}^0D$, hence equals the actual number of species R . In the context of diversity, q is generally limited to non-negative values. This is because negative values of q would give rare species so much more weight than abundant ones that ${}^qD$ would exceed R .

The general equation of diversity is often written in the form

$${}^qD = \left(\sum_{i=1}^R p_i^q \right)^{1/(1-q)}$$

3.2.9 Methods adopted to calculate Bio diversity:

There are four Ranges in the division. Each Range is taken as strata. There are 264 Sample plots of 0.1 ha (31.62 m Sq) in each range. Three Sample plot of Binka Range, Six points from Sonapur Range, five points from Ullunda Range and three points from Birmaharajpur Range (total -17 sample point) data have been analyzed for Bio Diversity index) to find out Shannon-Weiner Species Diversity Index, Evenness Index, Index of Dominance using the formula furnished below.

A) Shannon-Weiner Species Diversity Index has been calculated as per the following expression:

$$\bar{H} = -\sum \frac{n}{N} \log_e \frac{n}{N}$$

where,

$\bar{H}$ = Shannon-Weiner Species Diversity Index

n = No. of individuals per species

N = Total number of individuals of all species

B) Evenness Index has been calculated by the following expression:

$$e = \frac{\bar{H}}{\log_e S}$$



where,

e = Evenness Index

$\bar{H}$ = Shannon Weiner Species Diversity Index

S = No. of species

C) Index of Dominance has been calculated by the following expression

$$c = \sum \left(\frac{n}{N} \right)^2$$

where

c = Index of Dominance

n = No. of individuals per species

N = Total number of individuals of all species

Table No 3.6 Bio Diversity Index for different Sample points.

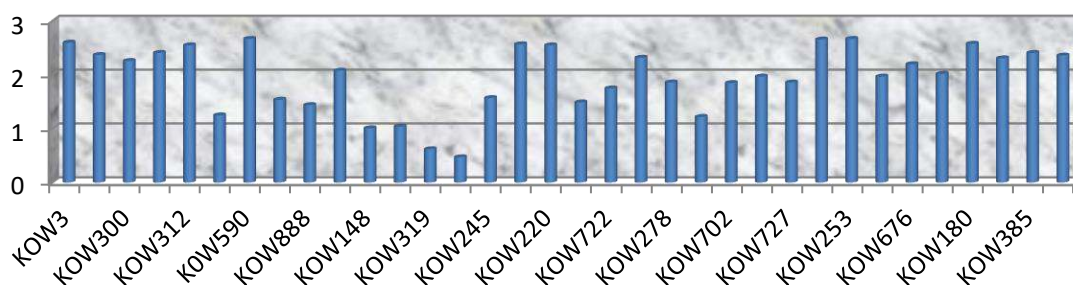
Name of Range	Sample Point no	Name of Forest Block	Shannon-Weiner SDI	Evenness Index	Index of Dominance	Simpson index	Inverse Simpson index
BJP	KOW3	Amjor RF	2.60	0.92	0.086	0.086	11.63
BJP	KOW290	Gangarei RF	2.37	0.80	0.177	0.177	5.65
BJP	KOW300	Gandharmardan PF	2.26	0.94	0.121	0.121	8.26
BJP	KOW305	Gonasika RF	2.41	0.83	0.141	0.141	7.09
BJP	KOW312	Jagar RF	2.55	0.94	0.094	0.094	10.64
Badbil	KOW572	Kadana-B RF	1.25	0.60	0.448	0.448	2.23
Badbil	KOW590	Karo RF, C-6	2.67	0.83	0.138	0.138	7.25
Badbil	KOW815	Sidhamatha RF, C-6	1.54	0.60	0.363	0.363	2.75
Badbil	KOW888	Thakurani RF, C-29	1.44	0.51	0.464	0.464	2.16
Badbil	KOW917	Ulibaru RF, C-1	2.08	0.87	0.159	0.159	6.29
Champua	KOW148	Baitarani East B PF	1.01	0.52	0.516	0.516	1.94
Champua	KOW176	Ba;ibandha RF	1.04	0.58	0.521	0.521	1.92
Champua	KOW319	Jyotipur RF	0.62	0.24	0.752	0.752	1.33
Champua	KOW658	Laksmiposi RF	0.47	0.34	0.790	0.79	1.27
Champua	KOW245	Bandhana RF	1.57	0.65	0.346	0.346	2.89
Gatgaon	KOW105	Atai RF	2.57	0.84	0.133	0.133	7.52
Gatgaon	KOW220	Barabanka RF	2.55	0.85	0.107	0.107	9.35
Gatgaon	KOW304	Ghatagaon RF	1.49	0.55	0.430	0.43	2.33
Gatgaon	KOW722	Pipilia RF	1.75	0.76	0.264	0.264	3.79
Gatgaon	KOW570	Kalimati RF	2.32	0.76	0.189	0.189	5.29
Patna	KOW278	Chadheibhol RF	1.86	0.60	0.321	0.321	3.12
Patna	KOW280	Chemena A RF	1.22	0.63	0.424	0.424	2.36
Patna	KOW702	Padampur RF	1.85	0.67	0.292	0.292	3.42



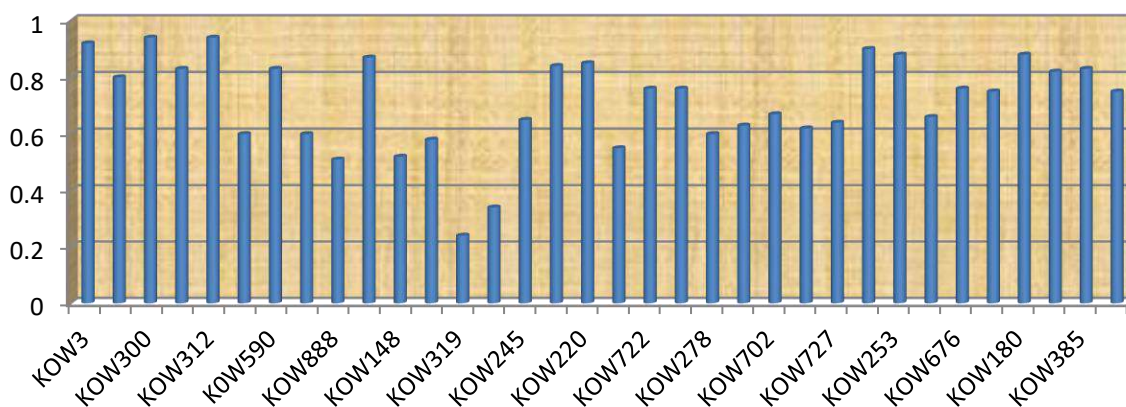
Patna	KOW705	Patna RF	1.97	0.62	0.294	0.294	3.40
Patna	KOW727	Purunapani RF	1.86	0.64	0.296	0.296	3.38
Keonjhar	KOW171	Balabhadrapur RF	2.66	0.90	0.089	0.089	11.24
Keonjhar	KOW253	Belda RF	2.67	0.88	0.087	0.087	11.49
Keonjhar	KOW247	Basantpur RF	1.97	0.66	0.258	0.258	3.88
Keonjhar	KOW676	Nalapanga RF	2.20	0.76	0.205	0.205	4.88
Keonjhar	KOW680	Narayanpur RF	2.02	0.75	0.226	0.226	4.42
Telkoi	KOW180	Bandhajhari RF,C-1	2.58	0.88	0.097	0.097	10.31
Telkoi	KOW265	Benamunda RF,C-3	2.31	0.82	0.130	0.13	7.69
Telkoi	KOW385	Kalapat RF	2.41	0.83	0.123	0.123	8.13
Telkoi	KOW800	Samakoilli RF	2.36	0.75	0.176	0.176	5.68

The sample Point enumeration information is at **Annexure-V** for reference.

Shannon-Weiner SDI

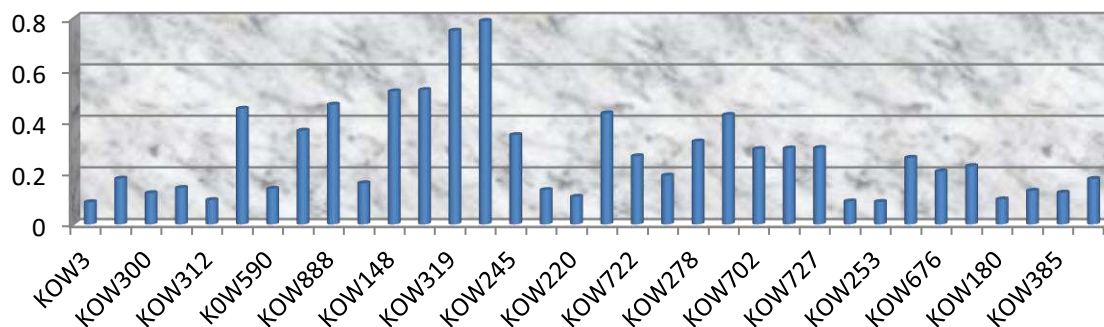


Evenness Index

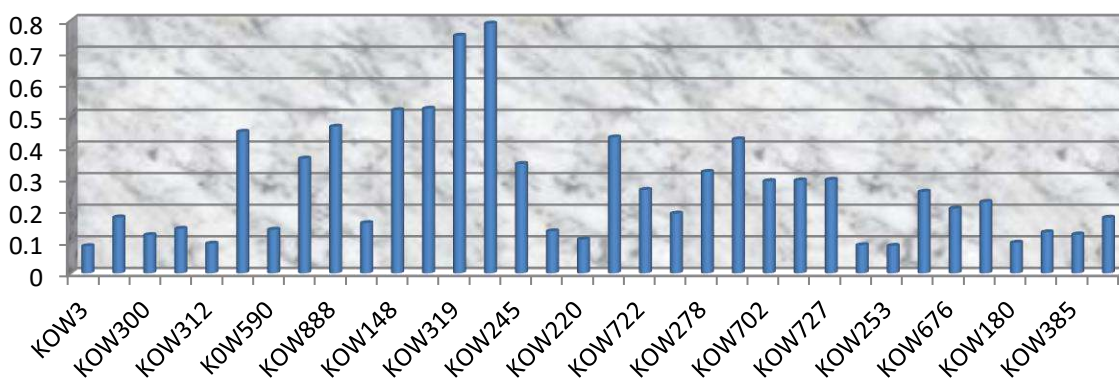




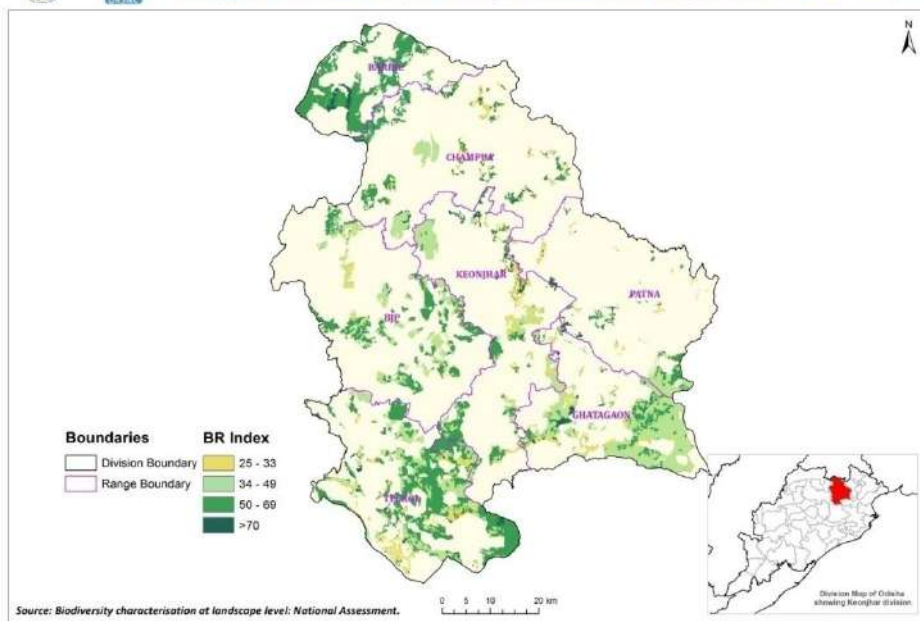
Index of Dominance



Simpson index



Biological Richness Map of Keonjhar Forest Division, Odisha



3.3 Status Of Biodiversity Conservation In Forests:

Biodiversity is the shortened forms of two words “biological and “diversity”. It refers to the variety of life that can be found on earth like plants, animals, fungi and micro-organisms as well as the communities that they form and the habitats in which they live. As defined by the Convention on Biological Diversity, biological diversity is the variability among living organisms from all the sources including inter alia, terrestrial, marine and other aquatic ecosystems and ecological complexes of which they are part, diversity within species, between species and of ecosystems”. Assessing the status and trends of biodiversity is essential for sustainable strategies at all levels from village to region to nation.

Ecological communities maintain the ecological and evolutionary processes that sustain life. These are necessary to help maintain the planet’s chemical balance, moderate climate, renew soil and conserve species diversity, plants, animals, and other species have intrinsic worth. They are also the source of all biological wealth- supplying food, raw materials, medicines, recreational resources and store of other goods and services. Tropical forests are the richest and complex biomes on the earth surface and it is providing 50% of life form (Wilson, 1988) that includes 96% of tree species richness. However, these forest ecosystems are losing their ability due to increasing biotic infestation such as anthropogenic perturbations and cattle grazing (Sundrapanian and Swamy, 2000). Species diversity is an expression of community structure. The number of species in a community is referred to as species richness.

As of now, no such direct conservation efforts have been initiated in this division but some efforts have been taken towards conserving the unique biodiversity of forests. In this context some key findings of the species identified are given below.



Table No. 3.7 Biodiversity values of different species in Keonjhar Division

Sl. No.	Scientific name	Local Name	Family Name	Habit	Status	Significant Characteristics
1.	<i>Abroma anguste</i>	Ultakamal	Sterculiaceae	Shrub	Common	Wild ornamental
2.	<i>Abrus precatorius</i>	Kaincha	Fabaceae	Climber	Common	Medicinal, ornamental, socio-cultural
3.	<i>Abutilon indicum</i>	Pedhipedhika	Malvaceae	Shrub	Rare	Medicinal, Edible
4.	<i>Acacia auriculiformis</i>		Mimosaceae	Tree	Common	Economical
5.	<i>Aegle marmelos</i>	Bel	Rutaceae	Tree	Common	Medicinal, economical, edible
6.	<i>Ageratum conyzoides</i>	Pakkasundar	Asteraceae	Shrub	Common	Medicinal
7.	<i>Alangium salvifolium</i>	Ankoli	Alangiaceae	Shrub	Common	Wild weed
8.	<i>Alocasia Montana</i>		Arecaceae			
9.	<i>Alstonia scholaris</i>	Indian Devil Tree	Apocynaceae	Tree	Common	Economical
10.	<i>Anacardium occidentale</i>	Hijlibadam	Anacardaceae	Tree	Common	Edible, Economical
11.	<i>Andrographis paniculate</i>	Chirota	Acanthaceae	Herb	Common	Medicinal, economical
12.	<i>Annona squamosa</i>	Sitaphal	Annoneaceae	Tree	Common	Edible
13.	<i>Arisaema erubescens</i>		Araceae			
14.	<i>Asparagus racemosus</i>	Satabhari	Asparagaceae	Climber	Vulnerable	Medicinal, Economical
15.	<i>Atalantia monophylla</i>	Wild Lime	Rutaceae	Shrub	Common	Medicinal, Edible
16.	<i>Atlosia scarabacoides</i>	Banakultha	Fabaceae	Climber	Common	Edible
17.	<i>Azadirachta indica</i>	Neem	Meliaceae	Tree	Common	Edible, Medicinal, economical
18.	<i>Baliospermum montanum</i>	Danti	Euphorbiaceae	Shrub	Common	Medicinal
19.	<i>Bambusa arundinaceae</i>	Kanta Bans	Poaceae	Grass	Common	Economical
20.	<i>Bauhinia vahlii</i>	Siyalipatra	Fabaceae	Climber	Common	Medicinal, economical



21.	<i>Benkaramalbarica</i>	Kontakoli	Rubiaceae	Tree	Common	Medicinal
22.	<i>Buchananialanzan</i>	Chironji	Anacardiaceae	Tree	Common	Edible
23.	<i>Cajanuscajanifolia</i>	Pigeon Pea	Fabaceae	Shrub	Common	Edible
24.	<i>Careyaarborea</i>	Khumbhi	Lacythidaceae	Tree	Common	Edible
25.	<i>Caryotaurens</i>	Fishtail palm	Araceae	Tree	Common	Edible
26.	<i>Cassia fistula</i>	Sonari	Caesalpiniaceae	Tree	Common	Medicinal, Economical
27.	<i>Cassia occidentalis</i>	Kaashunda	Caesalpiniaceae	Shrub	Common	Medicinal
28.	<i>Cassia siamia</i>	Sakunda	Caesalpiniaceae	Tree	Common	Medicinal
29.	<i>Cassia tora</i>	Chhotachakunda	Fabaceae	Shrub	Common	Medicinal
30.	<i>Celastruspaniculatus</i>	Kujri	Celastraceae	Climber	Vulnerable	Medicinal, Socio-cultural
31.	<i>Centellaasiatica</i>	Thalkudi	Apiaceae	Herb	Common	Medicinal, economical
32.	<i>Cissampelospareira</i>	Kumutia	Verbenaceae	Shrub	Common	Medicinal
33.	<i>Cleistanthuscollinus</i>	Pitusing	Menispermaceae	Vine	Common	Medicinal
34.	<i>Cleome monophyla</i>	Oduva	Euphorbiaceae	Tree	Rare	Poisonous
35.	<i>Clerodendrum inermes</i>	RangaSorisha	Capparaceae	Shrub	Common	Medicinal
36.	<i>Clerodendrum viscosum</i>	Vanajai	Verbenaceae	Shrub	Common	Medicinal
37.	<i>Cocculushirustus</i>	Karada	Menispermaceae	Climber	Common	Medicinal
38.	<i>Colocasiaesculanta</i>	Saru	Araceae	Climber	Common	Edible
39.	<i>Commelinaensifolia</i>	----	Commelinaceae	Prostrate	Common	Edible
40.	<i>Costospeciosus</i>	Kankanka	Costaceae	Shrub	Common	Medicinal, edible
41.	<i>Curculigoorchioiodes</i>	Kali musli	Hypoxidaceae	Herb	Common	Medicinal
42.	<i>Curcuma amada</i>	Amada	Zingiberaceae	Herb	Common	Edible
43.	<i>Curcuma aromatic</i>	Haldi	Zingiberaceae	Herb	Common	Edible
44.	<i>Cuscutareflexa</i>	Konalimuli	Convolvulaceae	Weed	Common	Weed
45.	<i>Cycas ramphii</i>		Cycadaceae	Tree	Common	Ornamental



46	<i>Cyperusrotundus</i>	Mutha	Cyperaceae	Herb	Common	Edible
47	<i>Dalbergia sissoo</i>	Sissoo	Fabaceae	Tree	Common	Economical
48	<i>Desmodiumgangeticum</i>	Anshumati	Fabaceae	Shrub	Common	Medicinal
49	<i>Desmodiumpulchellum</i>	Krishnaparni	Fabaceae	Shrub	Common	Medicinal
50	<i>Dilleniaindica</i>	Aou	Dilleniaceae	Tree	Common	Edible
51	<i>Dilleniapentagyla</i>	Ouu	Dilleniaceae	Tree	Common	Edible
52	<i>Dioscoreabulbifera</i>	Pita aalu	Dioscoreaceae	Climber	Common	Edible, Medicinal, Economical
53	<i>Dioscorea pentaphylla</i>	Panjasanga	Dioscoreaceae	Climber	Common	Edible
54	<i>Dioscoreapuber</i>	Kukaisanga	Dioscoreaceae	Climber	Common	Edible
55	<i>Dioscoreawallichii</i>	Sutaaalu	Dioscoreaceae	Climber	Common	Edible
56	<i>Dioscoria esculenta</i>	Kontaaalu	Dioscoreaceae	Climber	Common	Edible
57	<i>Dioscoriahamiltonii</i>	Mera,tuasanga	Dioscoreaceae	Climber	Common	Edible, medicinal
58	<i>Dioscoriahispida</i>	Bayaaalu	Dioscoreaceae	Climber	Common	Edible
59	<i>Diospyros melanoxyton</i>	Kendu	Ebenaceae	Tree	Common	Edible, economical
60	<i>Eclipta alba</i>	Bhingraj	Asteraceae	Prostrate	Common	Medicinal
61	<i>Eclipta prostrate</i>		Asteraceae			
62	<i>Elephantopusscaber</i>	Mayurachula	Asteraceae	Herb	Common	Edible, economical
63	<i>Emblica officinalis</i>	Amla	Euphorbiaceae	Tree	Common	Edible, Medicinal, economical
64	<i>Emilia sonchifolia</i>	Binj kudo	Asteraceae	Herb	Common	Medicinal
65	<i>Eucalyptus polybractea</i>	Eucalyptus	Myrtaceae	Tree	Common	Medicinal
66	<i>Eupatorium odoratum</i>		Asteraceae	Weed	Common	Weed
67	<i>Euphorbia hirta</i>	Chittakuttei	Euphorbiaceae	Prostrate	Common	Medicinal
68	<i>Evolvulusnummularius</i>	Musakarni	Convolvulaceae	Prostrate	Common	Medicinal
69	<i>Ficusparasitica</i>		Moraceae			
70	<i>Ficussemicordata</i>		Moraceae			
71	<i>Flemingiagrahamiana</i>	----	Fabaceae	Shrub	Common	Medicinal



72	<i>Flemingia stricta</i>	Uskura	Fabaceae	Shrub	Common	Medicinal
73	<i>Gardenia gummifera</i>	Kikimali/ Dekamari	Rubiaceae	Tree	Rare	Medicinal
74	<i>Gardenia latifolia</i>	Papara	Rubiaceae	Tree	Common	Medicinal
75	<i>Glycosmis pentaphylla</i>	Kadudibadi	Runtaceae	Shrub	Common	Medicinal
76	<i>Guazumaulmifolia</i>	Debodaru	Sterculiaceae	Tree	Common	Medicinal
77	<i>Hedyotiscorymbosa</i>	Gharapoadia	Rubiaceae	Herb	Common	Medicinal
78	<i>Helicteresisora</i>	Baranga	Sterculiaceae	Shrub	Common	Medicinal
79	<i>Hemidesmus indicus</i>	Duddhi	Asclepiadaceae	Climber	Common	Medicinal
80	<i>Holarrhenapubescens</i>	Kherwa	Apocynaceae	Tree	Common	Medicinal
81	<i>Holarrhenaantidysentrica</i>	Pita koron	Apocynaceae	Tree	Common	Medicinal
82	<i>Hyptissuaveolens</i>	Ganga Tulsi	Lamiaceae	Herb	Common	Medicinal
83	<i>Ichnocarpusfrutescens</i>	Shyاملata	Apocynaceae	Climber	Common	Medicinal
84	<i>Indigoferacassioides</i>	Girli	Fabaceae	Shrub	Common	Edible
85	<i>Jatropacurcas</i>	Danti	Euphorbiaceae	Shrub	Common	Economical
86	<i>Jatropha gossypifolia</i>	Dumajada	Euphorbiaceae	Shrub	Common	Medicinal
87	<i>Lanneacoromandelica</i>	Mahi	Anacardiaceae	Tree	Common	Edible
88	<i>Lantana camara</i>	Jaikoli	Verbenaceae	Shrub	Common	Medicinal
89	<i>Lasia spinosa</i>	Kohila	Araceae	Herb	Common	Edible
90	<i>Lawsoniainermis</i>	Manjuati	Lythraceae	Shrub	Common	Medicinal
91	<i>Leucas aspera</i>	Chero	Lamiaceae	Weed	Common	Weed
92	<i>Lygodiumflexuosum</i>	Indrajaal	Ligodiaceae	Herb	Common	Wild weed
93	<i>Madhucaalongifolia</i>	Mahulo	Sapotaceae	Tree	Common	Economical
94	<i>Mallatusphillippensis</i>	Sindoori	Euphorbiaceae	Tree	Common	Medicinal
95	<i>Mangifera indica</i>	ambo	Anachardeaceae	Tree	Common	Edible
96	<i>Melastomamalabathricum</i>	Mahagomy	Meliaceae	Tree	Common	Economical



97	<i>Melia azadirachta</i>	Nageswar	Guttiferea	Tree	Common	Medicinal
98	<i>Mesua ferrea</i>	Shiahkanta	Mimoceae	Tree	Common	Wild weed
99	<i>Mimosa himalayana</i>	Lajakulilata	Mimosaceae	Herb	Common	Ornamental
100	<i>Mimosa pudica</i>	Munde	Rubiaceae	Tree	Common	Medicinal
101	<i>Mitragynaparvifolia</i>	Aalo	Rubeaceae	Tree	Common	Fruits for monkey
102	<i>Morindatinctoria</i>	Somla	Moringaceae	Tree	Common	Edible, Medicinal
103	<i>Moringa oleifera</i>	Gongoi	Melastomataceae	Shrub	Common	Wild ornamental
104	<i>Mucunapreriensis</i>	Baidanka	Fabaceae	Climber	Common	Medicinal, economical
105	<i>Murrayapaniculate</i>	Kamini	Rutaceae	Shrub	Common	Edible
106	<i>Ocimumbasilicum</i>	Black tulsi	Lamiaceae	Herb	Common	Medicinal, socio-cultural
107	<i>Ocimumgartisimum</i>	Karpurotulsi	Lamiaceae	Herb	Common	Medicinal
108	<i>Oroxylumindicum</i>	Phanpana	Bignoniaceae	Tree	Common	Medicinal
109	<i>Passiflorafoetida</i>	Gandha Tamala	Passifloraceae	Vine	Common	Medicinal
110	<i>Pavettananceouata</i>		Rubiaceae			
111	<i>Phoenix sylvestris</i>	Khajuri	Araceae	Palm	Common	Edible
112	<i>Phyllanthus amarus</i>	Tamalaki	Phyllanthaceae	Weed	Common	Weed
113	<i>Phyllanthus niruri</i>	BhuiAmla	Phyllanthaceae	Herb	Common	Medicinal
114	<i>Phyllanthus reticulatus</i>	Amla	Euphorbiaceae	Tree	Common	Edible, Medicinal
115	<i>Phyllanthus officinalis</i>	Jejhang	Euphorbiaceae	Shrub	Common	Edible
116	<i>Piper longum</i>	Pippali	Piperaceae	Climber	Common	Edible, Medicinal
117	<i>Plumeria alba</i>		Apocynaceae			
118	<i>Premnalatifolia</i>		Verbenaceae			
119	<i>Pterocarpus marsupium</i>	Bijasal	Fabaceae	Tree	Common	Medicinal
120	<i>Pterospermumxylocarpum</i>	Muchkund	Sterculaceae	Tree	Common	Economical
121	<i>Pterospermumxylocarpus</i>	Giringa	Sterculiaceae	Tree	Common	Medicinal
122	<i>Pueraria tuberosa</i>	Bhuinpokharu	Fabaceae	Climber	Rare	Medicinal, edible, economical



123	<i>Rauvolfia serpentine</i>	Patalgaruda	Apocynaceae	Shrub	Rare	Medicinal
124	<i>Relipta prostrate</i>	Bhrungaraj	Asteraceae	Prostrate	Common	Medicinal
125	<i>Rubastamilnadia</i>	----	Rubiaceae	Shrub	Common	Weed
126	<i>Rubia cordifolia</i>	Athakoli	Rubeaceae	Climber	Common	Medicinal
127	<i>Rungiapectinate</i>	---	Rubeaceae	Herb	Common	Medicinal, edible
128	<i>Samaneasaman</i>	Gulabisiris	Mimosaceae	Tree	Common	Economical
129	<i>Scindapsus officinalis</i>	Partogaja/gajap eepli	Araceae	Climber	Rare	Medicinal
130	<i>Semecarpusanacardium</i>	Soso	Anacardiaceae	Tree	Common	Medicinal
131	<i>Semicarpusanacardium</i>	Bhalia	Anacardiaceae	Tree	Common	Edible, economical
132	<i>Shorearobusta</i>	Sal	Dipterocarpaceae	Tree	Common	Economical
133	<i>Smilax zeylanica</i>	Ramadantuni	Smilacaceae	Climber	Common	Medicinal
134	<i>Solanum nigrum</i>	Bhejri	Solanaceae	Herb	Common	Edible
135	<i>Spathodeacampanulate</i>	----	Bignoniaceae	Tree	Common	Medicinal
136	<i>Stone lamiates</i>	----	Lamiaceae	Shrub	Common	Grows on stone
137	<i>Synedrellanudiflora</i>	BadiPokasunga	Asteraceae	Shrub	Common	Medicinal
138	<i>Syzgiumcumini</i>	Jamun	Myrtaceae	Tree	Common	Edible
139	<i>Tephrosia purpurea</i>	Paharagacha	Fabaceae	Tree	Common	Medicinal
140	<i>Terminalia arjuna</i>	Arjuna	Combretaceae	Tree	Common	Ornamental, Medicinal
141	<i>Terminalia bellirica</i>	Bahada	Combretaceae	Tree	Common	Medicinal
142	<i>Terminalia catappa</i>	Desibadam	Combretaceae	Tree	Common	Medicinal, edible, economical
143	<i>Terminalia chebula</i>	Harda	Combretaceae	Tree	Common	Medicinal
144	<i>Terminalia roxburghii</i>	Atundi	Combretaceae	Tree	Common	Medicinal
145	<i>Terminalia tomentosa</i>	Aasan	Combretaceae	Tree	Common	Economical
146	<i>Toddaliaasiatica</i>	Tundapoda	Rutaceae	Shrub	Common	Edible
147	<i>Triumfettaneglecta</i>	Nichardia	Tiliaceae	Shrub	Common	Medicinal



148	<i>Triumfettarhomboidei</i>	Bidua	Tiliaceae	Shrub	Common	Economical
149	<i>Tylophora indica</i>	Mendi	Asclepiadaceae	Shrub	Common	Medicinal
150	<i>Urena lobata</i>	RaktaPheni	Malvaceae	Shrub	Common	Economical
151	<i>Vernonia cinerea</i>	Pokasunga	Asteraceae	Shrub	Common	Medicinal
152	<i>Vitex altissima</i>	----	Verbenaceae	Climber	Common	Edible for birds
153	<i>Vitex negundo</i>	BaiguniaSindura	Verbenaceae	Climber	Common	Medicinal
154	<i>Woodfordia fruitcosa</i>	Dhartiki	Lytharaceae	Shrub	Common	Medicinal
155	<i>Wrightia tinctoria</i>	Koruan	Apocynaceae	Tree	Common	Medicinal
156	<i>Zizyphus jujube</i>	Ber	Rhamnaceae	Tree	Common	Edible
157	<i>Zizyphus oenoplia</i>	Kanteikoli	Rhamnaceae	Shrub	Common	Medicinal
158	<i>Zizyphus rugosa</i>	Tin koli	Rhamnaceae	Tree	Common	Edible



3.3.1 Some of the plant species observed were listed as RET (Rare, Endangered and Threatened) species. The names are as follows:-

- a. *Scindapsus officinalis*
- b. *Pueraria tuberosa*
- c. *Gardenia gummifera*
- d. *Rauolfia seperntina*
- e. *Asparagus racemosus*
- f. *Mucuna gigantea*
- g. *Ficus semicordata*
- h. *Abutilon indicum*

3.3.2 People's Biodiversity Register :

PBR (People's Biodiversity Register) formulation & Access of benefit sharing (ABS) Regulation is being controlled by Odisha Bio Diversity Board independently and separately over which this division has no regulatory jurisdiction. As suggested the format for describing {7. ACCESS BENEFIT SHARING (ABS) 7.1 Details of Tradeable Biological resources available (Quantitative/ value / Market status) as extracted from **PEOPLE'S BIODIVERSITY REGISTER (PBR) Technical and Administrative Manual** is furnished below.

"7. ACCESS BENEFIT SHARING (ABS)

7.1 Details of Tradeable Biological resources available

No	Items	Biological Resources	Illustrative trade or common name	Plant part	Source

3.4 Status of Species Prone to Over Exploitation:

The luxuriant forest cover of Keonjhar has been devastated due to constant operation of biotic factors of various categories. Several anthropogenic activities are going on inside the forest, depleting the forest cover day by day especially mining. Shifting cultivation is also major threat to forest depletion. Tribals are mercilessly cutting down the trees and cleared the forest areas for cultivation.

Species extinction is one of the major outcomes "threats to biological diversity". Extinction of a species can lead to the loss of a factor that was responsible for keeping the ecosystem



balanced, thereby misbalancing it to some extent. Loss of species not only affects the ecosystem globally but also has a huge impact locally. Some of the factors which threaten the species extinction are mentioned as follows:

- Pollution
- Habitat loss
- Invasion of non-nativespecies
- Climatechange

Amongst these above-mentioned factors, the first two are the main factors responsible for loss in floral diversity. One of the main reasons behind the increasing pollution in the environment is the advent of industrialization in the modern civilization. Mining industry is an integral part of the industrialization and modernization. Different stages of mining have different effects on the environment. Mining activities render the area barren thereby creating loss of habitat for the plants previously present there and also, after mining the land gets filled with harmful chemicals and industrial wastes which make the environment too polluted for any kind of vegetative propagation.

In Keonjhar Division extensive sweeping of forest floor is seen in almost all Reserved Forests allotted to different V.S.S. The people in these areas normally sweep the forest floor in order to get the dry leaves and twigs for their fuel. By such process there is absolutely no under-growth and the soil is completely exposed. In order to get livelihood support, the villagers in the nearby forest areas collect the sal leaves for leaf plate making indiscriminately. Thereby the young sal crops are subjected to destruction. In vast areas of Atei Reserve Forests lopping and pollarding of sal poles and saplings are done by local people in order to get new flush of bigger leaves for preparation of khali and dona (Leaf cup and Plate).

The forest of Keonjhar Division are prone to over exploitation due to heavy population, Mining activities, great demand on timber and building materials and medicinal use of herbs / shrubs. Sal, Bija, Pahadi Sisoo, Kuruma, Kashi has been exploited beyond the productivity. Now Bija, Pahadi Sisoo is becoming rare species in forests. Sal due to its vigorous coppicing capacity and fire hardy nature is surviving the threat. Due to unscientific collection methods of NTFP, Species like Barun, Kochila, Manjusha, Panki, Paldhua, Sunamukhi, Tamul, Ban Harida, Bhuin neem, Kusmanda etc. are becoming rear and species like Amla, Muturi, Gudmari, Chhatiana, Meda, Bidanga are on the verge of being threatened one. Dhatki once considered as plenty are now becomes rear also. Over exploitation of Bamboo has resulted in degraded bamboo forests commercially harvestable bamboo forests have been reduced substantially.

The important species and reasons for over exploitation are furnished at **Table No 3.8**

**Table No 3.8 Species subjected to over exploitation & reason there off.**

Sl No	Species subjected to Over Exploitation	Reasons of Over exploitation.
1	Sal	During coupe working good Sal trees were removed. The remaining Sal trees didn't grow as expected. Regeneration didn't establish and grow to tree stage. Other reasons are ➤ Removal of Pole crop by people for house hold use, Centering Poles in construction. ➤ Saplings are cut and removed for fencing and to provide shed in social functions. ➤ Collection of Sal leaf beyond limit resulted stunted / poor growth. ➤ Degradation of Soil – not favouring Sal crop and moving towards mixed crop. ➤ Clearfelling due to Mining and establishment of Industries.
2	Bija	➤ Removal of Bija trees beyond working plan prescription for furniture purpose. ➤ No due silvicultural / tending attention to grow / establish Bija trees in forests though adequate regeneration is noticed in many blocks.
3	Planted Teak.	➤ Exclusively removed in immature stage for its high market value.
4	Herbs / Shrubs	➤ Herbs / shrubs are damaged due to ground fire and no specific attention is given for their establishment / regeneration / propagation due to its low economic value.
5	Fodder species	➤ Excessive lopping for Goats / cattle grazing in forests

3.5 Conservation of Genetic Resources:

No attempt has been made for conservation of Genetic resource in past. Now Bio diversity Board is preparing the “**Peoples Biodiversity Register**” in different Panchyat. A systematic approach is being formulated for conservation of Genetic Resource and proper documentation.

PBR (People's Biodiversity Register) formulation & Access of benefit sharing (ABS) Regulation is being controlled by Odisha Bio Diversity Board independently and separately. The format for describing {7. ACCESS BENEFIT SHARING (ABS) 7.1 Details of Tradeable Biological resources available (Quantitative/ value / Market status) as extracted



from **PEOPLE'S BIODIVERSITY REGISTER (PBR) Technical and Administrative Manual** is furnished below.

"7. ACCESS BENEFIT SHARING (ABS)

7.1 Details of Tradeable Biological resources available

No	Items	Biological Resources	Illustrative trade or common name	Plant part	Source

3.5.1 Objectives, priorities and approaches:

The first step in genetic conservation is to specify the objectives of the conservation program. This is of the utmost importance, since it is possible to conserve ecosystem properties and still lose species entities. It is also possible to conserve a species and still lose genetically distinct populations, and therefore, genes that may be of value in disease and pest resistance, and in future adaptation. They could also be important in species deployment through breeding program, if that becomes a need or necessity. Many forest genera and species around the world provide goods and services, such as timber, wood, food, fodder, environmental stabilization, shade, shelter, and cultural and spiritual values. However, fewer than 1000 tree species have been systematically tested for their present-day utility, and less than 100 are the subject of intensive genetic research program. Evidently, therefore, many different forest species are being used in situ to provide important goods and services, without any active genetic management. Worldwide, the conservation of forest genetic resources has as its overall objective the maintenance of genetic diversity in the thousands of tree species of known or potential socioeconomic and environmental importance. Moreover, the levels and distribution of genetic variation in any given species are expected to be in a process of constant natural change resulting from the main forces of evolution. Therefore, the central concern of conservation should be the evolutionary processes which **promote** and maintain genetic diversity, and not the endeavour to preserve the present distribution of variation as an end in itself. Assessing species' priorities for conservation action within any given country or local area, there may be divergent opinions on priorities among tree species. Forestry departments are likely to have a somewhat different emphasis and priorities from those of local forest dwellers and users, which can be different again from those of farmers and various other users of trees. It is apparent that insitu conservation programmes will be more successful if they target species of direct interest, use or concern to the land management authority and/or



landowner(s). This will have major implications for the planning of in situ conservation programs. A participatory rural appraisal approach can be useful for helping local communities whose land is communally owned to better identify their priority tree genetic resources and to develop appropriate in situ conservation responses. It is also important to consider the case for species and provenances which are of major economic importance when planted as exotics, but currently of much less significance in their native range and habitats. In such cases it is not unreasonable to expect that the likely beneficiaries of in situ conservation should contribute, financially or otherwise, to conservation. Given that there will be limited financial resources available for specific conservation program for forest genetic resources, it is necessary to consider which of the priority species are also in most need of, or warrant, conservation interventions and actions. This can be conveniently undertaken for different species by comparing the extent of the resource (level of genetic diversity or intra-specific variation) with the vulnerability or threats to the populations and/or ecosystems of which they are a part. Priorities for conservation of tree species in different sites in tropical semi-deciduous forests in the state are required to be identified. The decision tree approach is based on the use, ecological and threat values, scored by a spectrum of stakeholders including scientists and researchers, farmers, local peasants and business people. The species with the final highest scores are those which should be given priority for conservation. In general, conservation strategies of genetic resources have been grouped into in situ and ex situ categories.

In situ conservation strategies In the case of non-domesticated species, in situ conservation is probably the most important strategy and sometimes the only viable approach. In the tropics, where extinction rates of species are high because of land-use changes, setting conservation priorities is critical. In situ conservation is usually the preferred conservation strategy for most wild plant species, including some of the wild relatives of crop species, because, as mentioned previously, it allows the populations of interest to continue to be exposed to evolutionary processes. Alternatively, for many domesticated species (crop and livestock), on-farm conservation of traditional varieties is now widely supported as an important practice for conservation of genetic diversity. Molecular genetic studies, carried out on many forest tree species around the world, are contributing to a better understanding of patterns of variation to support the development of improved management practices, and to monitor changes of species turnover in time and in space. Ex situ conservation is considered to be the foundation that ultimately allows the use of genetic diversity in plant breeding and conservation. The essential elements of ex situ conservation are related to the need to identify, then conserve and manage the range of variability within the species, primarily through the development and management of regeneration, in various forms, in the field. Molecular genetic techniques, primarily with



genetic markers, can also help in some of the management tasks for ex situ populations, by confirming the identity of accessions and monitoring genetic changes in collections. However, the allocation of resources in genetic conservation should be need-driven rather than technology-driven. Biotechnology can also make contributions to the management of germplasm banks by providing better tools to assess levels of genetic diversity, and providing new alternatives to maintain genetic stocks. New molecular techniques avoid redundancy and duplication within collections through fingerprinting analysis and genetic diversity studies.

Genetic processes: evolutionary versus static conservation strategies –

The focus on whether or not to maintain genetic processes as part of the conservation strategy is important when deciding the choices of options for conservation.

Genetic processes typically deal with changes of gene frequencies and genotypic distributions.

All activities that reduce population size will generally increase the rate of inbreeding. Management and/or use of natural populations that influence the behaviour of pollinators and seed dispersers that can lead to changes in the amounts of inbreeding and/or change fertility, or alter microclimate and/or species composition, thus inducing new competitors.

Intended or unintended selection due to the use and/or management of natural stands, or during propagation and management of plantings—both can favour or disfavour certain alleles and thereby change allelic frequencies.

Continued natural selection to the prevailing environment that affects allele frequencies (as well as natural selection against inbred offspring in species with a mixed mating system, i.e. species that under natural conditions produce a mixture of selfed and outcrossed progenies).

It is therefore important in the planning process to consider to what extent these processes are unacceptable, acceptable or even desirable. This will of course depend on the objective of conservation. Roughly speaking, conservation strategies can also be separated into three categories in terms of the evolutionary process.

Static conservation strategies, where genetic processes are typically not considered important are required to be defined. The aim is to keep gene frequencies or genotypic distribution/properties

Description	Properties	Applications
Polymorphism	Isozymes	Protein expression
Co-dominant	Population	Low to medium



Strict evolutionary conservation strategies, where protection of genetic processes is considered as important as the conservation of the actual gene frequencies in the population, or more so are to be recorded. One can say that the objective of evolutionary conservation is to protect populations that can maintain fitness through long-term adaptation, so there is the expectation that gene frequencies should change.

Evolutionary conservation for utilized populations, where the objective is to conserve genetically diverse, viable populations growing under conditions that reflect the managed and used forests or planting became paramount important.

3.5.2 Static Conservation:

Clonal archives, seed banks and Cryopreservation: Static conservation activities are characterized by the fact that genotypes are the targets for conservation. Therefore, vegetative propagation is in general preferred to propagation by seed. Vegetatively propagated clones can be planted and protected in clonal archives. The grafted or rooted trees will often be able to grow to a considerable age if the grafting has been a success. Of course, at some future date, the trees have to be re-grafted on new rootstock. It is important to maintain the archives carefully in the early years in order to avoid shoots or sprouts of the rootstock taking over the grafted scion material. Constant weeding and tending is required, and good labelling and maps are essential. Static conservation thus requires continual, fairly intense, human management. Static conservation is also applied to conserve seed lots in seed banks, where seed is kept in cold storage, or under otherwise favourable conditions. Seed banks can only be used for conservation of species with storable seed. A large number of tropical tree species have so-called recalcitrant seed, which dies within a few years of storage. The vast majority of species have seed that can only maintain a high germination rate for relatively few years compared to the lifetime of the living tree, and the seed lots therefore need to be regenerated from time to time. This will include germinating the seed, producing the seedlings, growing the trees until they start flowering, and collecting new seed for storage. These 'rejuvenation' activities allow for new genetic recombination and new selection pressures during propagation and growth. For most species, seed banks should probably be seen as a short-term conservation activity. Seeds from endangered populations can be collected and stored in the seed bank for an interim period until they can be sown, seedlings grown and gene conservation plantings (the so-called *ex situ* conservation stands) established. Evolutionary conservation: Evolutionary conservation in protected and designated reserve areas Evolutionary conservation activities are characterized by programs where the trees produce progeny in successive generations: genes are generally 'conserved', but genotypes are not. Natural selection takes place among trees with new allelic combinations that either favour or



disfavour different genotypes. This process ensures that gene frequencies will change in the population: alleles with positive influence on fitness will increase, and alleles associated with low fitness will decrease. If the population size is sufficient, neutral genes should, in general, be maintained, but some genes will inevitably be lost by genetic drift; new genetic variation will arise by mutation after several generations. Human interventions (if any) are designed to facilitate moderate genetic processes rather than to avoid them. Genetic variation between populations is generally maintained when they are growing in different environments, and is even expected to increase over time. A typical example of a conservation population capable of evolutionary processes is a protected area in a natural forest. In a protected area, the species occupies its natural habitat (it is said to be in situ conserved), typically with a wide range of other species. Natural selection for general fitness is therefore largely related to competition among species, as well as to adaptation within species to current and future environmental conditions. However, evolutionary conservation can also take place in a planted stand, if natural selection is allowed to work, and if the planted trees are regenerated from seed, rather than by vegetative techniques, for the next generation. In such programmes, plantations will preferably be established and managed in ways that mimic the natural processes that will support natural selection. Of course, in most situations the mixture of species (if any) is largely artificial, and the selective forces may therefore favour different genes than would be the case in true in situ conservation. However, this reflects the fact that selection and fitness always depend on the degree of human influence in any ecosystem. Directional selection in favour of commercial traits—including characters such as good stem form or ease of establishment in plantations—is typically avoided in strict evolutionary conservation programmes, but of course this again depends upon the local objectives of the program. In summary, various factors will influence the success and relative suitability. During last plan period no substantial steps have been taken for conservation of Genetic Resource in the Division.

3.6 Fauna And Their Habitats

Keonjhar Forest Division is a climax eco-tone zone as it is in the midst of Sal zone Central Plateau. Kanjipani Ghati is a picturesque natural panoramic spot with magnificent up rolling mountain ranges. Trail of Kanjipani Ghati spread over 20 km long along NH-49 which offers unique experience to the natural lovers above 610 meter high ghat. The place is the treasure house of rich flora & fauna.

Mammals, such as Elephant, Leopard, Sloth bear, Barking Deer, Deer, Jungal Cat, fox, rabbit, red faced monkey, Longurs, wild pig etc.

Birds, such as gunduri quail, parrots, kingfisher, egret, Gallus gallus, and spotbell.

Reptiles, such as king cobra, python, boka, krait, tortoise, Godhi.



Fish, such as Balia walaga outtus, bansapati, Gadish ophiocephallus pumctates, Kerandi Barbs ambious.

Amphibians such as frog, toad, tree frog etc.

The list of flag ship species of the division are furnished at table No 3.9 below.

Table No. 3.9 List of Flagship Species with their habitats/sites in Keonjhar Division			
Name of the Range	Name of the flagship wild species	Name of Site	Details of the habitats (Near RF/PRF etc)
B&JP	Bar-Headed Goose	Badaghagra Dam	Sidhamatha DPF
B&JP	Great Crested Grebe	Badaghagra Dam	Sidhamatha DPF
B&JP	Hansarali	Badaghagra Dam	Sidhamatha DPF
B&JP	Indian Ponds Heron	Badaghagra Dam	Sidhamatha DPF
B&JP	Indian Stocks	Badaghagra Dam	Sidhamatha DPF
B&JP	Little Cormorant	Badaghagra Dam	Sidhamatha DPF
B&JP	Little Egret	Badaghagra Dam	Sidhamatha DPF
B&JP	Waterfowl	Badaghagra Dam	Sidhamatha DPF
B&JP	White breasted water hen	Badaghagra Dam	Sidhamatha DPF
B&JP	White Stork	Badaghagra Dam	Sidhamatha DPF
Champua	Egrets	Baitarani River	Baitarani A RF
Champua	Kingfisher	Suna River	Baitarani A RF
Champua	Pelicans	Podasimila Reservoir	Jadipada RF
Champua	Gadwall	Slime Dam	Baitarani B RF
Champua	Indian Ponds Heron \	Jagadala	Nayagarh RF



Champua	King Fisher	Jagadala	Nayagarh RF
Champua	Large Whistling Duck	Jagadala	Nayagarh RF
Champua	Little Cormorant	Jagadala	Nayagarh RF
Ghatagaon	Black Stork	Kalimati Dam	Kalimati RF
Ghatagaon	Bronze -winged jacana	Kalimati Dam	Kalimati RF
Ghatagaon	Cattle Egret	Kureijodi Dam	Barabanka RF
Ghatagaon	Common Sandpiper	Kalimati Dam	Kalimati RF
Ghatagaon	Great Cormorant	Kalimati Dam	Kalimati RF
Ghatagaon	Indian Ponds Heron	Kalimati Dam	Kalimati RF
Ghatagaon	Indian Shag	Kalimati Dam	Kalimati RF
Ghatagaon	King Fisher	Kalimati Dam	Kalimati RF
Ghatagaon	Lesser Whistling Duck	Kalimati Dam	Kalimati RF
Ghatagaon	Little Cormorant	Kureijodi Dam	Barabanka RF
Ghatagaon	Little Egret	Kalimati Dam	Kalimati RF
Ghatagaon	Geese	Kalimati Dam	Kalimati RF
Ghatagaon	Storks	Kalimati Dam	Kalimati RF
Ghatagaon	White breasted Kingfisher	Kalimati Dam	Kalimati RF
Ghatagaon	White breasted water hen	Kalimati Dam	Kalimati RF
Keonjhar	Asian Open billed Stork	Nalapanga Dam	Nalapanga RF
Keonjhar	Bali Hansa	Badasasan Pond	Sidhamatha RF
Keonjhar	Bani	Nalapanga Dam	Nalapanga RF
Keonjhar	Comb duck	Tikarapada Dam	Nayagarh RF
Keonjhar	Common Crane	Nalapanga Dam	Nalapanga RF
Keonjhar	Grey Heron	Kanjhari	Naranpur RF
Keonjhar	Grey Plover	Sapua	Khajuribani RF
Keonjhar	Grey lag Goose	Nalapanga Dam	Nalapanga RF
Keonjhar	Indian Ponds Heron	Sapua	Khajuribani RF
Keonjhar	Indian Shag	Nalapanga Dam	Nalapanga RF
Keonjhar	Bajra Kapta	Nalapanga Dam	Nalapanga RF
Keonjhar	King Fisher	Badasasan Pond	Sidhamatha RF
Keonjhar	Lesser Whistling Duck	Kanjhari	NaranpurRF
Keonjhar	Little Cormorant	Dhuliabeda Dam	Raghunathpur RF
Keonjhar	Little Egret	Kanjhari	Naranpur RF
Keonjhar	Little Grebe	Kanjhari	Naranpur RF
Keonjhar	PaniSarali	Tikarapada Dam	Nayagarh RF
Keonjhar	Red-crested Pochard	Badasasan Pond	Sidhamatha RF



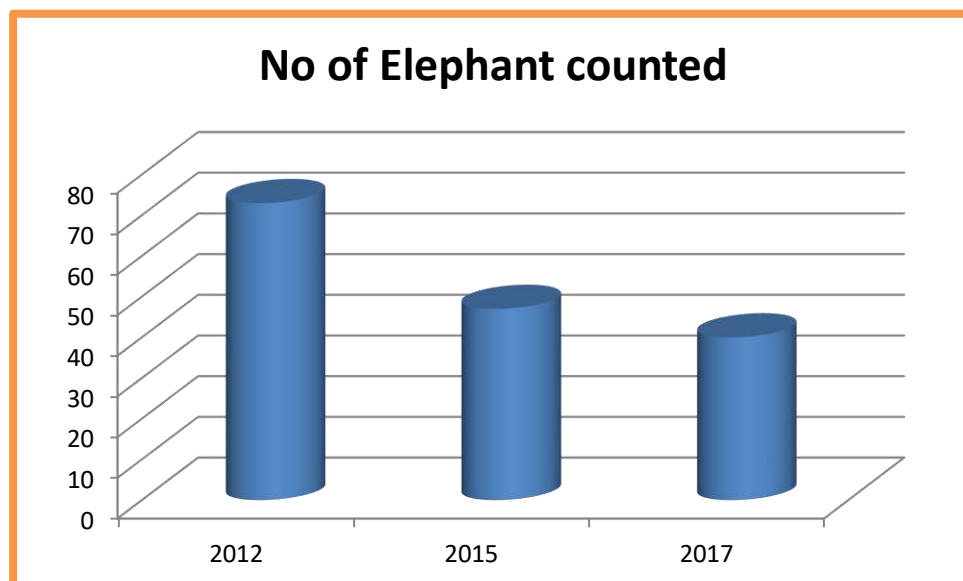
Keonjhar	Red-necked Grebe	Tikarapada Dam	Nayagarh RF
Keonjhar	White bellied Heron	Kanjhari	Naranpur RF
Telkoi	Cattle Egret	Khajuria M.I. Project	Bandhanjhari RF
Telkoi	Great Cormorant	Khajuria M.I. Project	Bandhanjhari RF
Telkoi	Littile Grebe	Khajuria M.I. Project	Bandhanjhari RF
Telkoi	Little Cormorant	Khajuria M.I. Project	Bandhanjhari RF
Telkoi	Little Egret	Dimiria M.1. Project	Saleikena-siriabahal RF

3.6.1 Census Result:

a) Elephant:

The elephant census has been conducted in the division during 2012,2015 and 2017. The census data is furnished below.

Information on Wildlife (Elephant Census)						
Year	Male	Female	Unknown	Young	Total	Male Female ratio
Keonjhar Division:						
2012	23	37	0	13	73	1: 1.60
2015	12	24	1	10	47	1: 2
2017	9	24	0	7	40	1:2.67





The male female ratio is around 1: 1.6 to 2.5 which are considered as good. From the above data it is observed that, the population is in a declining stage where as in the state, the population is in increasing trend. It seems that, the elephants are migrating outside due to adverse impact of mining & developments. The male female ratio is in increasing trend, which indicates lesser number of tuskers.

b) Tiger Estimation:

Tiger / Leopard census was conducted during 2016. It is found that there is no tiger / leopard in Keonjhar division.

c) Winter Birds Census:

The Census of Winterbirds are regularly being conducted in 2nd week of January every year. The Report for the year 2021 is enclosed as annexure-VI. It is observed that winter birds are congregating on MIPs of the Division. Keonjhar division is a plateau water body existence is limited. Due to Waterfalls, Dams some water body has been created in the division.

3.6.2 Elephant movement path:

There is one identified corridor namely Karo (Keonjhar)-Karampada (Saranda, Jharkhand) INTERSTATE in the division. There are some mining activities on this corridor which has resulted in the random and scattered movement of Elephants. Movement of Elephants in this tract is influenced by River Baitarani, Railway line and mining activities. The Elephants usually enter from Jharkhand and the presence of Elephants is felt on three sides of the division.

A. Karo - Karampada Elephant Corridor:

This corridor connects Karo and Sidhamatha Reserve Forests of Keonjhar Forest Division of Odisha with Karampada Reserve Forest of Saranda Forest Division of Jharkhand state. Elephant moves through hilly terrain and mining dominated landscape. Currently elephant movement occurs between Karo and Karampada Reserve Forest through Haramotto-KolhapunduliJhandiburu-Nawagaon-Karampada. Elephant movement have also been reported near Kiriburu Hill Top and Arjun Ladha mine near Jhirina nallah. The foothills of Karo RF are ideal for elephant movement and if a part of SAIL mining area is left for the corridor and restored then there is a possibility of usage of foothills to move between Karo and Karampada RF.

Alternate Name	
State	Odisha and Jharkhand.
Connectivity	Karo and Sidhamatha Reserve Forest of of Odisha with Karampada Reserve Forest of of Jharkhand



Length and Width	Length 8.4 – 19 km and Width 0 – 1.8 km
Legal status of the corridor	Reserved Forest, patta lands
Major land use	Forest, mines and human settlements
Major habitation/Settlements in Corridor	Haramotto, Kolhapunduli, Bangaon, Nawagaon, Karampada
Forest type	Tropical Dry Deciduous Forest
Frequency of Corridor usage by elephants	Regular and seasonal
Development activities/artefacts	Mines and processing plants

a) Administrative/Legal status of the corridor.

Tahasil-wise Districts covering the corridor: Jharkhand area, Barbil; Tahasil, Dist. Keonjhar. Karo-Karampada = 15 Kms.

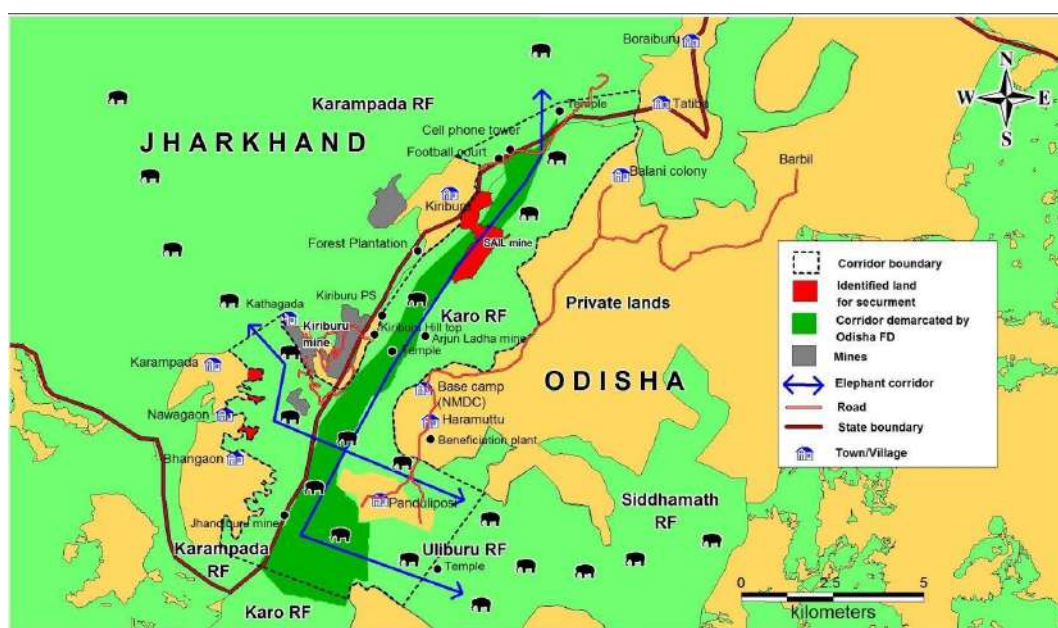
b) Beat/Section/Range-wise Forest Divisions covering the corridor:

Jharkhand State. Keonjhar Forest Division (Orissa)- Bolani beat of Barbil Section, Uliburu beat, Karo beat, Thakurani beat of Nalda Section, Bhadrasahi beat, Jhargaon, Roida beat, Rugudi beat of Guali section – all of Barbil Range. Khandbandh beat, Jurudi beat of Joda Section, Chipinda beat of Balibandh Section, Nayagarh beat and Dubuna beat of Bamebari Section – all of Champua Range.

The wild elephant are mostly residing in Bonai Division area. Now a days due to extensive mining activities, they are not using Karo-Karampada corridor. Hardly once/twice they use this corridor. But their movement has been very often noticed from Sidhamatha RF upto Baitarani River confining their movement in Khandbandha, Jouri, Dabuna and Nayagarh beat of Champua Range. The movement areas are not in good habitat. They usually stay for 2 – 3 days in one place and migrate to some other place and cause crop damage. The degraded habitat is to be restored in those areas though it is not linked with any elephant corridor.

c) Status of the Forest Land:

RF/PRF, etc. Karampada RF, Karo RF, Uliburu RF, Thakurani RF, Sidhamath RF, Baitarani RF, Jamitra DPF, Chamakpur PF, Mahaparbat DPF.



Biodiversity status of the corridor
Vegetation type and coverage:
 Mainly Sal mixed with Piasal, Kurum, Dhaura, Char, Asan, Kendu,

Mai, Rai, Kurei, Jia, Dantari, Bheru, Patuli, Gambhari, Palas, Mahul, Ghantu, Siris, Dimiri, Kumbhi, Dam-gurudu, Kusum, Girdhini, Sunari, Bandhan, Bela, Panas, Mango, Simili, Bara,



Anla, Bahada, Harida, Jari, Genduli, Jamu, Pani-gambhari, Barakholi, Kanteikuli, Kanchan. Climber: Atandi, Siali, Butia superva, Muturi, Dantari, Ventilego, Madraspatna. Undergrowth: Satabari, Dhatuki, Eupatorium, Woodfodia, Frutikosa, Banakhajuri, Hadavanga, Makadakendu, Karanja, Neem.

Birds: Peacock, Bulbl, Parrot, Eagle, Owl, Dove,

Animal: Beer, Jackel, Barking deer, Sambhar, Hyena, Wildboar, Langur, Jungle cat

Tribes: Santals, Kolha, Bhumija. Ganda

Elephant use in the corridor: The elephants move in the corridor is erratic and frequency of use is rapidly falling. The largest no. of elephants using the corridor is 20 to 25.

Other animals known to inhabit/use the corridor: (Large mammals, Birds, Reptiles). Wild Pig, Barking deer, Chital, Rabbit, Jackal. Birds: Parrots, Peacock, Maina, Pecha, Koel. Reptiles: Snakes, Godhi, Bajrakapta, Neula.

Availability of water in the corridor: Existing sources. Karo River, Murga Nala, Betlota Nala, Harmath Nala, Kara Nala, Suna river, Baitarani river, Balda Nala.

Known issues in the corridor for management:

Human habitation: The actual habitation of human being is not more, but due to establishment of extensive mining activities and heavy traffic of loaded trucks, the habitat has been disturbed and fragmented.

Fire: Beyond the mining lease area, ground fire occurs during hot summer is a cause when the elephants move to Sundargarh district and the adjoining Jharkhand State.

Poaching: No case of poaching is noticed except some cases of killing wild elephants by electrocution for which case have been booked in the past. Electric loops being used by some unscrupulous people for poaching of Wild boar, Deer and became a danger to elephants.

Depredation: After death of the lone tusker in Joda locality, the killing of human being is considerably reduced. But during the month of May 2008 a person was killed in Sidhamath RF and another was killed in Khandbandh near Baitarani RF during May 2009. Elephant drive activities are common during crop season in Guali, Joda and Bamebari and Balibandh Section of Champua and Barbil Range.

Electricity Supply line: Due to large scale industries, 33 KV line and 11 KV lines are common in the area in recent past; elephants have died due to passing of such electric lines.

Mining: This is a major issue in this corridor. The details of the mining activities has been discussed under Chapter 4 of this plan.

Railway tracks: During the year 2008-09 two female elephants have been died due to fatal accident near Banspani Railway line in Baitarani RF for which suitable EUP / EOP are to be designed along the Railway tracks.



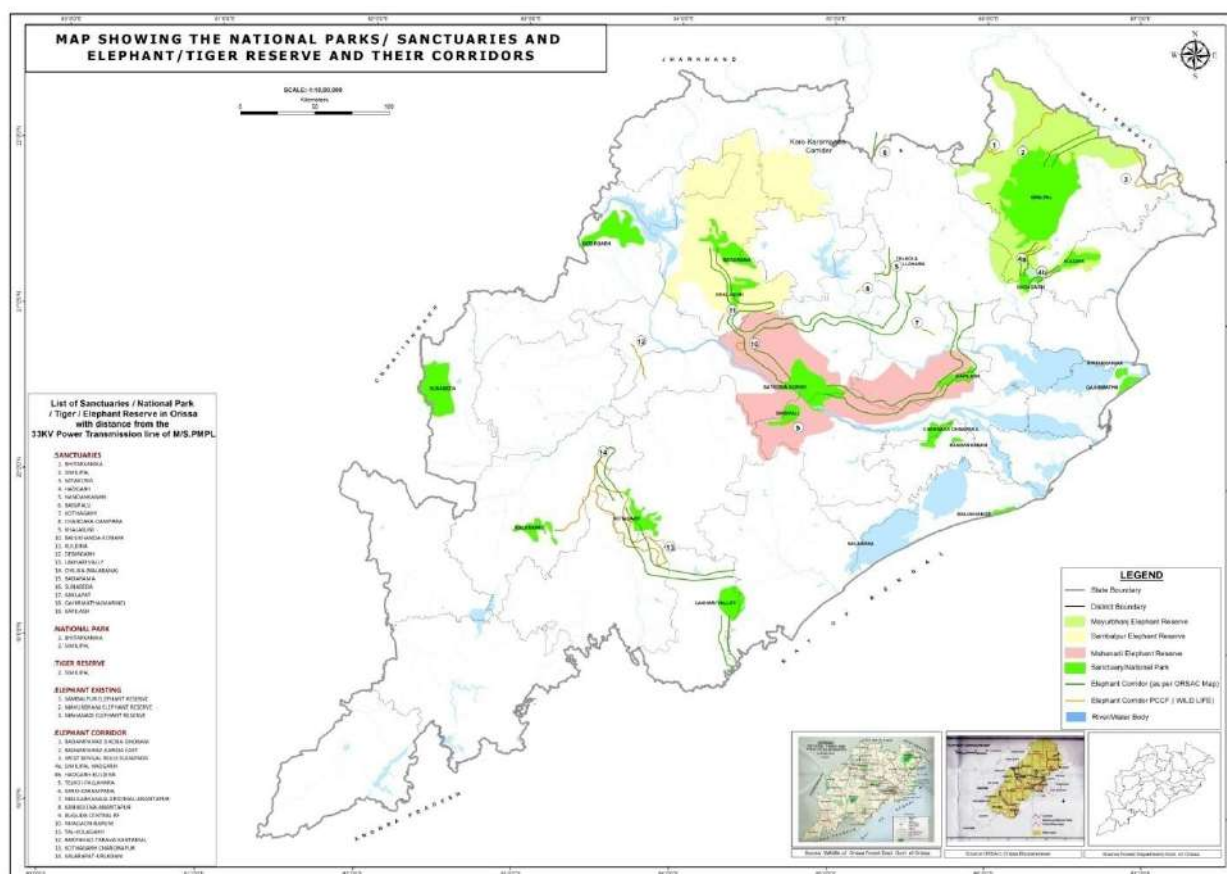
National Highway: The National Highway 20, connecting all the roads from different Mines, sponge iron plants and railway sidings is always busy with traffic and noise and dust.

Other major issues: The growing population and increased number of vehicles, Crusher plants and mining activities have reduced the use of habitat by the elephants.

Total area of the corridor: 17.3 sq.km.

Wildlife conservation Plan: Due to provisions in Forest Clearance / Environment clearance many Site specific Wildlife Conservation Plan are prepared and being implemented. This has improved the Man Power situation, financial position to manage the Wildlife Issues.

B) Telkoi-Pallahara Corridor:



Name of the Corridor: Telkoi-Pallahara Elephant Corridor.

Names of Elephant Habitats to be linked with the corridor: Kukuriamba RF to Malyagiri RF.

Administrative/Legal status of the corridor:

Tahasil-wise Districts covering the corridor. Telkoi Tahasil (Keonjhar district) Pallahara Tahasil (Angul district). Kakudiamba RF to Sikheswari RF - 30.4 Kms.

Beat/Section/Range-wise Forest Divisions covering the corridor:



Telkoi Range to Pallahara Range, Khamar Range. Telkoi Section, Golabandh beat, Dobalpal beat, Karadangi beat of Telkoi Range of Keonjhar Forest Division.

Status of the Forest Land: RF/PRF, etc. Reserve Forest and D.P.F.

Toposheet References on 1:50,000 scale: F45N7 (73 G/7)

Nearest Elephant Reserve/Region. – Mayurbhanj Elephant Reserve.

Land-use within the corridor (in hectares): Area of RF/PF/UDPF/Village Forest. RF 3105 ha. DPF 522.06 ha.

Area of Revenue land. Revenue land : 800 Ha approx.

Area of private land: 2000 Ha approx.

Area under Mining: No mining land.

Area under other usage: No other use than forest, habitation & Agriculture

Biodiversity status of the corridor: Due to moist nature of forests, Bio Diversity of the area is rich. Malygiri in the other side of the Corridor depicts a vast treasure of Plant diversity.

Vegetation type and coverage: Mixed deciduous forest dominated by Sal and its associates.

Elephant use in the corridor:

The elephants move in the corridor throughout the year mostly during July to March the paddy harvest time i.e. from September to February. Elephants very frequently use the corridor. The largest no. of elephants using the corridor is 20 to 30.

Other animals known to inhabit/use the corridor: (Large mammals, Birds, Reptiles). No other large mammals except Wild boar bear, barking deer, Spotted Deer, etc. Birds:- Parrots, peafowl, Maina, Owl, Koel. Reptiles:- Snakes, Godhi, Bajrakapta, Neula.

Availability of water in the corridor:

Existing sources: Samakoi river is the main source of water. Elephant movement is influenced by Rengali Dam Project in Angul District.

Known issues in the corridor for management: There are 50-60 villages in the corridor scattering here and there in the hillocks. The short duration paddy is being cultivated by the villagers. During Oct – Dec there is incidence of crop raiding by the herd of elephants. Their movement is not static. After crop harvest is over they migrate to some other place. During that period people become very sensitive and plans to kill the elephant and drive them constructing temporary manchans in the trees in their paddy field. To reduce pressure on forest department with sufficient awareness programmes is to be organized along with supplying Search light, Battery etc. to the squad. After crop is harvest, the people usually



set fire near to village to dispose of the garbage and agricultural waste products which spreads to near by jungle and cause severe damage to broad leave sal forest when there is leaf shading. To prevent fire, fire extinguish squad needs to be formed and sufficient fodder plantation is to be raised in the vacant revenue land. There is no problem of railway line, National High way, Mining and supply of electric line in this corridor. Total area of the corridor: 13.24 sq.km.

Present management: No major activities for management are required except providing spot light and other equipment to the villages to protect the area from depredation. Gaja Sathi scheme is to be implemented in this area.

3.6.3. Other Fauna observed& its description:

i) Elephant:

With its pendent trunk, its curious dentition, and its great size, the elephant presents distinctive characters which differentiate it from all other mammals. The size of elephant rarely exceeds 10' 6" (3.20m) at the shoulder. The average height of an adult male is 9' (2.75m). The female is 1' (30 cm) lower. The weight of one male can reach up to 700.00 kg and female up to 550.00 kg. It has two fan-like ears, pinnate trunk with one sensory projection, four legs and a long tail with messy hair at the tip. Only the males have a pair of tusks. Elephants have very poor sight, this senses of smell and hearing are highly developed, more so than in most animals. Both can be trained and tamed.

The exact breeding season is uncertain but as most of the young are dropped in late autumn and period of gestation lasts about 20 months, it is probable that the main breeding season is during the hot weather and at the commencement of rains.

ii) Bear –

It is a medium size animal with long coarse hairs. Limbs have 5 clawed digits; tail short and it can climb trees. Bear is partly carnivorous; also feed on fruits, honey and insects. Mahua flowers are liked by Bear. It can walk upright on hind legs and can be tamed. It is found in maximum number of forest blocks included in the present revision. It is a peace loving animal but become violent when hungry or under attack. Reportedly the bears are found in almost all RFs of Subarnapur Forest Division. The population is high in Birmaharajpur Sub-division in Ghikundi RF, Butukhaman RF, Hatlimunda RF, Durdura RF, Singhasan RF and Chandli RF.

ii) Spotted Deer –

The chital (spotted deer) is the most beautiful of all deer. Its coat is bright rufous-fawn profusely spotted with white at all ages and in all seasons. Old bucks are brownish in colour and darker. It is seen in herds of 10 to 30 numbers or even more which may contain 2 or 3 stags, found in valley & plains preferably in meadows along the perennial nalahs flowing in



this tract. It attains a height of about 1 mt. Only male has branchy horns. Their number is gradually decreasing. Some times seen in Singhasan RF, Barapahad RF.

iii) **Hare –**

This animal is about 40 cm in length & 1 kg in weight and is found in almost all peripheral forests in this zone. Its body is covered with fur & hairs. It varies in colour like pure white, black or mixed. Having hind limbs longer makes it powerful for running & jumping. It has a pair of large movable pinnate ears & a short bushy tail. It feeds mainly on grass. Found in all forest blocks, bushy forests and grass land nearby.

iv) **Monkey / Languor -**

The common monkey found in this area has a black face with silvery grey colour of the body. Two types of monkeys are seen in this area, the hanuman languor and the red faced monkey (macaque). Hind limbs are longer than fore limbs. Females live in herd headed by one strong male. The red faced monkey is of smaller size with short tail. Males & females irrespective in number live in herds. Some time a strong single male has seen alone.

v) **Fishing Cat –**

It is a fierce beast smaller than a Leopard but capable of mauling one in a fight. They live in forests adjacent to riverbanks and water bodies & hunt fish, crab, frog, birds, insects & some time others infant mammals. Its specialty is to get on to rocks overhanging water & sweep at fish with its paw as they swim by.

vi) **Civet Cat -**

It is a nocturnal cat like animal of forests having a long tail. A small flesh eating animal valued for its fatty substances with strong scent from its pouches close to the tail. It is used in making several kinds of perfumes. It is available in almost all RFs in Division.

vii) **Jungle Cat-**

The jungle cat (*Felis chaus*), also called reed cat and swamp cat, is a medium-sized cat native to all forests of this division. It inhabits foremost wetlands like swamps, littoral and riparian areas with dense vegetation. It is listed as Least Concern on the IUCN Red List, and is mainly threatened by destruction of wetlands, trapping and poisoning.

The jungle cat has a uniformly sandy, reddish-brown or grey fur without spots; melanistic and albino individuals are also known. It is solitary in nature, except during the mating season and mother-kitten families. Adults maintain territories by urine spraying and scent marking. Its preferred prey is small mammals and birds. It hunts by stalking its prey, followed by a sprint or a leap; the ears help in pinpointing the location of prey. Both sexes become sexually mature by the time they are one year old; females enter oestrus from January to March. Mating behaviour is similar to that in the domestic



cat: the male pursues the female in oestrus, seizes her by the nape of her neck and mounts her. Gestation lasts nearly two months. Births take place between December and June, though this might vary geographically. Kittens begin to catch their own prey at around six months and leave the mother after eight or nine months.

viii) **Jackal -**

Jackals are medium-sized omnivorous mammals of the genus *Canis*, which also includes wolves, coyotes and the domestic dog. While the word "jackal" has historically been used for many small canids, in modern use it most commonly refers to three species: the closely related black-backed jackal and side-striped jackal of sub-Saharan Africa, and the golden jackal of south-central Eurasia, which is more closely related to other members of the genus *Canis*.

Jackals are opportunistic omnivores, predators of small to medium-sized animals and proficient scavengers. Their long legs and curved canine teeth are adapted for hunting small mammals, birds, and reptiles, and their large feet and fused leg bones give them a physique well-suited for long-distance running, capable of maintaining speeds of 16 km/h (9.9 mph) for extended periods of time. Jackals are crepuscular, most active at dawn and dusk.

Their most common social unit is a monogamous pair, which defends its territory from other pairs by vigorously chasing intruding rivals and marking landmarks around the territory with their urine and feces. The territory may be large enough to hold some young adults, which stay with their parents until they establish their own territories. Jackals may occasionally assemble in small packs, for example, to scavenge a carcass, but they normally hunt either alone or in pairs.

ix) **Fox-**

Foxes are small-to-medium-sized, omnivorous mammals belonging to several genera of the family Canidae. Foxes have a flattened skull, upright triangular ears, a pointed, slightly upturned snout, and a long bushy tail (or *brush*). By far the most common and widespread species of fox is the red fox (*Vulpes vulpes*) with about 47 recognized subspecies. The global distribution of foxes, together with their widespread reputation for cunning, has contributed to their prominence in popular culture and folklore in many societies around the world.

x) **Hyena-**

Hyenas or **hyaenas** are any feliform carnivoran mammals of the family Hyaenidae. With only four extant species (in three genera), it is the fifth-smallest biological family in the Carnivora, and one of the smallest in the class Mammalia. Despite their low diversity, hyenas are unique and vital components of fauna and found in most of the forests. Although phylogenetically they are closer to felines and viverrids, and belong to the feliform category, hyenas are behaviourally and morphologically similar to canines in several elements of convergent evolution; both hyenas and canines are non-arboreal, cursorial hunters that catch prey with their teeth rather than claws. Both eat food quickly and may store it, and their calloused feet with large, blunt, nonretractable claws are adapted for running and making sharp turns. However, the hyenas' grooming, scent marking, defecating habits, mating and parental behaviour are consistent with the behaviour of other feliforms.

xi) **Sambar-**

The **sambar** (*Rusa unicolor*) is a large deer native to the Indian subcontinent is listed as Vulnerable on the IUCN Red List since 2008. Populations have declined substantially due to severe hunting, insurgency, and industrial exploitation of habitat. The appearance and the size of sambar vary widely across their range. They attain a height of 102 to 160 cm (40 to 63") at the shoulder and may weigh as much as 100 to 350 kg. Head and body length varies from 1.62 to 2.7 m (5.3 to 8.9 ft). Females are smaller than males. The shaggy coat can be from yellowish brown to dark grey in colour, and while it is usually uniform in colour, some subspecies have chestnut marks on the rump and underparts. Sambar also has a small but dense mane, which tends to be more prominent in males. The tail is relatively long for deer, and is generally black above with a whitish underside.

xii) **Barking Deer-**

The **Indian muntjac** (*Muntiacus muntjak*), also called barking deer, is a deer species native to forests of this division. This muntjac has soft, short, brownish or greyish hair, sometimes with creamy markings. It is among the smallest deer species. It is an omnivore and eats grass, fruit, shoots, seeds, bird eggs and small animals, and occasionally scavenges on carrion. Its calls sound like barking, often when frightened by a predator and hence the common name "barking deer". Males have canines, short antlers that usually branch just once near the base, and a large postorbital scent gland used to mark territories. The Indian muntjac has a short but very soft, thick, dense coat that is denser in cooler regions. The face of the muntjac is darker and the limbs are dark to reddish brown and the coat color seasonally varies from darker brown to yellowish and grayish brown and is white ventally. Their ears have much less hair but otherwise are the same color as the rest of the head. Male muntjacs have short antlers, about 10 cm (3-4



inches) long that protrude from long body hair-covered pedicels above the eyes. Females have tufts of fur and small bony knobs instead of antlers. Males also have elongated (2 – 4 cm), slightly curved, upper canines. These canines can be used in male-male conflicts and inflict serious injury. The body length of muntjacs varies from 89–135 cm and height ranges from 40 – 65 cm. The muntjacs, unique among the deer, have large, obvious facial (pre-orbital, in front of the eyes) scent glands used to mark territories or females. Males have larger glands than females.

xiii) Wild Boar-

The **wild boar** (*Sus scrofa*) is a suid native to all forests mostly moist one. Human intervention has spread its distribution further, making the species one of the widest-ranging mammals in the world. Its wide range, high numbers, and adaptability mean that it is classed as least concern by the IUCN and it has become an invasive species in part of its introduced range. The wild boar is a bulky, massively built suid with short and relatively thin legs. The trunk is short and massive, while the hindquarters are comparatively underdeveloped. The region behind the shoulder blades rises into a hump, and the neck is short and thick, to the point of being nearly immobile. The animal's head is very large, taking up to one third of the body's entire length. The wild boar inhabits a diverse array of habitats. The main habitats favored by boars in India are deciduous and mixed forests. Wild boar damages paddy field.

xiv) Squirrel-

It has elongated body covered with fur and has 5 long stripes of dark colour on its back. Its tail is long & bushy. The eyes and ears are large. It is an arboreal, active climber & nests on trees. It feeds on fruits, seeds & nuts.

xv) Rat -

Rats are found in forest areas nearer to villages. They are prolific breeders. They can give birth about 10 to 15 young ones at a time. They are burrowing animals & omnivorous. They have consistently growing teeth for which they bite wood, concrete & rocky soil. They can survive without water for a longer period.

xvi) Mongoose –

Its body is elongated and covered with yellowish gray fur. The head is long with pointed snout, eyes, small pinnate ears and a long tail. Limbs have 5 digits with claws. It can fight and kill the snakes and feeds on their blood. It is believed that it is an auspicious creature as per Hindu mythology.



xvii) Pangolin –

They are noticed in dense forests. They are about 5 ft long and their head, body and tail are covered with round horny scales. Its head is small with short pointed snout, eyes and small pinnate ears. Its limbs are strong with 5-clawed digits to dig anthills. It is a tree climber and can roll into ball on feeling danger for self-defense. It is profusely available in Singhijuba RF of Binka Range.

xviii) Porcupine –

Porcupine is a small spine bearing mammal usually found in night in almost all reserve forest of Sambalpur Forest Division.

xix) Bat –

Bats live in clusters of hundreds. Its body is covered with soft fur. It has short snout, large pinnate ears and small eyes with poor vision and concealed tail. In four limbs, only toe is clawed and hind limbs have 5-clawed digits. They produce ultra-sonic sound wave for flight. The fox headed bats are found in the sky at late evening in Subarnapur Forest Division.

xx) Otter –

It is seen near water bodies and forest streams & nalahs. Its body is slender, neck short, tail flattened, small pinnate ears, and claws non-retractile. It is semi-aquatic with short and dense oily furs and webbed digits in both limbs for which it moves faster inside water. It feeds on fish, crabs and frogs. In river Mahanadi / Hirakud reservoir these animal are found in cluster along with their siblings.

3.6.4 Birds:

i. Terrestrial Birds -

The terrestrial birds found in the Division can be broadly grouped into three groups, such as High, Medium & Low, depending on their numbers. The following birds named as Common myna, Jungle fowl, Indian gray Hornbill, Sparrow, Raven myna, various species of Cuckoo, Black drongo, Crow, various species of King fisher, Owl, Pigeon, Parakeet, Dove, Nightingale are seen in maximum number in this locality. These birds are included in High group.

The following birds such as Weaverbird, Falcon, Kite, Chat, and Woodpecker & Hawk are seen in medium numbers in this area. These birds are included in Medium group.

The following birds such as Blue jay, Black bee, Swiftly, Grey crane, Golden oriole, Gander and Brahmin kite are seen in very few numbers in this locality. These birds are included in Lower group.



ii. Aquatic Birds -

The following aquatic birds such as little cormorant, Graylag goose and Water fowl are seen in this area.

3.6.5 Aquatic animals.

The following aquatic animals such as Turtle, Crab, Leech, Oyster, Snail, Shrimp and Water snake are seen in the ponds, perennial & semi-perennial nalah and dams existing in the division

3.6.6 Reptiles:

The common reptiles such as Tortoise, Lizard, Iguana, Garden lizard, all varieties of Snakes and Pangolin are seen in this locality. Besides this, Centipede, Earthworm, Millipede & Galley worm are seen everywhere in this Division.

3.6.7: Fishes:

The fishes like Trout, Flat fish, Carp, Ground fish, Mrigal, Breeding fish and Big gudgeon are found in ponds & dams. Their size is large and they can attain weight up to 1 kg within a year in the dams. All varieties of fishes named above have scales except Trout. Flat fish, Trout, Ground fish and big gudgeon feed on fishes & other aquatic animals. Fishes are plentifully available in Kanjhari Dam and Danda dhar Dam. Baitarani River is also famous for its fish fauna in the locality.

3.6.8: Worms & Insects:

The common worms and insects noticed in this Division are Cockroach, White ant, Dragon fly, Mole cricket, Tree ant, Back bee, Beetle, Glow worm, Grasshopper, Spider, Wasp, Honey bee, Slug etc.

Odonates are considered to be indicator of ecological balance. An inventory was carried out to document the over looked odonate diversity in four habitat types (hill stream, river, reservoir and pond) of Keonjhar district, southern Odisha, India. The study recorded 64 species representing 45 genera under 9 families. Family Libellulidae was the dominant group representing 32 species. Maximum species (n=58, 90.6%) were recorded along hill streams. Forty-one species were recorded from single habitat type, of which 37 species were confined to hill streams. A decreasing trend in species diversity was observed from the water bodies in the forested areas to human dominated landscapes indicating human impact on odonate species diversity. Ditch Jewel (*Brachythemis contaminata*) was most frequently sighted in the water bodies near human habitations, indicating highly polluted water not suitable for human consumption, whereas species like Common Clubtail (*Ictinogomphus rapax*) and Common Hooktail (*Paragomphus lineatus*) were only recorded along hill streams, indicating unpolluted water. Keywords: Odonate diversity, bioindicator, water bodies, hill stream, human dominated landscape, Keonjhar



Odonates are a group of freshwater invertebrates, closely linked to specific freshwater habitat conditions and are widely used as ecological indicators of habitat quality and the integrity of freshwater ecosystems. Evolved around 250 million years ago, these magnificent groups of flying insects are sharing a long cultural relationship with humans as well as an important species in the ecosystem, being key indicator of water quality and fluvial ecosystem disturbance. The greatest numbers of species are found at places that provide a wide variety of microhabitats, though dragonflies tend to be much more sensitive to pollution than damselflies. They are also important and widespread components of freshwater ecosystems, being top predators. Extant Odonates of the World are broadly divided into three suborders the Zygoptera or damselflies, Anisozygoptera and the Anisoptera or dragonflies. The Anisozygoptera with four relict species was earlier recognized as a third suborder of Odonata. However, recent studies groups Anisozygoptera with Anisoptera. About 6,000 species of Odonata and subspecies belonging to 677 genera have been documented world-wide, of which India is represented by 474 species in 142 genera under 18 families. Odisha is one of the biodiversity rich regions of Eastern India because of its unique biogeographic amalgamations and home to diverse flora and fauna. Odonate research in Odisha dates back to early 1900s documenting the diversity of Chilika Lake and its adjoining areas. This was followed by reporting of 58 species of Odonate fauna by the Zoological Survey of India as part of faunal exploration. Subsequently, various workers surveyed the Odonate diversity along different geographic regions of Odisha and a total of 110 species of odonates representing 60 genera and 9 families have been documented from the state. Nair for the first time added 36 new species of Odonates in Odisha. Occurrence of Lesser Blue Wing (*Rhyothemis triangularis*) was reported from the Kotgarh Wildlife Sanctuary, Odisha, which was earlier reported from Assam, Karnataka, Kerala, and Tamil Nadu in India. Perusal of the above literature shows that, studies on the Odonate diversity of southern Odisha is meagre and few attempts have been made to bridge the information gap. Thus, the present study was carried out for an inventory of Odonate diversity and their distribution pattern in Keonjhar district of southern Odisha, India.

Odonates are the flagship insect communities which are bio-indicators of the aquatic ecosystems. Understanding the odonate-habitat association provides essential information for characterising the response of odonates to changes in the habitat. The rich faunal and floral biodiversity of Keonjhar is under tremendous anthropogenic pressure, due to industrialisation and other developmental projects in the last five decades. The higher odonate species richness in hill streams away from human dominated landscapes indicates the poor state of water bodies in populated urban or sub-urban habitats. The present inventory has served as the baseline information on Odonate diversity and distribution in



the water bodies of Keonjhar as well as it contributed to the biodiversity database of the state. Documentation of the biodiversity of this biogeographically important region in the Eastern Ghats is an urgent need. However, further studies are required to be undertaken for a longer period to understand the community structure, behaviour and impact of urbanization and habitat modification on odonate diversity and distribution.

3.6.8 Rare Endangered & Threatened Fauna in Keonjhar Division:

IUCN status of Fauna observed in the division has been annexed to this Plan (**Annexure----**)

3.7 Threats and Challenges to Wildlife:

The wildlife is facing greater challenge due to

- (i) Fragmentation of Habitat due to Mining / Industries/ construction / widening of Roads, Transmission lines/ railway lines expansion and new construction.
- (ii) Extensive Traffic pressure and transportation of minerals by Road / Train.
- (iii) Depletion of tree cover / Forest crop density.
- (iv) Scarcity of Water in interior & high altitude Forests in summer.
- (v) Depletion of Food stock and deterioration of quality Food / Fodder.
- (vi) Depletion of Prey base / herbivorous.
- (vii) Annual Fire and loss of Ground Flora.
- (viii) Heavy biotic interference and intrusion by domestic animals (Cattle/ Goat/ Sheep)
- (ix) Illegal hunting by putting nets, electric live wire, etc.

3.7.1 Details of challenges:

The main factor causing injury and death to wild animals are degradation in habitat due to mining, industries and shifting cultivation. Human interference is low, but podu cultivation severely affects fauna i.e. direct destruction, fragmenting the habitat as well as reducing the availability of food. Mining and related transportation are the major factor which poses challenge to the manager. Poaching of animals for its meat, trophies, skins and other animal products are also other factors. There are incidences of poaching of elephants in the Division. Animal death is mainly caused by poaching. Accidental death and Natural death also takes place. Detection of wild life offences is satisfactory.

Over the years, the original habitat has been destroyed and diminished due to over exploitation. With the vanishing wilderness the wildlife population has shrunk to lowest



level. The encroachers and oustees cleared good forest growth on valley for agriculture. They also started keeping herds of cattle; goats etc. which in turn contributed to overgrazing and denuded the existing forest growth. Due to trampling, accelerated soil erosion has taken place and desiccation has set in. All succulent and good palatable grass, shrubs and trees have been replaced by thorny and plants species and retrogression has set in. This has created food scarcity for herbivores. It affected the carnivore population due to reduction in prey-base. Destruction and shrinkage of habitat and habitat quality has affected particularly the mega-herbivore i.e. elephants since they consume a lot of green fodder for their survival. The inadequacy of basic needs like food, shelter, cover and water has forced the elephants to come out of their original forested habitat to villages on forest fringes for raiding crops. This has given way to elephant-human conflicts. Conflicts are most acute when the wildlife species presence in an area poses a significant threat to human existence. Moreover, the people also go for hunting of wild animals and birds, which again is a constant threat for the existence of wildlife population. The last but not least, excessive fishing and movement of country boats also deprive the wild animals using the reservoir for drinking of water. The perennial water holes and nallas are important habitat zones for wildlife. As usual, wildlife uses these riparian zones, water holes and reservoir water more than any other habitat. The settlements have come up close to these sources. Their cattle and goats not only cause heavy trampling of the surrounding areas of these water sites but also pollute the clear water by defecating, urinating and wallowing. The herds camp near these water sites, which provided relief in terms of water to drink and wallow and provide succulent fodder for foraging.

The population growth is very less for all animals. The prey-predator ratio is highly imbalanced. Over the years the numbers of carnivores have decreased drastically and significantly. This is due to loss of adequate forest cover and decline in pray base. There have been few attempts in this division to improve the forest cover for the carnivores and also to improve the availability of fodder trees, shrubs and grasses for herbivores. Planting of fodder and fruit bearing trees, which is essential, was attempted in a scanty manner.

If corridors of similar habitats are not established and efforts to maintain genetic exchange by artificial ways are not ensured between fragmented wilderness areas than protected area will lose much of its original diversity very soon. With the increase in forest protection in future the sub- adults of wild animals will continue to disperse outside protected area in search of their new home-range and territories even through artificial corridors. Diversion of forest land for mining, agricultural, encroachment, illicit felling, settlements, developmental works have wiped out all natural forests for their free movement.

During summer forest fire is very common which is mainly due to unscrupulous people. This causes burning of the available herb level forage besides causing temporary shifting of



wildlife from burnt areas to un-burnt area. The dry leaf litter of these dry deciduous forests acts as fire hazards. Fire is set by the inhabitants in settlement and grazers for collection Sal seed, Sal leaves, mahua flower and mahua seed and for facilitating hunting of small animals. Repeated fire sets in retrogression in the tree communities, destroys regeneration, reduce the soil fertility and increases soil erosion. Fire promotes thorny as well as fire resistant species and also favours perennial grasses.

Heavy trampling by cattle particularly by buffaloes have some contribution to compactness of the soil and drastically reduced the seed germination and regeneration on the forest floor. Overgrazing at some places has significantly resulted in reduction of regeneration and trampling of soil by compaction resulting in accelerated soil erosion. Grazing in critical growth period i.e. during monsoon has led to dominance of grasses of lesser palatability. The obnoxious weeds like *Lantana*, *Eupatorium* etc. are found in blank areas close to habitation and in fallow lands. Due to increased biotic interference and degradation close to settlements there is less canopy cover. Hence the weeds dominate over herbs and proliferate by reducing the availability of palatable species in shrub layer to wild herbivores.

Poaching of spotted deer, wild Boars, snakes, hares etc. is noticed though out the forest areas which is mainly done by tribal. Some reports regarding poaching of tuskers for their valuable tusk have also been received. The chances of trade on wildlife trophy cannot be ignored. Not much report are coming in time to investigate into such cases of hunting due to lack of adequate staff and patrolling. However, many people in this division have kept snakes, flying squirrel, spotted deer, hare, wild birds, pangolin etc, from sanctuary area and have kept them as pet animals. Action has been taken to release them in forest. Many people possessing gun and staying closer to sanctuary have not registered their names with the wild life warden as per Wildlife (Protection) Act, 1972 amended. In brief, there is very less enforcement of the aforesaid Act and people are virtually not aware about the legal provisions and its impacts.

3.7.1: Fragmentation of Habitat due to construction / widening of Roads, Transmission lines.

According to the National Transport Development Policy Committee, The demand for road based transport services has dramatically accelerated following economic liberalization, and has provided for as much as 90% of the total passenger traffic, leaving a meager 10% for rail. Rail and road freight traffic is expected to grow at about 12% and 8% per annum respectively, to achieve a 50% share each in the total freight traffic at the end of 15th plan. Accordingly construction of New Roads / up gradation of existing road net work exerts pressure on Forest Land. This depletes forest wealth as well as fragments the habitat leaving the animals in isolation. Similarly the transmission lines are being drawn in all rural /



urban areas and it passes through forests. Electrocutions of animals are frequently observed.

Due to large scale mining especially Iron & Manganese through Open Cast mining Method has affected and shrunked the habitat in Barbil, Champua and BJP Range which constitutes around 35% of the Division area.

3.7.2: Depletion of tree cover / Forest crop density:

From satellite imagery study and experience, it is observed that the crop density is more or less is declining and more forest blocks are being managed under Improvement Working Circle. Reasons for such depletion are mainly overexploitation / illicit felling of selective over wood resulted in depletion of cover to animals. Due to lack of camouflaging the animals became easy prey to predators.

3.7.3: Scarcity of Water in interior & high altitude Forests in summer:

Now as it is observed the Forests are more or less confined to Hills / Ridges. Plain Forests are decreasing day by day and are subject to much biotic pressure. Animals are withdrawing from forest fringes and concentrating on inaccessible pockets of Forest. Day by Day the rainfall is erratic and number of Rainy days in a year is decreasing. The nalla / Rivulets are drying up and in summer it became dry. The animals face water scarcity. Sometimes, in search of water they come to nearby habitation and endangered their life. High pollution due to Dust, the water body is always turbid and difficult to get clear water for animals. Due to heavy silt carrying run off, the water bodies are heavily silted up. The life of inland water bodies are reducing fastly than expected.

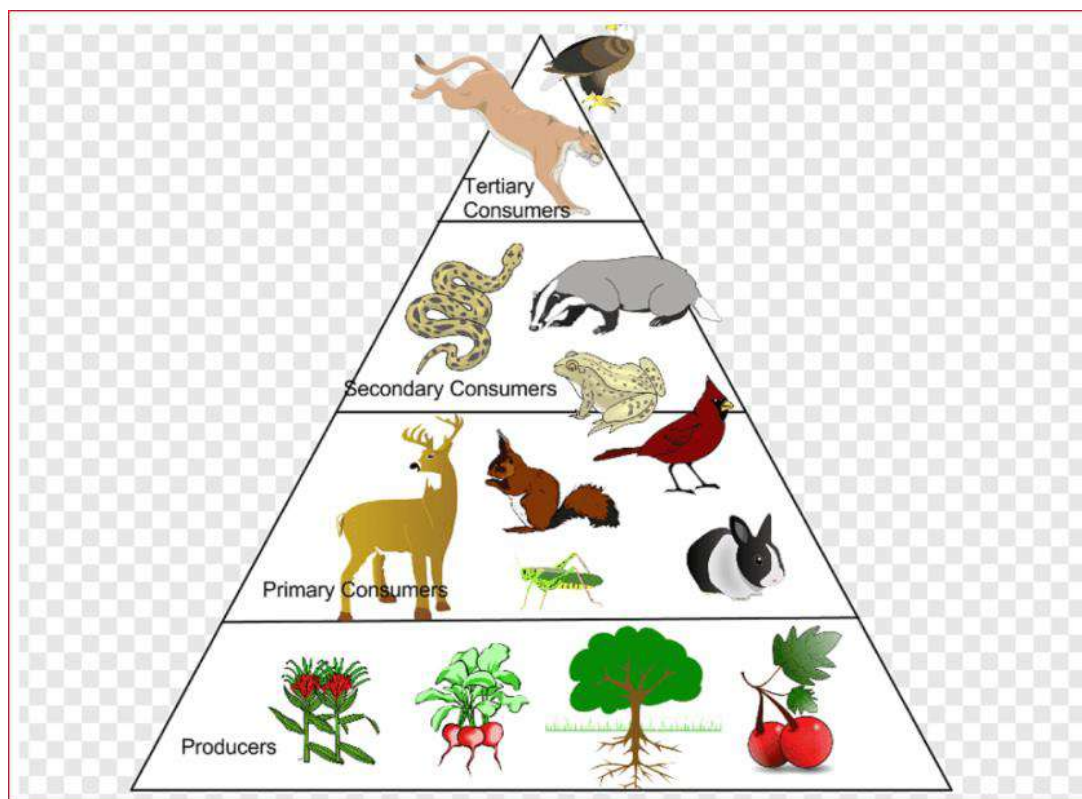
3.7.4: Depletion of Food stock and deterioration of quality Food / Fodder.

The forests of the tract are becoming more dryer due to annual fire, reduced rainfall and reduced rainy days, grazing beyond its carrying capacity, compacting of soil, increased runoff, top soil erosion etc. The plant community is gradually regressing towards thorny, unpalatable, stunted seral stage rather than improving towards climax. In the process the forest lacks quality food / fodder to herbivorous. Due to lack of micro organisms, bears, wild boar etc are facing scarcity of food stock.

3.7.5: Depletion of Prey base / herbivorous:

Herbivorous animals are mostly the prey base of all Carnivorous. Due to depletion of Grass lands / quality fodder and poaching of animals, their number / population is in a declining trend and it has affected the population of apex carnivore's animals. In many forest areas, concentration of prey base is at a threshold limit. The health of the forest is also indicated from presence / abundance of carnivorous animals. It is a common observation in all forest blocks of the Division that both prey base and predators are in a rapid declining trend. It is

clear signal to all forest managers to act for increase in fodder, water and adequate tree cover for animals.



3.7.6 Annual Fire and loss of Ground Flora.

All the forests of Keonjhar Division are of Moist deciduous nature mixed with dry mixed forest with a mosaic pattern. Annual Fire is a common occurrence which destroyed the ground flora, regeneration, humus layer and affects the living of animals. Though adequate steps are being taken by department, it is felt the need to associate the VSS, general public in an intensive manner to combat fire menace.

3.7.7: Heavy biotic interference and intrusion by domestic animals (Cattle/ Goat/ Sheep)

The forests are freely assessable to the public throughout the year though it is legally prohibited. Lopping of branches, cutting of trees for fodder for cattle, Goat etc is a common phenomenon. It always breaks the tranquility of wild animals. It seriously hampered the breeding, movement and always in a state of disturbed environment and grazing related problems.

3.7.8: Illegal hunting by putting nets, electric live wire, etc.

The Forests and agricultural field are intermingling at many places. The villagers / anti-social elements are putting Nets, Snairs (Phasa), and Electric Live Wires in agricultural field to protect their crop from depredation. These phasa sometimes put threat to animals.



In recent past Elephant Death for various reasons are furnished below at table No 3. To indicate the nature of threat to mega animals and it can be extrapolated for other animals.

Table No 3.10 Elephant Death for the year from 2018-19 to 2021-22 (December) in Keonjhar Division

Sl No	Case No.	Date	Sex/ Age	Range	Village/ RF/KF etc.	Cause of Death
1	UD Case No. 3 CH/ 2018-19	24.07.2018	Male-12 to 14 Years	Champua	Chamakpur KF. 150 meters away from river Baitarani	Due to shock arising from septicemia
2	OR Case No. 52 K/ 2018-19	21.11.2018	Female-30 Years	Keonjhar	Basantpur & Naranpur between Railway Station	Due to Train accident
3	UD Case No. 11 CH/ 2018-19	28.03.2019	Male Calf- 1 Month old	Champua	Mahaparbat DPF, Near village Hatimara Chhak	Due to cardial(there is Fighting among the male elephant & Female elephant
4	UD Case No. 1 G/ 2019-20	09.04.2019	Female- 15 to 20 years	Ghatagaon	Near Gayalmunda Village	Anthrex
5	OR Case No. 30 G/ 2019-20	22.08.2019	Male Calf 2 years	Ghatagaon	Near Balijodi Village	Road Accident
6	OR Case No. 30 G/ 2019-20	22.08.2019	Adult Female 20 years	Ghatagaon	Near Balijodi Village	Road Accident
7	OR Case No. 30 G/ 2019-20	22.08.2019	Female 15 years	Ghatagaon	Near Balijodi Village	Road Accident
8	UD Case No. 5 BJ/ 2019-20	07.10.2019	Female 50 years	BJP	Upper Sumath KF	Natural
9	UD Case No. 7 BJ/ 2019-20	19.02.2020	Male Calf 5-6 years	BJP	Taramakanta DPF	Natural
10	UD Case No. 2 CH/ 2020-21	05.05.2020	Gender could not be ascertained due to putrified	Champua	Kasis KF	
11	UD Case No. 3 CH/ 2020-21	24.05.2020	Male(Single Tusker) 20 years	Champua	Chamakpur KF	Due to Accute Tympanitis
12	OR Case No. 28 CH/ 2020-21	14.06.2020	Male 8 - 10 years	Champua	Baitarani (A) RF	Due to Electrocution
13	OR Case No. 28 CH/ 2020-21	14.06.2020	Female 20 years	Champua	Baitarani (A) RF	Due to Electrocution



14	UD Case No. 2 BL/ 2020-21	03.07.2020	Male Baby elephant 3-4 years	Barbil	Sidhamath RF	Due to respiratory failure
15	UD Case No. 9 K/ 2020-21	11.09.2020	Female	Keonjhar	Barabanka RF (Village Tangarbahali)	Pressure impacts on hearts & lungs
16	UD Case No. 3 BJ/ 2020-21	16.10.2020	Male calf 2 years	BJP	Nadapani village	Death may be due to septicaemia
17	UD Case No. 6 BJ/ 2021-22	18.07.2021	Female 20 years	BJP	Rabbo Village	Due to acute Hepatitis and oedema of the Lungs (Clostridium Haemolyticum)
18	UD Case No. 6 BJ/ 2021-22	18.07.2021	Male Calf 5 years	BJP	Rabbo Village	Due to acute Hepatitis and oedema of the Lungs (Clostridium Haemolyticum)
19	UD Case No. 14 CH / 2021-22	26.09.2021	Female Elephant	Champurua	Kalikaprasad Beat (Rajia-village)	Dystocia (Pregnant)
20	UD Case No. 8 BJ/ 2021-22	06.08.2021	Female Elephant 40 years	BJP	Talachampe Village	Clostridium Haemolyticum
21	UD Case No. 9 BJ/ 2021-22	10.08.2021	Female Elephant	BJP	Inside Sarukudar KF	Clostridium Haemolyticum
22	UD Case No. 12 K/ 2021-22	07.12.2021	Female Elephant 20 years	Keonjhar	Nekadaghar Village	Due to Electrocution

On analysis of the animal / Elephant death report it is observed as follows.

Table No 3.11 Animal/Elephant Death Report

Sl No	Cause of Death	No of Elephant involved.
1	Train accident	1
2	Road accident	3
3	Electrocution	3
4	Respiratory Diseases	2
5	Natural death	2

The pie chart illustrates the distribution of elephant deaths across six categories. The largest portion is 'Other diseases' at 50%, followed by 'Road accident' and 'Electrocution' at 14% each. 'Respiratory Diseases' and 'Natural death' each account for 9%, and 'Train accident' accounts for 4%.

- Train accident: 4%
- Road accident: 14%
- Electrocution: 14%
- Respiratory Diseases: 9%
- Natural death: 9%
- Other diseases: 50%



6	Other diseases	11	

It can be inferred that Electrocuting and Road accident are the major reasons for Elephant death. Pollution related death is also a cause of concern.

Table No 3.12 Human death data for the year 2018-19 to 2021-22 (December) by Elephant						
Sl No/	Range	Village	Name of the deceased	Gender	Date of death	Name of wild animal
1	BJP	Khuntakanta	Lutu Pradhan, S/O Ganeswar Pradhan	Male	25-07-2018	Elephant
2	Keonjhar	Sendkap	Pala Naik W/O- Damodar Naik	Female	26-09-2018	Elephant
3	Keonjhar	Bidyadharpur	Rasika Munda S/O- Rengalu Munda	Male	19-10-2018	Elephant
4	Barbil	Kollaharodkala	Gurubari Munda, W/O Late Rekunda Munda	Female	16-10-2018	Elephant
5	Champua	Kendughati	Harihara Naik, S/O Natha Naik	Male	07-11-2018	Elephant
6	Champua	Khandabandha	Lipi Munda W/O Bilay Munda	Female	16-12-2018	Elephant
7	BJP	Kadamdihi	Baburam Munda S/O Late Pandu Munda	Male	26-11-2018	Elephant
8	Keonjhar	Guhachatua	Sukramini Munda, W/O Sagara Munda	Female	28-02-2019	Elephant
9	Telkoi	Akul	Kadali Ranasingh W/O- Rabi Ranasingh	Female	04-06-2019	Elephant
10	BJP	Danla	Kadami Munda W/O- Late Braju Munda	Female	09-07-2019	Elephant
11	Champua	Malda	Sini Munda D/O- Bajei Munda	Female	11-07-2019	Elephant
12	Ghatagaon	Chakradharpur	Bharat Naik S/O- Jagabandhu Naik	Male	11-07-2019	Elephant
13	BJP	Sankari	Binod Dehury S/O- Badia Dehury	Male	24-07-2019	Elephant
14	Telkoi	Tangiri	Suagi Juanga W/o- Late Panu Juanga	Female	30-11-2019	Elephant
15	Ghatagaon	Kadabahali	Chunduri Munda W/o- Madhaba Munda	Female	13-12-2019	Elephant



16	Patna	Hariharpur	Subasini Mahanta D/o- Late Raghunath Mahanta	Female	10-01-2020	Elephant
17	Champua	Katupali (Munda Sahi)	Jaguna Munda S/o- Chanda Munda	Male	13-04-2020	Elephant
18	Champua	Bachu Hatting	Markanda Naik, S/O- Kantha Naik	Male	03-12-2020	Elephant
19	Champua	Joda	Srikanta Naik, S/O- Baisaku Kaik	Male	19-12-2020	Elephant
20	Telkoi	Jagmohanpur	Janaki Pradhan, W/o- Dibakar Pradhan	Female	17-02-2021	Elephant
21	Champua	Jamupani	Deba Champia, S/o- Samara Champia	Male	06-04-2021	Elephant
22	Telkoi	Siriabahal	Goura Chandra Nayak, S/o- Kirtan Nayak	Male	17-05-2021	Elephant
23	Barbil	Gandhalpada	Machu Munda, S/o- Mangulu Munda	Male	05-07-2021	Elephnat
24	Champua	Anandpur	Rajashree Sardar, D/O- Mohan Sardar	Female	12-07-2021	Elephant
25	Champua	Purunapani	Chamara Munda, S/O- Dama Munda	Male	27-09-2021	Elephant
26	Telkoi	Banspal	Makuru Naik, S/o- Ganapati Naik	Male	11-09-2021	Elephant
27	Champua	Dhanurjayapur	Duryodhan Naik,	Male	24-10-2021	Elephant
28	Ghatagaon	Hatinota	Jaldhar Maharana, S/o- Sukadev maharana	Male	09-11-2021	Elephant
29	Telkoi	Ranibeda	Narayan Mahanta, S/o- Binod Mahanta	Male	13-11-2021	Elephant

The elephant death from 2018 till 2021 December is 22 where as the death of Human in Man- animal conflict is 29. This is more or less 1:1 on broader sence.



3.8 Protection & Management of Fauna:

In Keonjhar Division there is no National Park, Wildlife Sanctuary or Protected area. There are two Elephant Corridors i.e. karo karampada and Pallahara- Telkoi corridors. The Protection & Management is being practiced within framework of law. The following measures are being taken for Protection & Management of Fauna in this Division.

3.8.1 Management Practices adopted:

A. Deployment of Squad:

In order to strengthen the existing staffs in Ranges, Squads have been deployed under various nomenclatures i.e. Anti-Depredation Squad, Elephant trackers, Anti-Poaching squad, Fire Fighting Squad, Protection Squad.

B. Regular checking of Transmission Lines:

As there are number of transmission lines (132KV, 33KV, 11KV) in the area, fear of electrocution is always hangs over the head of management. Regular checking of transmission line for Sagging is being taken up by staffs. The electric line authority / User Agency are regularly directed to check steps against sagging of lines. They are also directed to fence the poles / towers all around to prevent accidental electrocution of animals.

Bird's deflectors are being provided on the earthing conductors to prevent birds hitting.

C. Construction of RCC Machans: For Protection of Crops Machans are being constructed in villages, being used by farmers to protect crops.

D. Installation of early warning system: On development of new technology, early warning System is being installed to provide warning to villagers / staffs on presence of elephant nearby.



E. Use of Drone Camera: Drone Camera is being used to keep a watch on elephant movement, location of Forest Fire and related matters. Continuous monitoring of elephant movement is being taken up.

F. Improvement of habitat: Habitat is being improved by tree planting, increasing food availability in forests. Fodder and Fruit bearing species are being given importance in all planting activities.

G. Creation of Water Body:

Water bodies have been created to provide water during summer. The list of water body created has been furnished at Chapter-5 of this Plan.

H. Anti-Poaching Gates:

There is no Anti-poaching gate to prevent poaching of wild life in this Division.

I. Maintaining Salt licks:

There are number of Salt lick naturally available in Ghatgaon, Telkoi and BJP range. These are being maintained. Adequate safety measures being taken at Salt lick sites against poaching etc.





CHAPTER- 4

MAINTENANCE AND ENHANCEMENT OF FOREST HEALTH AND VITALITY

4.1 Status of Regeneration

Regeneration survey has been conducted during point sampling enumeration. The procedure followed is as per Para 74 of the National Working Plan Code-2014. As per the guideline the following steps are taken.

- Young plants of tree species up to 10 cm diameter are taken into consideration for assessment of regeneration status of a particular species as practiced in National Forest Inventory by FSI.
- Data collected from the square plots of 3x3m for saplings (2cm to 10 cm collar diameter) and from the square plots of 1x1m for seedlings are used to assess the regeneration status of species in the management unit i.e. compartment/ blocks.
- The phyto-sociological data from plot level enumeration, the regeneration status of the sampled species have been assessed in the following categories as follows.

Category	Guiding Principle
Good regeneration	If seedlings are more in numbers than the saplings and likewise saplings is more than that of adults.
Fair regeneration	If seedlings are more in numbers than the saplings but the saplings are equal or less than that of adults.
Poor regeneration	If a species survives in only sapling stage, but not as seedlings (though sapling may be less, more or equal to adults).
No regeneration	If a species is absent both in sapling and seedling stage, but present as adult.
New regeneration	If a species has no adults but only sapling and/or seedlings.

For study of Regeneration status some species common to all forest blocks and of economic importance are taken in to consideration. The status of regeneration is as furnished at table No 4.1

**Table No 4.1 Status of Reseneration of important species**

Sl. No.	Trees	Status of regeneration
1	Sal	Sal is the main forest species in this tract and found in all forest blocks. Its regeneration is extremely good in Karo, Siddhamath, Uliburu, Thakurani, Baitarani, Kalapat, BandhanjhariRanibeda etc. Moderate regeneration is found in blocks like Kodbil, Lunghara I & II, Suakati I & II, Atei, Kanjipani, Gonasika etc. The natural regeneration is rare in Patna, Poipani, Kalikaprasad, Balibandha, Belda, Jadipada, Tando, Rasapada, Palaspada etc.
2	Asan	The regeneration of Asan is moderate in Kalapat, Atei, Khajuribani etc. The regeneration of Asan in all other blocks are less.
3	Dhaura	The regeneration of Dhaura is profuse in North-western aspect of Kalapat R.F, in the hill portion of Renda and Mankadachuan. The regeneration status of Dhaura is of low intensity in all other blocks.
4	Bija	The regeneration of Bija is profuse in Karo R.F on the border of Sundargarh and Sighbhum, Northwestern side of Renda. The regeneration is moderate in Atei, Kalapat. Very negligible regeneration is noticed in Balibandha, Tando, Kalikaprasad, Baunsuli, Poipani, Patna etc.
5	Kuruma	The regeneration is very low in Karo, Siddhamath, Kalapat, Ranibeda, Bandhanjhari, Atei etc. In the rest blocks the regeneration is almost absent.
6	Gambhar	The regeneration is very low in Kalapat, Atei, Barabanka etc. In the rest of the blocks the regeneration is almost nil.
7	Sishoo	The regeneration is very low in Atei, Kalapat, Karo, Ranibeda, Barabanka,Nayagargh etc. In the rest of the blocks the regeneration is almost nil.
8	Kasi	The regeneration is very low in Atei, Kalapat, Karo, Ranibeda, Siddhamath, Thakurani, Barabanka etc. In the rest of the blocks the regeneration is not remarkable.
9	Bandhan	The regeneration is very low in Atei, Siddhamath, Thakurani, Kalapat, Karo, Benamunda, Baunsuli, Ranibeda, Barabanka etc. In the rest of the blocks the regeneration is negligible.
10	Arjuna	The regeneration is very moderate in Atei along river Baitarani, Karo along Karo river, Kalapat along Samakoi. In the rest of the blocks the regeneration is found in less intensity near riverbanks and nala banks.
11	Kendu	Its regeneration is profuse in all blocks of this division.
12	Mahula	Its regeneration is profuse in all blocks of this division.

**Table No 4.1 Status of Reseneration of important species**

Sl. No.	Trees	Status of regeneration
13	Chara	Its regeneration is profuse in all blocks of this division.
14	Kangada	Its regeneration is profusely found in part of Krushnapur and Eastern side of KalapatR.F.andKanjipani RF. In the rest areas the regeneration is absent.
15	Aonla	Its regeneration is profuse in all blocks of this division.
16	Harid	Its regeneration is moderately present in all blocks of this division.
17	Bahada	Its regeneration is moderate in all blocks of this division.
18	Khakada	Its regeneration is moderate in all blocks of this division.
19	Siddha	Its regeneration is moderate in all blocks of this division.

Besides the above, there is no regeneration which can be categorized as **“in plenty / abundant”** for any specific species in the division confined to specific forest blocks noticed during Regeneration Survey. The overall status of regeneration is good to Moderate. Suitable strategy is required to be incorporated in management practices to achieve establishment of regeneration.

Forest Block wise regeneration Status as observed after analysis by ORSAC is furnished below for reference. (Table No 4.2)

Table No 4.2 Regeneration status of important Forest blocks.

Sl No	Name of Forest Block	Regeneration Status	Sample Point no	Crop Composition
1	Amjor RF	Moderate	KOW3	Mainly Sal & mixed , Sal, Chara, Kendu etc
2	Gangarei RF	Moderate	KOW290	Moderate sal mixed forest with its associate trees
3	Gandharmardan PRF	Moderate	KOW300	Mainly Sal, Dhoura,Chara & Kendu
4	Gonasika RF	Moderate	KOW305	Moderate sal mixed forest with its associate trees
5	Jagar RF	Moderate	KOW312	Mainly Sal & Mixed
6	Kadana-B RF	Moderate	KOW572	Sal
7	Karo RF, C-6	Moderate	KOW590	Sal tree dominated to the extent of 40 % associated with Bahada,Chara, Asan, Kendu,Kuruma, etc
8	Sidhamatha RF, C-6	Moderate	KOW815	Laterite soil with Murum and less porosity of soil



9	Thakurani RF,C-29	Moderate	KOW888	Sal tree dominated to the extent of 60 % associates with other species i.e. Asan, Kendu, Chara, Bhalia, chauli, Mahula, dhala, Rimili, Jamu, Piasal etc
10	Ulibaru Forest, C-1	Moderate	KOW917	Sida tree dominated to the extent of 50 % with Sal, Kendu, Asan, Anla, Chara etc
11	Baitarani East B PF	Moderate	KOW148	Mainly Sal & mixed forest.
12	Balibandha RF	10 to 15 %	KOW176	Sal mixed forest.
13	Jyotipur RF	Moderate	KOW319	Sal, Sal, puijamal forest.
14	Laksmiposi RF	Moderate	KOW658	Sal mixed forest with bushes & grass.
15	Bandhana RF	30% regeneration	KOW245	Sal, Chara, Kendu etc.
16	Atai RF	Moderate	KOW105	sal, karada, char, mahula, dhura, asan
17	Barabanka RF	Moderate	KOW220	mixed mainly with sal
18	Ghatagaon RF	Adequate	KOW304	Sal, char, jamu, asan, kendu
19	Pipilia RF	Moderate	KOW722	Mainly sal trees, 70% of sal
20	Kalimati RF	Moderate	KOW570	Mainly sal, others- Harida, Asan, karada etc.
21	Chadheibhol RF	Adequate regeneration	KOW278	major tree species is sal. other species are char, kendu, jamu, anal, harida,, bahada and other species are present here
22	Chemena A RF	Sal 10 %	KOW280	Pure sal forest.
23	Padampur RF	Moderate	KOW702	Sal, char, jamu, acacia, mahul, vhalia, korei.
24	Patna RF	Moderate	KOW705	Mainly sal
25	Purunapani RF	Good	KOW727	pure sal with associated species.
26	Balabhadrapur RF	Moderate	KOW171	Sal, Dhaura, Mai, Sunari, Karada, Char, Bhalia
27	Belda RF	Sal, khakda, harida, kasi, dhaura, bahada, chana	KOW253	Sal and mix forest
28	Basantpur RF	Moderate sal, char, asan	KOW247	Sal and mix forest
29	Nalapanga RF	Moderate	KOW676	Sal, Asan, Dhaura, Kasi, Jia, Kendu, Korada, Khakada, Jamu , Char, Kusuma



30	Narayanpur RF	Sal, asan, mahula, dhaura, char, khakda, ghurudu, moderate forest	KOW680	Sal and mix forest
31	Bandhajhari RF,C-1	Moderate	KOW180	Sal and mix forest
32	Benamunda RF,C-3	Poor	KOW265	Sal, Chara, Jamu, Mahula, Asana, Kendu etc
33	Kalapat RF	Moderate	KOW385	Sal, Asan, Jamu, Kendu, kangada, Dhaura.
34	Samakoilli RF	Sal, Moderate	KOW800	Sal and mix forest

From the above data it is observed that the regeneration is good for Sal and moderate for other important species.

4.1.1 Regeneration Survey of Bamboo (Rattans).

Bamboo is not available in the division. However bamboo plantation has been taken up in some patches which is not so promising.

4.2 Area affected by Forest Fire:

Forest Fire is of common occurred in forests of this division during fire season. The dry season in the area extends from the month of October to June and experiences a very hot summer during April to June. Due to the prolonged hot weather, not a single forest block is free from forest fire. Almost all instances of forest fire are man-made. The occurrence of repeated forest fire year after year prevents regeneration of many valuable tree species. As a result of this phenomenon, many fire hardy species found to replace the economically important species in the forests. Annual repeated fires are causing a series of damages both directly and indirectly to the forests. It burns leaves and other residue lying on the forest floor and destroys the microbial population of the soil and thus prevents the formation of humus. The humus is very vital for the soil fertility and its absence adversely affects the growing stock. Forest fire is also one of the main factors responsible for the mortality of seedlings, sapling even of poles in forests. It also causes desiccation and hardening of the soil which accelerate the process of soil erosion.

4.2.1 Causes of Forest Fire:

The major causes of fire in forests of Keonjhar Division are enumerated below to have a better understanding of the nature of the fire and how to Control & Manage. Normally the forests experience Ground Fire in general. No Crown fire has been noticed in forests of this division.



- Burning of forest floor for local people / cultivators / cow herd boys etc. for good growth of grass.
- During winter (November to February), people of locality and far places visit important places in Forest & do their picnic. After Picnic Un-extinguished and unattended fires sometimes caused accidental fire.
- Burning of fallen woods / Green timber for preparation of Charcoal, sometimes spread to nearby Forest, if not properly attended.
- Un-extinguished cigarettes or bidi butts being thrown by passerby leads to break out of ground fire.
- Collectors of NTFP sometimes set fire to get better harvest / yield.
- To prevent movement of wild elephants to a particular region / part, people may set fire to scar them. This fire became wild and causes Forest Fire.
- Encroachers set fire to clean the encroached area free from debris.
- Some cultivators set fire to get ashes into their crop land through runoff water to provide organic manure to nearby agricultural field.

4.2.2 Damage Caused to Forests by Fire:

Though Forest fire has a better role in management of Grass Land, induce regeneration of species having hard coat seeds, Reduce thickness of un-decomposed coriaceous leaf litters, control weeds, burning of seeds of unwanted species. Fire as a good servant has some role in forest management in this division. Forest fire occurs annually and the damage caused is enumerated as follows.

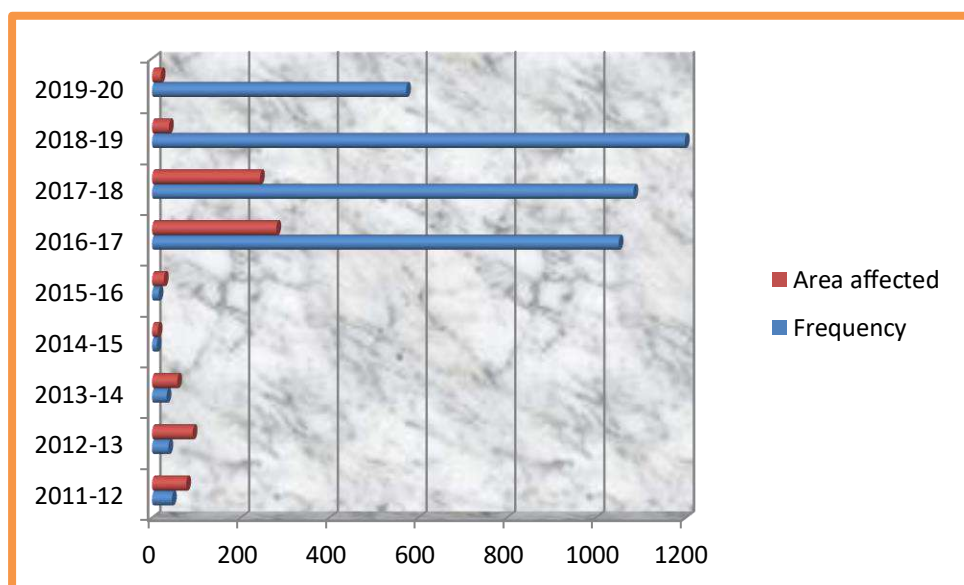
- It adversely affects the establishment of seedlings / Saplings. The most affected species is Sal.
- It results in degradation of forests, loss of soil fertility and accelerates soil erosion.
- In Bamboo forests, the rhizomes are badly affected. In case of such fire spreads to bamboo forests devastates the clumps.
- Fire destroys the organic elements and microfauna in the soil and its nutrient content. Repeated fire in the Dry Deciduous Forests causes retrogression of the vegetation towards a more xerophytic condition.
- It causes imbalance in the entire ecosystem.
- It has an adverse effect on insects, amphibians and reptiles.
- It affects the movement of animals; also affect the corridors, habitat for the bigger animals.
- Germination capacity of seeds is badly affected.
- Repeated Fire results entry of intrusive species like Lantana, Eupatorium etc.

The occurrence of fire recorded during plan period is furnished below.



Table No 4.3 Incidence of Forest Fire & area affected: Keonjhar Division

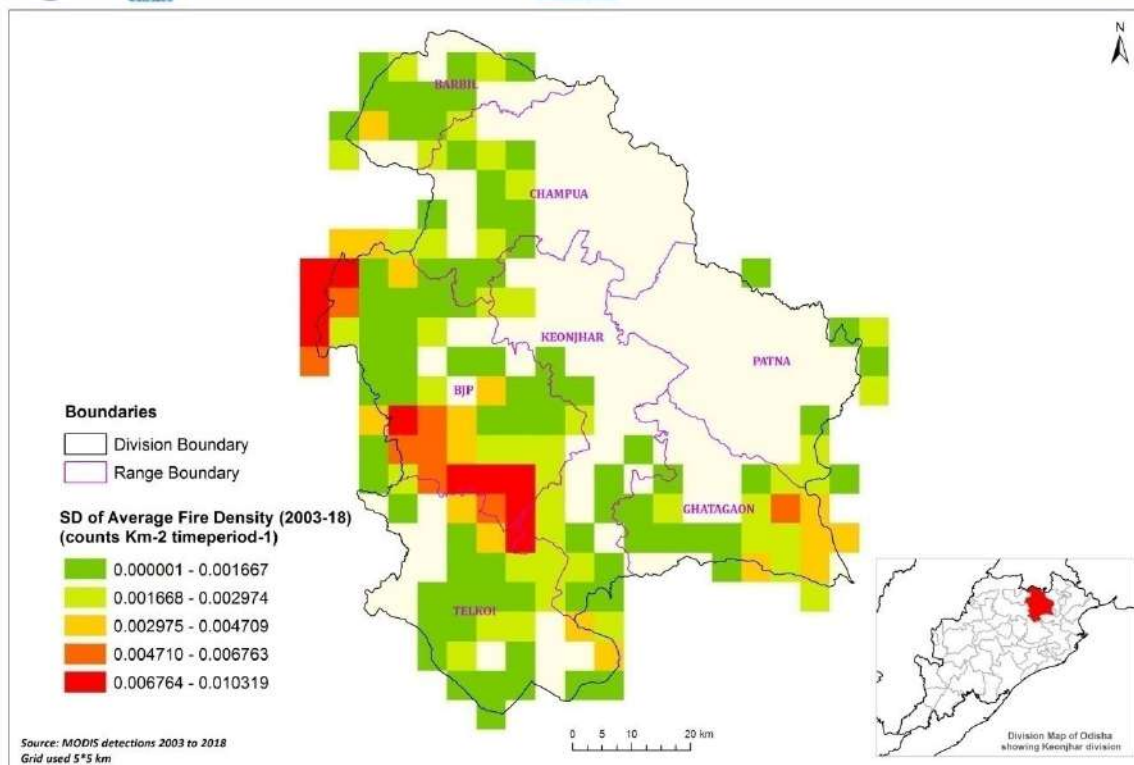
Sl No.	Year	Frequency of fires (no of fire incidents in season/year)	Total forest area affected (ha)
1	2011-12	45	77.25
2	2012-13	37	91.64
3	2013-14	33	56.92
4	2014-15	11	12.92
5	2015-16	15	26.75
6	2016-17	1051	280.4405
7	2017-18	1084	243.4185
8	2018-19	1199	38.1515
9	2019-20	573	19.684



The above data are compiled basing on Modis Fire Data. Other local fire incidences are not included in the list. Overall fire incidence is required to be managed in a more **“Efficient & Professional Method”** than “As and when method”.



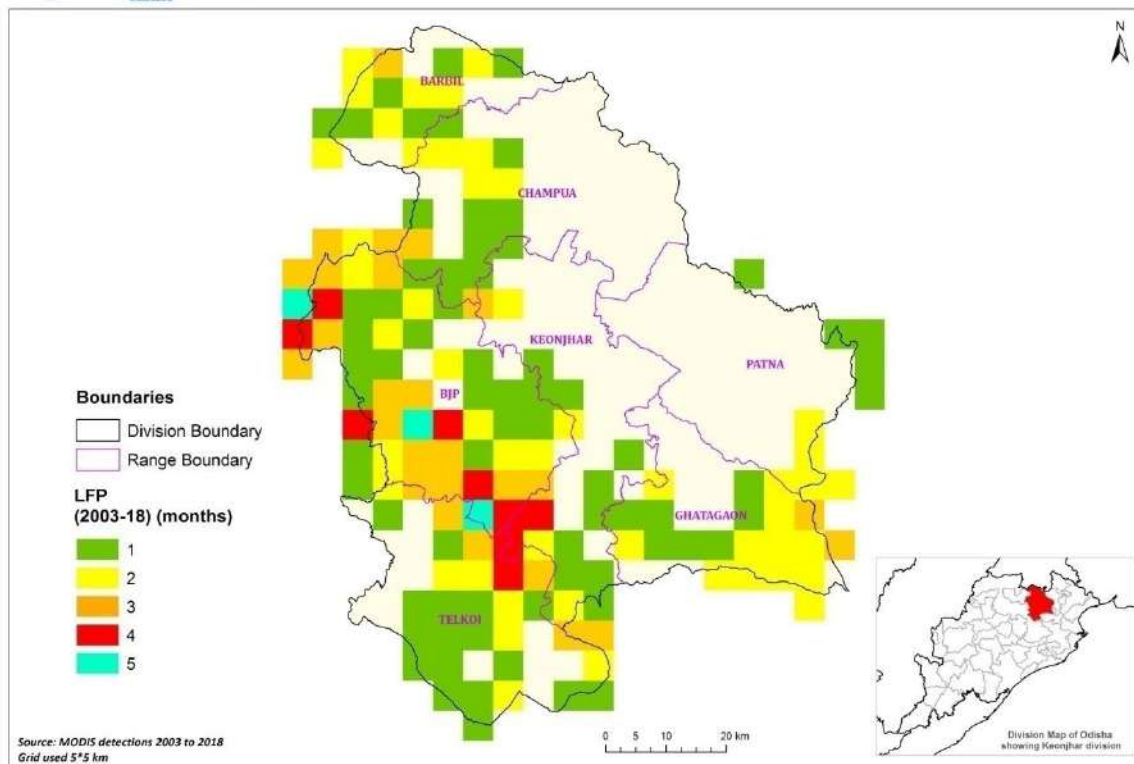
Standard Deviation AFD Map of Keonjhar Forest Division, Odisha



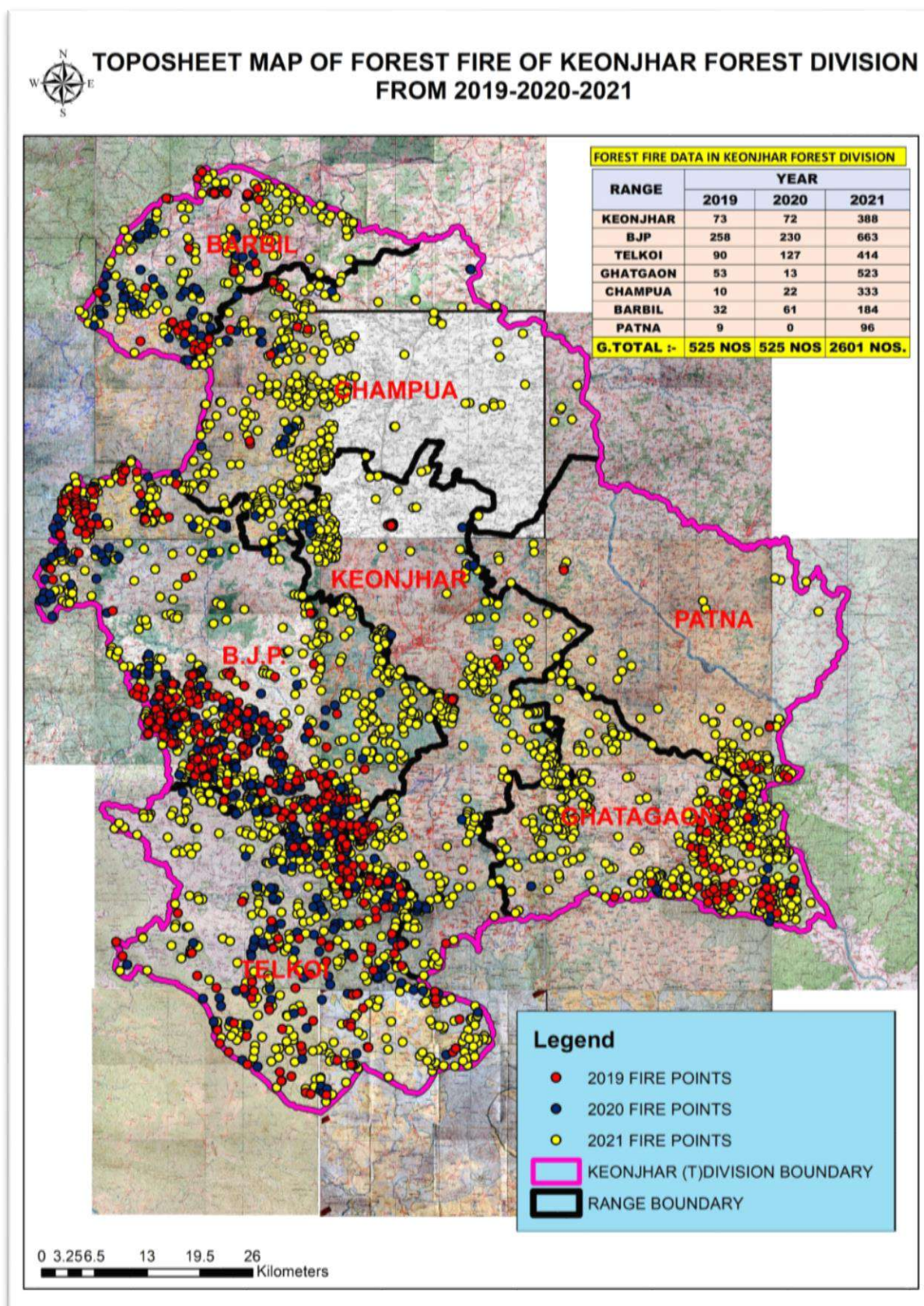
For Official Use



Length of Fire Period Map of Keonjhar Forest Division, Odisha



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4.3 Area Damaged By Natural Calamities

4.3.1 Floods, Drought, Storms and cyclones:

This Division is not free from the ravages of natural calamities like floods, drought and storm. Almost every year the area is affected by cyclonic storms of varying intensity during summer. It is observed in most of the forest blocks have been affected by storm. But definite record is not available in the Division. The area also gets affected regularly by floods in the River Baitarani and their branch rivers during rainy season. However, there is no report regarding damage of forests due to flood has been recorded.

4.3.2 Drought:

Droughts also occur in certain parts of the Division due to want of rains during the rainy season. In the peak summer months when there is a period of scarcity of water in the forest due to the drying up streams of hill, the Wild life become easy prey for the poachers near the small water holes. Heat waves accompanied with sunstroke death and injuries have also become serious problem in this area since 1998. No recorded data on effect of drought is available in the division

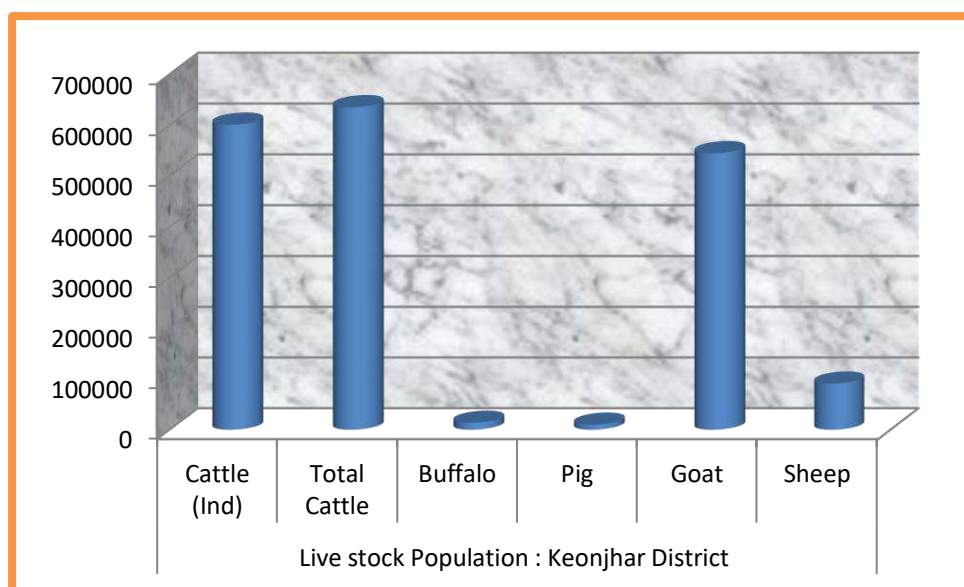
4.4 Area Protected From Grazing

The Forest blocks of Keonjhar Forest Division are vulnerable to grazing in view of nearer to human habitations. There is heavy biotic pressure, in respect grazing by the domesticated cattle population of the nearby forest area. The regeneration of principal tree species is damaged due to browsing and tramping by cattle population. The plantation areas, bamboo coupe areas and timber coupe areas should be closed for grazing in the year following the year of felling. In Keonjhar Forest Division practically no area is protected from grazing.

It plays a major role in the depletion of forests. With the increase in human population, the population of cattle has also increased massively. These large herds of cattle and buffalos are kept by the villagers not only used for ploughing agricultural fields, pulling carts or getting milk, but also to get more dung for use in their agricultural fields, as they do not spend anything for its survival and maintenance of cattle. Severe damage is caused to the plantations and young regenerations by grazing and browsing by domestic animals, leading to replacement of good forest tracts of mesophytic flora by relatively more xerophytic, dry and thorny ones. During the course of grazing, the soil gets automatically compacted and the topsoil becomes hard as a result of which reestablishment of vegetation becomes more and more difficult. Heavy grazing is noticed in Atei, Barabank R.F and especially in almost all

Reserved Forests. It makes the soil unfit for regeneration. The poor ground regeneration of Sal and other valuable species with very poor establishment of regeneration to sapling and pole stage are the result of excessive grazing. The excessive and uncontrolled grazing in these forests at the present rate will not only curtail but also destroy the fodder resources with all its consequences to rural economy. It also leads to accelerate soil erosion, which will first endanger the cultivated field itself. Steps should be taken by giving more stress on growing fodder species, replacing the large unproductive herds of cattle by few productive ones and introducing stall-feeding. People should be regularly motivated for the purpose. The number of indigenous cows and buffaloes are more than the crossbreed cows and buffaloes. More than 1/3rd of the cattle population are cows, buffaloes and oxen while the rest are mainly of goats and sheep. The population of pig is very less and mostly confined to Barbil and Joda areas. In present days, the population of goat and sheep is increasing due to encouragement through different Government schemes. The cattle population in Keonjhar district is furnished in **Table No. 4.4**.

Table No 4.4 Live Stock Population: Keonjhar Division.					
Cattle (Ind)	Total Cattle	Buffalo	Pig	Goat	Sheep
600858	635244	13674	9877	544658	91103



The intensity of grazing in different blocks of Keonjhar district is furnished at table No 4.5 below.

**Table No 4.5 Extent and Intensity of grazing in different forest blocks of Keonjhar district.**

Grazing intensity	Name of the Forest blocks
Light	Kalikaprasad, Balibandh, Mooney, Naibuga, Pedipokhari, Belda, Jadipada, Bandhanjhari, Benamunda, Anjar, Suakati, Jagar, Mundula, Badbil, Belaposi, Bila, Budhikapudi, Laxmiposi, Chadheibhol, Chemena, Ninua, Rasapada, Tando, Budhikapudi.
Moderate	Poipani, Maidankel, Kandara A, B, C, Baitarani East A, Baitarani East B, Basantapur, Balabhadrapur, Nalapanga, ChhamundaGolabandha, Dhanurjayapur, Jharbeda, Saleikena-Siriabahal-Kalapokhari, Tamango, Sikheswari, Amuni, Bayakumutia, Gandhamardan, Baunsuli, Padmapur, Baitarani A, Baitarani B, Lunaghara, Gonasika
Heavy	Atei, Ghatagaon, Pipilia, Kalimati, Badamasinabila, Balipokhari, Kalapat, Kodbil, Krushnapur, Mankadchua, Ranibeda, Bardhana, Jyotipur, Laxmiposi, Ukhunda, Thakurani, Uliburu, Karo, Siddhamath, Barabanka, Nayagarh, Narayanpur, Raghunathpur, Raikala, Sarupat, Nelung, Tangarani, Dublapal, Godhihudi, Rekuti, Renda, Gadagadei, Saharpur, Kanjipani, Khajurimundi, Champei, Digchampei, Gaudachampei, Pradhanpada, Patna, Purunapani, Sarasposi, Palaspada, Samakoi, Danla, Dumurudiha, Shyamanali-Koilisuta, Khajuribani.

4.5 Loping Practices:

It is found that, the forest fringe dwellers while collecting NTFP generally lop the trees to get more products. As a result, NTFP yielding trees are damaged and their number decreases. Further, the people while grazing their cattle inside the forest lop the trees to feed their cattle. Such practices are detrimental to the forest growth which damages the young forest growth and the regeneration status of forest become poor. There is no recorded data available regarding lopping practices in Keonjhar Division. But usually, the forest fringe dwellers regularly go inside the forest and cut branches to feed particularly to Goats. Although goat rearing has become a lucrative business in part of the division, still there is no remarkable impact on the forest.

4.6 Area infested by invasive weed species in Forests:

Invasive species are recognized as potential threats to ecosystem and this problem is exacerbated as global trade and travel accelerates and human-mediated disturbance



increases. Synergies are lacking across management, research, policies and decision making as there are insufficient networking, coordination and collaboration across organizations and departments to manage invasion. Thus, sustainable management of invasive species is challenging but inevitable given the increasing range of alteration caused by invasion which has little prospect of irreversibility. To be sustainable, Invasive Species Management Framework (ISMF) strategies must include environmental, social, economic and political factors that influence the causes, impacts, and control of invasive species across spatio-temporal scales.

Only three nos. of species of obnoxious category such as *Lantana camara*, *Eupatorium odoratum* and *Parthenium hysterophorus* are common invasive species in all the forest blocks of the Division. In most of the plantation area taken up in the past has been covered by this species after establishment of plant in the soil and post-plantation operation. The old plantation area of Keonjhar Division is provided below.

During field verification, it is observed that about 2-2.5% of forest area have been invaded by weeds. It is hindering with regeneration of important species. It is mostly observed in open / blank areas of forests. (table No 4.6)

Table No 4.6 Forest Block infested with Weeds: Keonjhar Division.

Sl No	Name of Range	Name of Forest Block	Type of Forest	Weeds growth (in %)		
				Eupatorium	Lantana camara	Apludam utica
1	Keonjhar	Belda R.F	Open forest	25%	25%	24%
2	Keonjhar	Jadipada R.F	Open forest	27%	27%	4%
3	Keonjhar	Maidankel R.F	Open forest	21%	21%	-
4	Keonjhar	Nelung R.F	Open forest	28%	28%	-
5	Keonjhar	Padmapur R.F	Open forest	27%	27%	-
6	Keonjhar	Tangarani R.F	Open forest	25%	27%	-
7	Keonjhar	Raikala R.F	Open forest	27%	21%	-
8	Keonjhar	Nayagarh R.F	Open forest	21%	25%	-
9	Keonjhar	Naranpur R.F	Open forest	28%	21%	-
10	Keonjhar	Raghunathpur R.F	Open forest	27%	21%	-
11	Keonjhar	Sarupat R.F	Open forest	27%	-	-
12	Keonjhar	Barabank R.F	Open forest	25%	-	-
13	Keonjhar	Basantapur R.F	Open forest	21%	-	-
14	Keonjhar	Balabhadrapur R.F	Open forest	25%	-	-
15	Keonjhar	Barash DPF	Open forest	21%	-	-
16	Keonjhar	Barabank R.F	Open forest	28%	8%	7%
17	Keonjhar	Nalapanga R.F	Open forest	27%	23%	5%
18	Keonjhar	Khajuribani R.F	Open forest	35%	34%	4%
19	Keonjhar	Balabhdrapur R.F	Open forest	25%	7%	6%



20	Keonjhar	Kalapat R.F	Open forest	37%	5%	3%
21	Ghatagaon	Balipokhari RF	Open Forest	20%	-	-
22	Ghatagaon	Pipilia RF	Open Forest	25%	-	-
23	Ghatagaon	Barabanka RF	Open Forest	10%	-	-
24	Ghatagaon	Nalapanga RF	Open Forest	3%	-	-
25	Ghatagaon	Ghatgaon RF	Open Forest	30%	-	-
26	Ghatagaon	Atei RF (Part)	Open Forest	10%	-	-
27	Ghatagaon	Kalimati RF	Open Forest	20%	-	-
28	Ghatagaon	Masinabilla RF	Open Forest	20%	-	-
29	Ghatagaon	Badamasinabila RF	Open Forest	10%	-	-
30	Patna	Padmapur R.F	Open forest	26%	18%	-
31	Patna	Baunsuli RF	Open forest	35%	15%	-
32	Patna	Purunapani RF	Open forest	20%	10%	-
33	Patna	Pradhanpada RF	Open forest	20%	-	-
34	Patna	Atei RF (Part)	Open forest	20%	-	-
35	Patna	Patna RF	Open forest	22%	-	-
36	Patna	Poipani RF	Open forest	25%	-	-
37	BJP	Gargadei RF	Mixed Forest	25%	25%	5%
38	BJP	Saharpur RF	Mixed Forest	30%	-	7%
39	BJP	Kanjipani RF	Mixed Forest	27%	25%	5%
40	BJP	khajurimundi RF	Mixed Forest	30%	27%	-
41	BJP	Anjhar RF	Mixed Forest	28%	-	-
42	BJP	Jagara RF	Mixed Forest	25%	-	-
43	BJP	Mundula RF	Mixed Forest	27%	20%	7%
44	BJP	Amuni PRF	Mixed Forest	26%	-	-
45	BJP	Bayakumutia PRF	Mixed Forest	20%	15%	-
46	BJP	Champai PRF	Mixed Forest	20%		5%
47	BJP	Danla PRF	Mixed Forest	28%	20%	-
48	BJP	Diga champei PRF	Mixed Forest	25%	17%	-
49	BJP	Dumurdiha PRF	Mixed Forest	27%	15%	-
50	BJP	Ghandhamardan PRF	Mixed Forest	26%	10%	7%
51	BJP	Gonasika PRF	Mixed Forest	30%	15%	5%
52	BJP	Gouda champei PRF	Mixed Forest	28%	-	-
53	BJP	Lunghar(I) PRF	Mixed Forest	25%	-	-
54	BJP	Lunghar(II) PRF	Mixed Forest	27%	-	-
55	BJP	Suakati(I) PRF	Mixed Forest	26%	15%	-
56	BJP	Suakati(II) PRF	Mixed Forest	20%	20%	-
57	BJP	Raigoda PRF	Mixed Forest	15%	20%	-
58	BJP	GuptaGanga DPF	Mixed Forest	25%	15%	7%
59	BJP	Katira DPF	Mixed Forest	17%	-	7%
60	BJP	Pandadhar-Bayakumutia	Mixed Forest	20%	20%	-
61	BJP	Sanghagora(A) DPF	Mixed Forest	25%	-	5%



62	BJP	Sanghagora(B) DPF	Mixed Forest	15%	-	5%
63	BJP	Sunduria DPF	Mixed Forest	20%	-	7%
64	BJP	Tarmakanta DPF	Mixed Forest	25%	-	5%
65	BJP	Kalanda DPF	Mixed Forest	28%	-	5%
66	BJP	Kakharua DPF	Mixed Forest	30%	-	5%
67	BJP	Karuagarh DPF	Mixed Forest	15%	-	5%
68	BJP	Khandadhar DPF	Mixed Forest	30%	-	7%
69	BJP	Kuanar DPF	Mixed Forest	25%	15%	10%
70	BJP	Kumudi(B) DPF	Mixed Forest	18%	10%	-
71	BJP	Sidhamatha DPF	Mixed Forest	20%	15%	7%
72	BJP	Thakurani DPF	Mixed Forest	25%	20%	7%
73	Barbil	Karo RF	Open Forest	20%	15%	4%
74	Barbil	Sidhamatha RF	Open Forest	25%	11%	6%
75	Barbil	Thakurani RF	Open Forest	33%	13%	-
76	Barbil	Uliburu RF	Open Forest	28%	9%	-
77	Telkoi	Kalapat RF	Mixed Forest	24%	11%	-
78	Telkoi	Bandhanjhari RF	Mixed Forest	25%	2%	-
79	Telkoi	Benamunda RF	Mixed Forest	22%	-	-
80	Telkoi	Krushnapur RF	Mixed Forest	28%	3%	-
81	Telkoi	Kudbil RF	Mixed Forest	26%	-	-
82	Telkoi	Mankadachua RF	Mixed Forest	29%	-	-
83	Telkoi	Samakoi RF	Mixed Forest	22%	12%	-
84	Telkoi	Saleikena-Siriabahal-Kalapokhari RF	Mixed Forest	24%	-	-
85	Telkoi	Dobalapal PRF	Mixed Forest	26%	-	-
86	Telkoi	Tamang RF	Mixed Forest	25%	9%	-
87	Telkoi	Jharbeda RF	Mixed Forest	28%	-	-
88	Telkoi	Ranibeda RF	Mixed Forest	24%	10%	-
89	Telkoi	Sikheswari PRF	Mixed Forest	22%	-	-
90	Telkoi	Renda PRF	Mixed Forest	26%	-	-
91	Telkoi	Rekuti PRF	Mixed Forest	23%	-	-
92	Telkoi	Samanali- Koilisuta PRF	Mixed Forest	25%	-	-
93	Champua	Baitarani (A)	Mixed Forest	15%	10%	-
94	Champua	Baitarani (B)	Mixed Forest	15%	15%	-
95	Champua	Balibandha	Mixed Forest	20%	10%	-
96	Champua	Bardhana	Mixed Forest	10%	10%	-
97	Champua	Jyotipur	Mixed Forest	15%	10%	-
98	Champua	Kalikaprasad	Mixed Forest	15%	10%	-
99	Champua	Laxmiposi	Mixed Forest	15%	15%	-
100	Champua	Mooney	Mixed Forest	25%	25%	-
101	Champua	Naibuga	Mixed Forest	15%	10%	-
102	Champua	Pedipokhari	Mixed Forest	15%	15%	-



103	Champua	Ukhunda	Mixed Forest	15%	15%	-
104	Champua	Baitarani East (A)	Mixed Forest	10%	10%	-
105	Champua	Baitarani East (B)	Mixed Forest	10%	10%	-
106	Champua	Jamitra	Mixed Forest	15%	15%	-
107	Champua	Kankana	Mixed Forest	15%	15%	-
108	Champua	Mahaparbat	Mixed Forest	15%	15%	-
109	Champua	Nandijhari	Mixed Forest	15%	15%	-

4.6.1 Effects of weeds on Forest Management:

Weed growth in forest blocks put hindrance in management. The effects are

- Bringing the area under Plantations became difficult and weeds suppress the planted seedlings.
- Regeneration due to seed becomes extremely difficult as the recruits are suppressed if not attended.
- Removal of weeds become cost prohibitive.
- Weed seeds dispersed through by wind / animals and spreading to nearby forest area.
- Weeds when dry became fire hazards.

It increases Rodent population in nearby area

4.6.2 Practices to Control the weeds:

Controlling of weeds is of paramount importance to allow natural regeneration to establish and check invasion. It may be of Physical method, Chemical method and combination of both.

4.6.2 (a) Physical Method:

Controlling the weeds can be possible by uprooting the weeds when it is green (in case of weeds those dies in summer and reappear during rains i.e. annual weeds). Cutting of weeds in green stage / before flowering is also practiced under which no seed formation or seed dispersal is allowed. There are weeds like lantana, those can be controlled / eradicated by cutting followed by controlled burning and uprooting the species. After uprooting, the area must be covered under plantation with extra weeding in first two years. Under tree cover the weeds growth will be substantially checked.

4.6.2(b) Chemical Method:

There are Chemicals / Weedicides available in the market which suppresses the weeds to a greater extent. Application of such chemicals at pre-monsoon period is more effective.



These chemicals trade name along with its main constituents (Components) and application practices are furnished below.

i) Glyphosate 41% SL: It is an Amino Acid synthesis inhibitor. It inhibits the EPSP synthase enzyme, which leads to depletion of key amino acids that are necessary for protein synthesis and plant growth. This should be applied @0.5 Kg active ingredient+200 ltr water/acre or 1.2 Ltr formulation+ 200 ltr water/acre during growth phase. The plant can be pruned and applied with this solution after first rain. The soil must remain moist. Avoid inhalation, skin or oral contact with the weedicide. Do not chew tobacco, eat food or smoke during spraying. Follow normal precautions – keep away from food stuff containers and animal food; avoid contact with mouth, eyes and skin; avoid inhalation of the spray mist; spray in the direction of wind; wash thoroughly the contaminated cloths and parts of body after spraying; do not smoke, drink, eat or chew while mixing and spraying; and wear full protective clothing while mixing and spraying.

ii) 2,4-D Dimethyl Amine salt 58% SL: It affects weeds by causing uncontrolled cell division in vascular tissue. This should be applied @1 Kg active ingredient+120 ltr water/acre or 1.8 Ltr formulation+ 120 ltr water/acre during growth phase. The plant can be pruned and applied with this solution after first rain i.e. during active growth phase. Follow normal precautions – keep away from food stuff containers and animal food; avoid contact with mouth, eyes and skin; avoid inhalation of the spray mist; spray in the direction of wind; wash thoroughly the contaminated cloths and parts of body after spraying; do not smoke, drink, eat or chew while mixing and spraying; and wear full protective clothing while mixing and spraying.

Precautions: Chemical weedicides are poisons and it should not be used in wildlife concentrated area, near to water source where it is likely to be leached / washed to water body. This chemical method may be applied to area where physical control is difficult and not supported by financial provision.

4.7 Incidence of pest and Diseases:

Incidence of pest and diseases in the division is not so severe. But, lack of special attention to some of the logs and firewood in depot, seized material in Range yards are subjected to attack of insect pest and diseases. Damages occur due to stem borers, defoliators, skeletoniser and termite attack in the forest. Defoliators, skeletonisers are commonly found in Teak plantation and stem borers are found inferior Quality Sal Forest. Teak leaf defoliators in teak plantation are some time found causing damages to the trees by eating away the leaf. Loranthus which is a parasitic plant found in different trees like Sal, Piasal, Kurum etc and causes unsoundness of host tree. Different types of fungi attack the forest



species. Occasionally the fungal disease like dry rot is noticed to the heart wood of Sal and other tree species. Many fungi are found to affect the forest crop adversely. Some harmful effects are listed below with their causing organisms which are mostly found in recent past in Keonjhar Division. It is observed during field tour that no such pest or diseases prevalent in the forest blocks of Keonjhar Division.

Diseases caused by Insects: The forests of Keonjhar Division is susceptible to various insects as narrated below:

- 1) ***Hoplocerambyx spinicornis* (Sal heart wood borer):** This Sal heartwood borer is found to attack the felled un-barked logs and sickly Sal trees particularly during rainy season. This type of damage is noticed in Ate, Ranibeda, Bandhanjhari and Kalapat areas.
- 2) ***Haplomachaelis* (teak skeletoniser):** This type of insects causes damage to the teak leaves. It eats up the entire pulpy portions except the mid-ribs and veins of the leaves. Generally, it occurs towards the end of rainy season particularly during the period from September to November.
- 3) ***Hyblaea pleura* (Teak defoliator):** These types of insects attack the teak leaves. Due to its attack the leaves become yellowish and restrict photosynthesis and ultimately fall down. Because of such affect, the growth of the tree hampered and cause loss of timber value.
- 4) **Scolytid beetles:** These insects attack the premature Sal seeds. Further defoliation of Sal leaf is also noticed which is caused by the larvae of a moth during summer season. The occurrence of such damage is of minor nature.

Diseases caused by Fungi and Parasites: Many Fungi and Parasites have been found to be adversely affecting the crop, which are as follows:

- 1) ***Loranthus currula*:** *Loranthus* is found in the comparatively moist forest of Karo, Siddhamath, valleys of Kalapat. It grows on the top of the Sal trees and slowly causes damage to the host tree. The extent of damage to the host tree has not yet been assessed exactly. Though its presence will not kill the host plant, but will make it unsound.
- 2) ***Polyporus shorea*:** This fungus normally attacks the root portion of the Sal trees. Gradually it destroys the root system and makes the tree incapable of drawing water and nutrients from the soil. After some time when a major portion of the root system is damaged causing a normal wind is enough to uproot the tree. Infection of the roots can easily be seen in such uprooted trees. This type of incidence is seen in Bandhanjhari, Ranibeda, Kalapat, Karo forests.



- 3) ***Fomes fastuosus***: This fungus is a heart rot of Sal particularly in the butt region. When injury is caused to the plant by forest fire and coppicing, the basal area of the plant is susceptible to be attacked by these fungi. At the initial stage of attack, the heartwood of the plants shows dark brown stains in smaller patches. It gradually develops into small pockets and decay of the butt end starts from this stage. When decay further continues the pockets get filled with white decayed fibres. On further disintegration in subsequent stages, empty brown pockets are created. The growth of the tree is badly hampered. This is noticed in Atei and Barabanka R.F.
- 4) ***Hymenochaeterubiginosa***: This fungus attacks Sal heartwood. Due to such attack, the tissues become white and fibrous surrounded by brown wood. Externally, sporophorus appears in tiers, one above the other, in close cluster from the stem of affected trees. Its occurrence is sporadic in nature and found in good sal forests of these divisions.
- 5) ***Ganoderma lucidum***: It is a very notorious fungus. These fungi normally attack Sisoo plantations. One of such incidences was experienced in Keonjhar Division earlier and confirmed by Forest mycologist, F.R.I. Dehradun who had recommended the removal of the diseased trees to arrest its spreading. These fungi normally attack and kill the bark of the tree and cause white spongy rot in the sapwood.
- 6) ***FomesCaryophylli***: It is heart rot of Sal and commonly seen in all the forest patches where Sal is the predominant species. Decay due to this fungus is commonly known as *Sambar Akshi*. The affected patch appears like a pox mark or eyes of a Sambar deer. In the very early stage of attack, heartwood is stained slightly dark to brown. Then ring rot is caused. Gradually the decayed wood turned to spongy and finally the fungus emerges outside through the sapwood and bark. The bark in the affected portion is gradually shed off. A considerable damage is caused to the valuable heartwood and the tree loses completely its economic timber value and only produces firewood. At times, epicormic branches appear but they do not always indicate heart rot.
- 7) ***Hypoxylonannulatum***: This is a root fungus and normally attacks *Eucalyptus tereticornis* in drought prone areas. Due to its attack, heart wood development is checked and decay may develop as white spongy rot.

4.8 Forest degradation and its drivers:

Forest degradation is mainly due to Mining activities in the region, illegal removal of Forest Produce i.e. timber & Fire wood. Due to Biotic pressure & interference like heavy grazing, Ground fire and above all pressure from increasing population which exert pressure on land resulting encroachment. The nature of degradation & its driver are summarized below.



Table No 4.7 Forest Degradation & its drivers.

Forest degradation:	Drivers of Degradation.	Remedial measures.
Loss of Tree cover	Mining activities Collection of Firewood and timber for local consumption.	To provide alternate fuel, timber substitute. To have strict enforcement of protection & legal action.
Loss of Ground Flora	Forest fire.	Regulating Picnic party entering in to Forest / Plantations. Maintaining Fire Lines on chess board pattern ie along the contour and across the contour by using Fire Blower. Strict vigilance on Forest Fire detection & combating. Taking help of nearby Fire stations / brigades/VSS .
	Heavy Grazing.	Regulating Grazing, Practicing Rotational grazing. Development of Grass lands.
Reduction in Forest area.	Mining activities / Diversion of Forest land for non forestry purpose	Conservative approach
	River Bank erosion.	Planting of Soil binding species on River banks. Resorting to construction of structures to prevent bank erosion in extreme cases of importance.
	Land grabbers / Encroachers.	Appropriate legal action, Motivate the encroachers to resort to Agro Forestry.
Bio diversity.	Loss of Bio diversity.	Introduce / protect less known species. Educate students / villagers regarding importance of Bio Diversity. Control use of pesticides in agriculture. Protect Riverine plant succession. Introduction of creation of adequate SMC



work over the Forest

4.9 Pollution Control And Protection Of Environment

Population explosion and its ancillary activities necessitate development of various industries. Minerals are essential for different use in our day-to-day life as well as to boost economy. Mining industry stands on the crossroad of human health and economic development of society leads to environmental impact. Presently environmental impact and management plan is a common discussion across the globe keeping in view of need of minerals and metals for various improvement of society. Hence, exploration and exploitation of minerals through mining industry needs efficient management to keep pace between environment and sustainability.

Mining operational plan including details of method of mining, environmental report and reclamation plan etc are few requisites from investor for efficient mining operation. It is necessary that lessee has to prepare a formal environmental impact assessment (EIA) and an environmental management plan (EMP) report for approval before commencement of mining activities. The reclamation plan for EIA/ EMP provides the basis for Government's decision to permit environmental acceptability.

In a view to make effective sustainable mining programme, it is always advisable to conduct a baseline survey of the existing environmental attributes; to evaluate different environmental impacts likely to cause due to proposed activities. This study has been conducted in order to predict the proposed impact and in. Irrespective of magnitude of operation formulating a scientific Environmental Management Plan it is quite necessary to maintain ecological balance of the mining operational area.

In Keonjhar Division a number of mining operations inside the forests blocks of Karo RF, Sidhamath RF, Thakurani RF, Baitarani A& B RF etc (mineral rich belt of Joda-barbil area under Champua Sub-Division) and Gandhamardan PRF of Suakati area in Sadar sub-Division has come up in recent past without much control. Thousands of trucks are plying daily in NH 20 carrying manganese and iron ores transporting it to Paradeep Port for export to foreign countries creating air and noise pollution. But uncontrolled mining has many adverse impacts on the environment and human health. Potential impacts include air and water pollution; mine waste disposal and land degradation. Hence, environmental impact assessment is highly essential for the present environmental scenario.

Scientific assessments can facilitate in formulating a suitable environmental management plan depicting all mitigation measures. The mining and allied activities in the mining area



have influence on environmental attributes. The mining activity influencing the following environmental attributes.

- Land use pattern
- Air Quality
- Noise Quality
- Water Quality
- Ecological Condition
- Socio-Economic Condition

The mining and allied activities in the proposed project area have influence on environmental attributes. These attributes include:

- Excavation
- Construction of approach and haulage road
- Drilling and Blasting
- Loading and Transportation
- Processing and Sizing of ores
- Disposal of overburden/waste etc.
- Stocking of low-grade ores.
- Site preparation

4.9.1 Impact on Land Use Pattern and Solid Waste:

In the mining area the following land use pattern is generally taken up by the lease. So, there will be change of original land to degraded one impacting the environment of a different kind during the lease period.

- Excavation
- Dumping of topsoil
- Infrastructures
- Railways
- Mineral separation plant
- Mineral storage and Sub grade stack
- Overburden dump
- Roads
- Tailing Pond
- Magazine
- Safety zone area (Green belt)

4.9.2 Impact on Air Quality:

The dust generated from mining activities is the primary source of air pollution. The emission sources include excavation and mining of ore bodies, drilling, blasting, screening,



sizing and transportation within the mining lease area. Dust generation is of short term and settles quickly within close ranges if proper care is taken in right time. Dust nuisance may not be a problem if deployment of water tankers with sprinklers are used and keep the haulage road surface wet resulting suppressed dust particles. In core zone of mines amount of auto exhaust emissions can be reduced by minimizing the vehicular activities for transportation of ores and waste by dumpers and excavators.

4.9.3 Impact on Water Quality:

Water is one of the most precious resources on the earth. The source of water in the mining area gets polluted because of regular mining activities in and around the mines. Water is obtained from dug wells as well as natural water course. Moreover, due to large scale mining operation by mechanized method, dust suppression is done by water spraying through water sprinkler which is limited to haulage road and dumping area only. Rainwater flowing through the exposed mine cuts carries some sediments of laterite. Surface runoff water from mines has high turbidity during monsoon. Quarry water is required to be treated before releasing to natural drainage system.

For facilitating mining and allied activities water required is not less than 100 m³ per day and it is met from ground water. Thus, the annual requirement of water by taking 300 working days shall be minimum 300000 m³ impacting a lot to the ground water. The exploitation of ground water for irrigation and other purposes is met from the buffer zone surrounding the mine lease area. The mining lease areas falls in hilly region where the ground water table is available at an average depth of 490 meters above MSL in rainy season.

4.9.4 Impact on Noise Level:

In the open cast mechanized mining, the various sources of noise in the area are attributable mainly due to drilling, blasting, operation of compressor, loading and haulage, operation of diesel pump and vehicular traffic. The noise level result due to such operations in the active working zones in the area should be in prescribed standard limit as given below in Table No. 4.8



Table No. 4.8: Health Hazards at Different Noise Levels:		
Sl.No.	dB(A)	Potential Effects
01	20	No sound perceived
02	25	Hearing threshold
03	35	Slight sleep interference
04	50	Moderate sleep interference
05	55	Annoyance (mild)
06	60	Normal speech level
07	70	Smooth muscles/glands react
08	75	Changed motor coordination
09	80	Moderate hearing damage
10	85	Very annoying
11	90	Affect mental and motor behaviour
12	95	Severe Hearing Damage
13	100	Awaken Everyone
14	115	Maximum Vocal Effort
15	125	Pain Threshold
16	130	Limit Amplified Speech
17	135	Very painful
18	140	Potential of hearing loss high

4.9.5 Impact on Transportation:

The transportation of ore by vehicles has a definite impact on noise pollution. Minimum number of vehicle (dumper) having 10 tonne & 18 tonne capacity may reduce noise pollution in comparison to ordinary trucks having less capacity. After full-fledged operation of mining, number of heavy vehicles may increase but has a huge contribution to noise pollution. Steps should be taken for ensuring PUC certified vehicle along with tarpaulin covered unit as a pollution control measure.

4.9.6 Impact on Ecological Conditions:

The mining operation shall have definite adverse impact on the existing ecological conditions during break-up of forest land resulting clearance of surface area, loss of forest cover, retardation of growth due to pollution if not mitigated immediately and threat to wild life and its habitat due to mining & allied operation (blasting & vibration etc.). In order

to mitigate the above adverse effect, mining project proponent has to take definite steps to minimize the impact. Such adverse effect in respect of air shall be mitigated by

- Construction of well compacted roads.
- Regular water spraying on roads and waste dumps by tankers.
- Provision of dust collectors for the drilling machines
- Controlled blasting
- Plantation of wide leaf trees, creepers, tall grasses around quarry sites, waste dumps, roads, colony and other surrounding barren zones.

4.9.7 Mitigative Measures:

Various mitigation measures are required to be taken up to control pollution in Keonjhar Division through the lessee.

4.9.7.1 Solid waste management for restoration of mined outland:

Solid waste is generated and dumped during the life of the mine. 80% of the solid waste generated during the life of the mine should be used for backfilling of mined out voids. Rest 20% of waste should be used for Road making and dumping etc. On completion of mining activities, the degraded land covered under mining shall be restored through back filling of solid waste removed and stacked. Each non-working bench is proposed to be stabilized by boulder pitching and plantation of shrubs to arrest free movement of loose materials. Waste dumps should be stabilized, graded and compacted. This shall be provided with peripheral check dams and garland drains to control the movement of loose materials. Dump yards are to be planted with local tree species.

4.9.7.2 Programme of Plantation:

Area has to be reclaimed more systematically and scientifically so that back filling area will rarely require any extensive soil preparation for plantation because the original soil cover is not much disturbed. However, in the reclaimed area, suitable nutrients may have to be added for proper growth of plants. Sides of the dumps yard (waste) has to be planted with grass, shrubs etc. to effect stabilization. Post plantation care includes replacement of casualties, weeding, soil working, manuring, watering, protection from grazing and fire, engaging watch and ward staff. The forests over the mine waste dump when fully developed give a positive impact on climate. The terrace formation gives better landscaping. The plantation along the boundary, along the roads, around quarry and dump area etc helps to develop much improved landscape. The scheme of reclamation and afforestation has to be implemented at the starting of 5th year of operation.

4.9.7.3 Measures for Controlling Air Pollution:



Mining areas has significant contribution towards air pollution in the area. This is mostly due to fugitive emission. For the mine, the pollution occurs from dust (PM) during vehicular traffic, blasting, loading / unloading etc. As the particles are heavy in nature, they settle easily in the immediate vicinity. The following control measures are adopted to reduce air pollution.

- Construction of well-compacted roads.
- Regular water spraying on roads and waste dumps by tankers.
- Provision of dust collectors for the drilling machines
- Controlled blasting
- Supply of dust masks for the drill operators
- Plantation of wide leaf trees, creepers, tall grasses around quarry sites, waste dumps, roads, colony and other surrounding barren zones.

4.9.7.4 Measures for Controlling Water Pollution:

As the mining area is having undulating topography, so there is huge a difference between highest and lowest contour. In the lower contour region, there should be a rain water harvesting pond connected by various connecting drains from all over the mining lease area. The entire roof top of human habitation should be connected to the rain water harvesting pond by small drains. Further, the rain water harvesting pond should also be fed by pumped out quarry water in the rainy season. The water in the rainy season will be only be pumped out to rain water harvesting tank for settling and then it should be mixed with coagulants and other chemicals for disinfection. But in the process, the cause and the source of polluted water in the area could be attributed mostly to the surface run-off during rainy season. The following measures are required to be taken for preventing possible water pollution.

- No overburden or loose sediments will be kept in the working benches particularly during monsoon months.
- Check dam should be provided around the overburden dumpsites to arrest flow of loose sediments before discharge into the drainage system of the region.
- Peripheral drain proposed to arrest the inflow of run-off water to the quarry area.

4.9.7.5 Control Measures for Noise Pollution:

The operation of mining activities involves use of machineries, use of vehicles and use of explosives as well. It contributes a lot to create noise pollution in the area. Therefore, the following measures are suggested to be taken up to minimize the adverse impact of noise.

- Proper and regular maintenance of vehicles, compressors and jack hammers.



- Provision of supplying earplugs for jackhammer drillers and compressor operators.
- Carrying of blasting only during daytime (not during cloudy weather and when strong wind is blowing towards residential areas). Blasting will be carried out with limited explosives at a time so that the noise generation can be well maintained with the prescribed limits.
- Provision of Green Belt (thick foliage) along the lease boundary and road.

4.9.7.6 Mitigation measures for Biological Environment:

Along with the measures provided above to restrict Air pollution, Water pollution, it is equally important to up keep the Biological environment. Therefore, the following measures are suggested.

- Ensuring management plan for wild life.
- Undertaking by the proponent to contribute proportionate amount towards implementation of the management plan.
- Creation of Green belt plantation at various possible places.

4.9.7.7 Site specific Conservation measures:

Above all, the following site-specific measures are suggested to control pollution.

- Conducting awareness programme through A/V presentation, lectures, circulation of pamphlets, etc.
- Erection of watch towers to prevent poaching, theft of fire wood and timber.
- Training of mine workers/staff in wild life conservation.
- Providing water ponds and salt licks.
- Provision of required fencing
- Avoiding blasting during night time to reduce noise levels
- Proper maintenance of HEMM to reduce noise levels

4.9.8 Mining /industries within the Division:

At present there are many mining in the division. The list of mining is as follows. (Table No 4.9)



Table No 4.9 List of Mines / Prospecting mines in Keonjhar Division at in Topo Sheet NO.73-G/5

Sl. No	Name of Lessee	Location	RF/DPF	Area in Ha	Mineral	Status
5	Pattanaik Minerals	Jaribahal	KF	106.5340	Iron Ore	ML
6	O.M.C	Khandbandh	KF	366.3110	Iron Ore	ML
7	S.C Padhee	Gurubeda	KF	49.7760	Iron Ore	ML
8	Narayani Sons	Surjaturpa	Baitarani RF	138.9000	Iron Ore	ML
9	K.M Corporation	Jururi	KF	27.1700	Iron & Mn	ML
12	R.P Sao	Guali	Sidhamatha RF	365.0260	Iron Ore	ML
14	K.J.S Ahluwalia	Nuagaon	KF	767.2840	Iron Ore	ML
16	K.C.Pradhan	Chamakpur	DPF	142.6970	Iron Ore	ML
17	Sirazudin & Co.	Belda	KF	335.8900	Iron Ore	ML
18	O.M.C	Balda, Palsa, Jajang	KF	866.5950	Iron Ore	ML
20	K.M.C	Jururi	KF	135.5700	Iron & Mn	ML
21	K.M.C	Jururi	KF	12.6900	Iron Ore	ML
22	Mineral Trading Syndicate	Bhalubasa	DPF	62.3220	Iron Ore	ML
23	T.B Lal	Jajang	KF	39.8970	Iron & Mn	ML
29	Pattanaik Minerals	Jaribahal	KF	17.1500	Iron Ore	ML
30	TISCO	Gurda & Jururi	Baitarani RF	643.6120	Iron Ore	ML
31	O.M.D.C	Bhadrasahi	Sidhamatha RF	999.7060	Iron Ore	ML
32	R.P Sao	Chormalda	Sidhamatha RF	141.1220	Iron Ore	ML
33	Rungta Sons (P) Ltd.	Katasahi	Sidhamatha RF	226.6240	Iron Ore	ML
34	O.M.C	Dubuna	Pedipokhari RF	1135.4190	Iron Ore	ML
39	M.L Rungta	Kalimati	KF	715.6390	Iron Ore	ML
40	K.M.C	Jururi	KF	54.7540	Iron Ore	ML
41	K.M.C	Jururi	KF	39.4560	Iron Ore	ML
42	S.N Pal	Katamati	KF	9.6990	Iron Ore	ML
48	O.M.C	S.G.B.K	KF	1011.4620	Iron & Mn	ML
49	Essel Mining & Ind. Ltd.	Jilling & Langalota	Baitarani RF	456.1000	Iron & Mn	ML
50	H.G Pandya & Others	Jajang	DPF	100.1370	Iron & Mn	ML



52	A. Roy & B. Roy	Jalahuri	Baitarani RF	182.1080	Iron & Mn	ML
53	Rungta Mines (P) Ltd.	Jajang	KF	669.3500	Iron & Mn	ML
54	S.C Padhi	Banspani	KF	41.6820	Iron & Mn	ML
56	TISCO	Khandbandh	Baitarani RF	1293.4330	Iron & Mn	ML
57	M.R Das	Kalaparbat	KF	5.1390	Iron & Mn	ML
60	K.C.Pradhan	Paredipada	Karo RF	12.1000	Iron & Mn	ML
61	R.B Das	Kundurupani	KF	10.2550	Iron & Mn	ML
63	S.N Mohanty	Unchbali	KF	9.6300	Iron & Mn	ML
64	Essel Mining & Ind. Ltd.	Unchbali	KF	107.3060	Iron & Mn	ML
65	K.J.S Ahluwalia	Kendudihi	Sidhamatha RF	40.3060	Iron & Mn	ML
69	Pragati Pvt. Ltd.	Khuntapani	Baitarani RF	18.6150	Iron & Mn	ML
76	O.M.C	Banspani	Baitarani RF	380.4000	Iron Ore	ML
77	O.M.C	Sarkadihi	Pedipokhari RF	564.3560	Iron Ore	ML
81	M.H Rehman	Topadihi	KF	26.4760	Iron Ore	ML
81A	M/s U.M.S	Laidapada	KF	28.3280	Mn. Ore	ML
83	D.C Jain	Dolpahar BI-A	Baitarani RF	89.9610	Iron Ore	ML
84	D.C Jain	Dolpahar BI-B	Baitarani RF	0.6970	Iron Ore	ML
85	D.C Jain	Dolpahar BI-II	Baitarani RF	7.6970	Iron Ore	ML
86	D.C Jain	Dolpahar BI-III	Baitarani RF	1.0120	Iron Ore	ML
87	D.C Jain	Dolpahar BI-C	Baitarani RF	2.0020	Iron Ore	ML
89	O.M.C	Tiringpahar	Baitarani RF	79.3000	Iron Ore	ML
91	Rungta Sons (P) Ltd.	Bandhubeda	KF	26.2260	Iron Ore	ML
93	O.M.C	Parulipada	Karo RF	170.1700	Iron & Mn	ML
96	N. Pattanaik	Jajang Khandbandh	KF	66.3680	Iron Ore	ML
100	FACOR	Katasahi	KF	13.6740	Iron Ore	ML
101	Smt. Indrani Pattanaik	Unchbali	KF	106.1127	Iron Ore	ML
103	S.N. Mohanty	Unchbali	KF	10.1170	Iron & Mn	PL
104	O.M.C	Chormalda	Sidhamatha RF	416.8350	Mn. Ore	ML
107	O.S.I.L	Gorubeda	Baitarani RF	148.3570	Iron Ore	ML
109	T.P.Mohanty	Naibarga	KF	69.9780	Iron & Mn	PL
110	T.P.Mohanty	Naibarga	KF	29.2260	Iron & Mn	PL
111	T.B.Lal	Brahmanijhari	KF	429.9170	Iron & Mn	PL
112	S.N Paul	Katasahi	KF	31.3460	Mn. Ore	PL
112A	R.B Thakur	Katasahi	KF	96.5680	Iron & Mn	ML

TOPO SHEET NO.73-F/12

113	Akhil Ch. Mohanta	Ramachandrapur		38.3000	Chinaclay	PL

TOPO SHEET NO.73-G/9



71	B.K Mohanty	Parsala		28.6700	Quartzite	ML
73	G.L Chauda	Chanthia		3.0700	Quartzite	ML
105	Black Stone Mining	Dhabakuchuda		205.8700	Pyrophyllite	PL

TOPO SHEET NO.73-G/13

72	S.N Mohanty	Raruangoda		32.9210	Quartzite	ML

M.L. & P.L AREA JODA CIRCLE WITH THEIR STATUS

TOPO SHEET NO.73-F/8

Sl. No	Name of Lessee	Location	RF/DPF	Area in Ha	Mineral	Status
1	D.R pattanaik	Murgabeda	Thakurani RF	15.3780	Iron Ore	ML
2	Dr. S. Pradhan	baitarani	Baitarani RF	52.8920	Iron Ore	ML
3	TISCO	Joda East	Baitarani RF	670.8070	Iron Ore	ML
4	SAIL	Bolani	Karo RF	1320.8950	Iron Ore	ML
10	O.M.D.C	Bhadrāsahi	Sidhamatha RF	103.6000	Iron Ore	ML
11	B.P.M.E.L	Thakurani	Thakurani RF	1600.8730	Iron Ore	ML
13	K.N Ram (MESCO)	Roida-I	Sidhamatha RF	104.6800	Iron Ore	ML
15	Kaypee Enterprises	Thakurani	Thakurani RF	228.0400	Iron Ore	ML
19	A. Lodha	balagonda	Karo RF	326.5080	Iron Ore	ML
24	K.C Pradhan	Lakraghat	Sidhamatha RF	10.7200	Iron Ore	ML
25	Dr. S. Pradhan	Balita	Thakurani RF	34.7500	Iron Ore	ML
26	Bhanj Mineral (P) Ltd.	Deojhar	Thakurani RF	399.0200	Iron Ore	ML
27	B.D Pattanaik	Kalaparnbat	Thakurani RF	25.6330	Iron Ore	ML
28	TISCO	Manmora	Baitarani RF	16.3490	Mn. Ore	ML
35	O.M.C	Dalki	Thakurani RF	265.2600	Mn. Ore	ML
36	B.P.M.E.L	Dalki	Thakurani RF	267.7600	Mn. Ore	ML
37	TISCO	Bamebari Baneikala	Thakurani RF	1150.5500	Mn. Ore	ML
38	O.M.C	Roida block-D	Sidhamatha RF	129.4990	Mn. Ore	ML
43	TISCO	Katamati	Murgabeda DPF	403.3240	Mn. Ore	ML
44	O.M.D.C	Belkundi	Uliburu RF	1276.8650	Iron & Mn	ML
45	TISCO	Joda West	Baitarani RF	1437.7190	Iron & Mn	ML
46	O.M.C	Serenda Bhadrāsahi	Thakurani RF	1734.5170	Mn. Ore	ML
47	OMC/IDC	Roida block-C	Sidhamatha RF	192.8100	Iron & Mn	ML
51	Bhanj Mineral (P) Ltd.	Inganijharn	Baitarani RF	242.3130	Iron & Mn	ML
55	B.P.M.E.L	Roida	Sidhamatha RF	254.9520	Iron & Mn	ML
58	Kusaleswar Minerals	Kalaparnbat	Thakurani RF	9.8140	Mn. Ore	ML
59	K.C Pradhan	Horomotto	Karo RF	61.0150	Iron & Mn	ML
62	S.D Sharma	Raika	Thakurani RF	26.2430	Iron & Mn	ML
66	D.R Pattnaik	Thakurani	Thakurani RF	121.3850	Iron & Mn	ML
67	Dr. S. Pradhan	Inganijharn	Baitarani RF	18.7000	Iron & Mn	ML
68	SAIL	Bolani	Karo RF	1787.0930	Iron & Mn	ML



70	Essel Mining & Ind. Ltd.	Kasia	Sidhamatha RF	194.1960	Iron, Limestone & Dolomite	ML
74	B.K.Mohanty	Uliburu	Uliburu RF	62.7260	Iron. Mn & Quartzite	ML
75	B.K.Mohanty	Uliburu	Uliburu RF	56.9400	Iron, Mn & Limestone	ML
78	T.B.Lal	Kasia Barapada		77.4970	Iron Ore	ML
79	S.N Mohanty	Khuntapani	Baitarani RF	15.3780	Iron Ore	ML
80	K.N Ram & Co.	Roida -II	Sidhamatha RF	74.8660	Iron Ore	ML
82	OMDC	Bagiaburu	Uliburu RF	21.5200	Iron Ore	ML
88	NMDC	Kiriburu	Kiriburu RF	1051.8810	Iron Ore	ML
88	Jagdish Mishra	Uliburu	KF	30.5130	Iron Ore	ML
90	Dr. S. Pradhan	baitarani	Baitarani RF	1.5050	Iron Ore	ML
92	O.M.C	Roida Sidhamatha	Sidhamatha RF	78.7110	Iron Ore	ML
94	M.R.Das	Uliburu	Uliburu RF	3.0760	Mn. Ore	ML
95	B.C Deb	Dadwan	Baitarani RF	114.9340	Iron & Mn	ML
97	Tarini Minerals	Deojhar	Thakurani RF	34.3650	Iron Ore	ML
98	M.R Das	Deojhar	Thakurani RF	11.5370	Iron Ore	ML
99	S.L Sarda & M.L Sarda	Thakurani	Thakurani RF	947.0460	Iron Ore	ML
102	K.C Pradhan	Bolani	Karo RF	17.1000	Iron Ore	ML
106	Kusaleswar Minerals	Raika	Thakurani RF	6.2280	Iron & Mn	ML
108	Dr. S. Pradhan	Kalaparbat	Thakurani RF	177.4530	Iron & Mn	ML
5	Pattanaik Minerals	Jaribahal	KF	106.5340	Iron Ore	ML
6	O.M.C	Khandbandh	KF	366.3110	Iron Ore	ML
7	S.C Padhee	Gurubeda	KF	49.7760	Iron Ore	ML
8	Narayani Sons	Surjaturpa	Baitarani RF	138.9000	Iron Ore	ML
9	K.M Corporation	Jururi	KF	27.1700	Iron & Mn	ML
12	R.P Sao	Guali	Sidhamatha RF	365.0260	Iron Ore	ML
14	K.J.S Ahluwalia	Nuagaon	KF	767.2840	Iron Ore	ML
16	K.C.Pradhan	Chamakpur	DPF	142.6970	Iron Ore	ML
17	Sirazudin & Co.	Belda	KF	335.8900	Iron Ore	ML
18	O.M.C	Balda, Palsa, Jajang	KF	866.5950	Iron Ore	ML
20	K.M.C	Jururi	KF	135.5700	Iron & Mn	ML
21	K.M.C	Jururi	KF	12.6900	Iron Ore	ML
22	Mineral Trading Syndicate	Bhalubasa	DPF	62.3220	Iron Ore	ML
23	T.B Lal	Jajang	KF	39.8970	Iron & Mn	ML
29	Pattanaik Minerals	Jaribahal	KF	17.1500	Iron Ore	ML
30	TISCO	Gurda & Jururi	Baitarani RF	643.6120	Iron Ore	ML
31	O.M.D.C	Bhadrasihi	Sidhamatha RF	999.7060	Iron Ore	ML



32	R.P Sao	Chormalda	Sidhamatha RF	141.1220	Iron Ore	ML
33	Rungta Sons (P) Ltd.	Katasahi	Sidhamatha RF	226.6240	Iron Ore	ML
34	O.M.C	Dubuna	Pedipokhari RF	1135.4190	Iron Ore	ML
39	M.L Rungta	Kalimati	KF	715.6390	Iron Ore	ML
40	K.M.C	Jururi	KF	54.7540	Iron Ore	ML
41	K.M.C	Jururi	KF	39.4560	Iron Ore	ML
42	S.N Pal	Katamati	KF	9.6990	Iron Ore	ML
48	O.M.C	S.G.B.K	KF	1011.4620	Iron & Mn	ML
49	Essel Mining & Ind. Ltd.	Jilling & Langalota	Baitarani RF	456.1000	Iron & Mn	ML
50	H.G Pandya & Others	Jajang	DPF	100.1370	Iron & Mn	ML
52	A. Roy & B. Roy	Jalahuri	Baitarani RF	182.1080	Iron & Mn	ML
53	Rungta Mines (P) Ltd.	Jajang	KF	669.3500	Iron & Mn	ML
54	S.C Padhi	Banspani	KF	41.6820	Iron & Mn	ML
56	TISCO	Khandbandh	Baitarani RF	1293.4330	Iron & Mn	ML
57	M.R Das	Kalaparbat	KF	5.1390	Iron & Mn	ML
60	K.C.Pradhan	Paredipada	Karo RF	12.1000	Iron & Mn	ML
61	R.B Das	Kundurupani	KF	10.2550	Iron & Mn	ML
63	S.N Mohanty	Unchbali	KF	9.6300	Iron & Mn	ML
64	Essel Mining & Ind. Ltd.	Unchbali	KF	107.3060	Iron & Mn	ML
65	K.J.S Ahluwalia	Kendudihi	Sidhamatha RF	40.3060	Iron & Mn	ML
69	Pragati Pvt. Ltd.	Khuntapani	Baitarani RF	18.6150	Iron & Mn	ML
76	O.M.C	Banspani	Baitarani RF	380.4000	Iron Ore	ML
77	O.M.C	Sarkadihi	Pedipokhari RF	564.3560	Iron Ore	ML
81	M.H Rehman	Topadihi	KF	26.4760	Iron Ore	ML
81A	M/s U.M.S	Laidapada	KF	28.3280	Mn. Ore	ML
83	D.C Jain	Dolpahar BI-A	Baitarani RF	89.9610	Iron Ore	ML
84	D.C Jain	Dolpahar BI-B	Baitarani RF	0.6970	Iron Ore	ML
85	D.C Jain	Dolpahar BI-II	Baitarani RF	7.6970	Iron Ore	ML
86	D.C Jain	Dolpahar BI-III	Baitarani RF	1.0120	Iron Ore	ML
87	D.C Jain	Dolpahar BI-C	Baitarani RF	2.0020	Iron Ore	ML
89	O.M.C	Tiringpahar	Baitarani RF	79.3000	Iron Ore	ML
91	Rungta Sons (P) Ltd.	Bandhubeda	KF	26.2260	Iron Ore	ML
93	O.M.C	Parulipada	Karo RF	170.1700	Iron & Mn	ML
96	N. Pattanaik	Jajang Khandbandh	KF	66.3680	Iron Ore	ML
100	FACOR	Katasahi	KF	13.6740	Iron Ore	ML
101	Smt. Indrani Pattanaik	Unchbali	KF	106.1127	Iron Ore	ML
103	S.N. Mohanty	Unchbali	KF	10.1170	Iron & Mn	PL
104	O.M.C	Chormalda	Sidhamatha RF	416.8350	Mn. Ore	ML
107	O.S.I.L	Gorubeda	Baitarani RF	148.3570	Iron Ore	ML
109	T.P.Mohanty	Naibarga	KF	69.9780	Iron & Mn	PL
110	T.P.Mohanty	Naibarga	KF	29.2260	Iron & Mn	PL
111	T.B.Lal	Brahmanijhari	KF	429.9170	Iron & Mn	PL



112	S.N Paul	Katasahi	KF	31.3460	Mn. Ore	PL
112A	R.B Thakur	Katasahi	KF	96.5680	Iron & Mn	ML
113	Akhil Ch. Mohanta	Ramachandrapur		38.3000	Chinaclay	PL
71	B.K Mohanty	Parsala		28.6700	Quartzite	ML
73	G.L Chauda	Chanthia		3.0700	Quartzite	ML
105	Black Stone Mining	Dhabakuchuda		205.8700	Pyrophillite	PL
72	S.N Mohanty	Raruangoda		32.9210	Quartzite	ML

(NB: Serial No provided is as indicated in the Location map (Topo map) attached as Plate No –I,II)

4.9.9 Regulating Activities:

Considering the importance and fragile nature of the eco system, Wildlife many regulations to protect the environment have been in force. These regulations / Notifications are

a) Ban on use of polythene of specified thickness.

The Government of Odisha, Forest & Environment Department has issued notification banning use of polythene , thermo cool etc within the municipal limits or as the case may be within the Municipal Corporation Limits of Bhubaneswar, Cuttack, Berhampur, Rourkela, Sambalpur and Puri, namely:-

- (i) Polythene carry bags of any shape, thickness and size (excluding compostable);
- (ii) Bottled drinking water Polyethylene Terephthalate (PET/PETE) bottles of less than 500 ml. capacity;
- (iii) Single use disposable cutleries made up of thermocol (polystyrene) or plastic such as dish, spoon, cup, plate, glass, fork, bowl, straw, pouch to store liquid and container etc. of any size and shape &
- (iv) Thermocol decorative materials (flowers and the like)

(Note: Compostable plastics shall conform to the Indian Standard: IS 17088:2008. The manufacturers or seller of compostable plastic carry bags shall obtain a certificate from the Central Pollution Control Board before marketing or selling.). The ban order is at Annexure-VII.

b) EIA Notification 2006

The EIA Notification 2006 provides guidelines for obtaining Environment Clearance from MoEF&CC, Government of India. This is being followed in case of mining and allied projects being implemented in the Division.



CHAPTER 5

CONSERVATION AND MAINTENANCE OF SOIL AND WATER RESOURCES

5.1 Area Treated Under Soil & Water Conservation Measures

The vegetation is becoming more and more of dryer tract due to change in climatic conditions, irregular rainfall and reduced number of rainy days. Due to various mining activities, more underground water is being drawn and discharged to natural courses. In order to improve soil condition and moisture regime of forest floor, soil and moisture conservation measures are being taken up in an integrated manner. The Year wise SMC details as below (Table No 5.1)

Table No 5.1 Abstract of SMC undertaken in the Division.

Name of Division	Year & Area treated (in ha)						
	Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Keonjhar	Area	2290.97	5514.95	1100.0	11390.30	0	0
	Year	2016-17					
	Area	0					

5.1.1 Water body created:

During Last plan period 113 number of Water body has been created within the Forest area to provide water to animals and also help in percolation of water. The water bodies created has been listed below (Table No, 5.2)

Table No 5.2 List of Water body Created during last Plan Period. Keonjhar Division

Name of the Range	Name of site	Year	GPS Coordinate	No of Water Bodies created
Keonjhar	Maidankel RF at tentulinanda	2010-11	21° 39' 10.69" N ,85° 39' 54.97" E	1
Patna	Atei RF	2010-11	21° 31' 6.3" N, 85° 57' 17.9" E	1
Barbil	Karo RF	2011-12	22° 03' 51.8" N, 85° 17' 13.0" E	1
Ghatagaon	Atei RF	2011-12	21° 26' 57.1" N, 85° 54' 41.1" E	1



Telkoi	Dobalapal - Telkoi - palalahada EC	2012-13	21° 21' 58.5" N, 85° 22' 24.3" E	1
Telkoi	Golagadia - Telkoi - palalahada EC	2012-13	21° 18' 20.93" N, 85° 22' 11.98" E	1
Barbil	Haramatha - Karo - Karampada EC	2012-13	22° 03' 8.6" N, 85° 16' 41.6" E	1
Ghatagaon	Barabanka RF	2012-13	21° 26' 32.7" N, 85° 45' 48.1" E	1
Keonjhar	Nayagarh RF	2012-13	21° 47' 18.2" N, 85° 29' 50.6" E	1
Telkoi	Patakholi RF	2012-13	21° 11' 17.5" N, 85° 31' 38.7" E	1
Telkoi	Ahigola RF	2012-13	21° 18' 37.5" N, 85° 26' 39.8" E	1
Patna	Atei RF	2012-13	21° 32' 41.0" N, 85° 58' 14.3" E	1
Ghatagaon	Atei RF	2012-13	21° 25' 58.6" N, 85° 56' 24.8" E	1
Ghatagaon	Atei RF near Badahudi	2012-13	21° 26' 24.5" N, 85° 58' 32.2" E	1
Champua	Baitarani RF	2012-13	22° 02' 57.72" N, 85° 32' 48.67" E	1
Patna	Atei RF near Dumuria	2012-13	21° 32' 42.2" N, 85° 59' 28.3" E	1
Keonjhar	Belda RF, Jadikhunta	2012-13	21° 42' 21.7" N, 85° 39' 35.5" E	1
Keonjhar	Maidankel RF, Jadikhunta	2012-13	21° 39' 14.55" N, 85° 41' 05.11" E	1
Keonjhar	Nayagarh RF, Kasirapatana	2012-13	21° 45' 28.1" N, 85° 31' 04.4" E	1
Patna	Banamahuladia	2012-13	21° 32' 9.4" N, 85° 59' 30.8" E	1
Patna	Mushakhari	2012-13	21° 33' 53.5" N, 85° 53' 25.2" E	1
Telkoi	Balli	2012-13	NA	1
Telkoi	Sinduria	2012-13	NA	1
Telkoi	Gundurijoda	2012-13	NA	1
Telkoi	Purujoda	2012-13	NA	1
Telkoi	Sirigida	2012-13	21° 14' 08.73" N, 85° 22' 37.22" E	1
Champua	kalikaprasad RF	2012-13	22° 00' 28.89" N, 85° 37' 06.10" E	1
Champua	laxmiposi RF	2012-13	21° 51' 34.49" N, 85° 35' 56.35" E	1
Champua	Balibandha RF	2012-13	21° 55' 18.40" N, 85° 34' 43.25" E	1
Champua	Ukhunda RF	2012-13	21° 49' 43.9" N, 85° 40' 16.3" E	1
Telkoi	Sinkulabahal - Telkoi- Palalahada EC	2013-14	21° 26' 08.1" N, 85° 20' 53.1" E	1
Barbil	Haramatha - Karo- Karampada EC	2013-14	22° 02' 57.0" N, 85° 16' 35.1" E	1
Ghatagaon	Atei RF near Arjunbilla	2013-14	21° 25' 38.6" N, 85° 53' 52.0" E	1
Keonjhar	Basantapur RF near Jamunalia	2013-14	21° 35' 30.59" N, 85° 40' 36.65" E	1
Keonjhar	Raghunathpur RF near Dubulapal	2013-14	21° 38' 03.39" N, 85° 42' 49.67" E	1
Keonjhar	Naranpur RF near Alanapada	2013-14	21° 35' 40.31" N, 85° 40' 14.28" E	1
Keonjhar	Nalapanga RF	2013-14	21° 25' 57.12" N, 85° 39' 11.32" E	1



Keonjhar	Nayagarh RF near Hatikucha	2013-14	21° 47' 18.3" N, 85° 29' 50.6" E	1
Patna	Jadipada RF near Nichhintpur	2013-14	21° 45' 18.1" N, 85° 40' 37.1" E	1
Telkoi	Chamunda RF	2013-14	21° 22' 58.1" N, 85° 21' 13.9" E	1
Telkoi	Kalapat RF near Sankhalei	2013-14	21° 17' 11.9" N, 85° 29' 58.6" E	1
Ghatagaon	Atei RF	2013-14	21° 25' 52.1" N, 85° 54' 33.3" E	1
Ghatagaon	Atei RF	2013-14	21° 27' 59.2" N, 85° 56' 50.2" E	1
Keonjhar	Naranpur RF	2013-14	21° 36' 34.03" N, 85° 40' 10.06" E	1
Patna	Atei RF near Thenganali	2013-14	21° 30' 49.7" N, 85° 59' 46.9" E	1
Patna	Padmapur RF near Kantiapada	2013-14	21° 41' 16.8" N, 85° 45' 5.9" E	1
Champua	Jyotipur RF	2013-14	21° 53' 24.7" N, 85° 46' 35.6" E	1
Champua	Bardhana RF	2013-14	21° 53' 48.8" N, 85° 45' 40.6" E	1
Telkoi	Samakoi RF near Madhyapur	2013-14	21° 20' 39" N, 85° 22' 8.7" E	1
Telkoi	Samakoi RF near Khuntapada	2013-14	21° 20' 28.4" N, 85° 23' 43.3" E	1
Barbil	Thakurani RF near Murga	2013-14	22° 7' 50" N, 85° 26' 44" E	1
Ghatagaon	Barabanka RF	2013-14	21° 23' 36.8" N, 85° 44' 30.6" E	1
Ghatagaon	Barabanka RF	2013-14	21° 23' 35.8" N, 85° 44' 31.4" E	1
Barbil	Thakurani RF near Tankura [2 x 1 Nos]	2013-14	22° 07' 50.9" N, 85° 26' 44.1" E	1
Telkoi	Ghodabedasahi - Telkoi-Palalahada EC	2014-15	21° 17' 44.9" N, 85° 20' 28.9" E	1
Telkoi	KhajuniaSahi - Telkoi-Palalahada EC	2014-15	21° 18' 09.4" N, 85° 19' 25.2" E	1
Barbil	Sidhamatha RF near Jhadgaon - Karo-Karampada EC	2014-15	22° 02' 29.7" N, 85° 22' 39.5" E	1
Barbil	Karo RF near Kolhapanduli - Karo-Karampada EC	2014-15	22° 02' 7.1" N, 85° 15' 58.7" E	1
Keonjhar	Raghunathpur RF near Dhenkikote Village (2 x 1)	2014-15	21° 37' 14.05" N, 85° 42' 19.63" E	1
Keonjhar	Nayagarh RF near Kusumita Village	2014-15	21° 47' 18.3" N, 85° 29' 19.8" E	1
Keonjhar	Belda RF	2014-15	21° 42' 4.6" N, 85° 40' 26.5" E	1
Keonjhar	Maidankel RF	2014-15	21° 38' 44.12" N, 85° 40' 50.95" E	1
BJP	Gadgadei RF	2014-15	21° 31' 58.6" N, 85° 31' 01.7" E	1
BJP	Anjar RF	2014-15	21° 37' 15.9" N, 85° 31' 52.7" E	1
BJP	Anjar RF	2014-15	21° 37' 15.9" N, 85° 31' 52.7" E	1



BJP	Kalanda DPF	2014-15	21° 39' 25.4" N, 85° 19' 56.4" E	1
Telkoi	Koilisuta	2014-15	21° 17' 25.56" N, 85° 21' 41.58" E	1
Telkoi	Tangiri	2014-15	21° 11' 55.14" N, 85° 27' 18.9" E	1
Telkoi	Kalapokhari	2014-15	21° 24' 59.6" N, 85° 21' 46.8" E	1
Telkoi	Godhihudi	2014-15	21° 15' 38.64" N, 85° 20' 54.36" E	1
Telkoi	Raisuan	2014-15	21° 09' 56.28" N, 85° 31' 10.14" E	1
Telkoi	Ghuntuposi	2014-15	21° 21' 24.3" N, 85° 21' 59.3" E	1
Telkoi	Ahigola	2014-15	21° 18' 09.8" N, 85° 26' 47.7" E	1
Telkoi	Laxminarayanpur	2014-15	21° 12' 27.7" N, 85° 37' 41.1" E	1
Ghatagaon	Atei RF near Murgapahadi	2014-15	NA	1
Ghatagaon	Barabanka RF near Asanbahali	2014-15	21° 27' 06.4" N, 85° 45' 47.4" E	1
Ghatagaon	Barabanka RF near Adakata	2014-15	21° 24' 22.6" N, 85° 44' 58.0" E	1
Ghatagaon	Atei RF near Baiganpal	2014-15	21° 23' 20.6" N, 85° 54' 40.2" E	1
Ghatagaon	Barabanka RF near Jamoposi	2014-15	21° 30' 0.5" N, 85° 45' 37.3" E	1
Ghatagaon	Barabanka RF near Sitabinja	2014-15	NA	1
Ghatagaon	Atei RF near Dukhabahali	2014-15	NA	1
Patna	Belda RF Near Bhuluda Village	2014-15	21° 42' 51.9" N, 85° 40' 54.8" E	1
Patna	Patna RF Near Dhanurjayapur Village	2014-15	21° 37' 6.2" N, 85° 49' 55.3" E	1
Patna	Chadheibhole RF near Chadheibhol Village	2014-15	21° 42' 12.3" N, 85° 59' 20.2" E	1
Patna	Padmapur RF near Manpur Village	2014-15	21° 41' 56.0" N, 85° 46' 20.3" E	1
Champua	Ukhunda RF	2014-15	21° 49' 59.75" N, 85° 40' 52.06" E	1
BJP	Gandijoda KF	2014-15	21° 33' 35.6" N, 85° 30' 28.8" E	1
Telkoi	Bena inside Kalapat RF	2014-15	21° 19' 57.14" N, 85° 26' 53.18" E	1
Patna	Baunsuli RF near Godipokhari	2014-15	21° 42' 47.7" N, 85° 43' 47.4" E	1
Patna	Poipani RF near Gopapur	2014-15	21° 36' 21.7" N, 85° 48' 0.1" E	1
Barbil	Thakurani RF	2014-15	22° 06' 30.7" N, 85° 27' 1.6" E	1
Telkoi	Telkoi- Palalahada Elephant Corridor at Deuladiha	2015-16	21° 20' 07.11" N, 85° 22' 07.29" E	1
Barbil	Karo- Karampada EC at Karo RF	2015-16	22° 02' 27.5" N, 85° 17' 33.6" E	1



Keonjhar	Raghunathpur RF of Keonjhar Range	2015-16	21° 38' 03.39" N, 85° 42' 49.67" E	1
Barbil	Karo RF	2015-16	21° 59' 49" N, 85° 15' 12" E	1
Telkoi	Tungurubahal PRF	2015-16	21° 28' 47.21" N, 85° 21' 47.63" E	1
Patna	Bhalupahadi [Padampur RF)	2015-16	21° 43' 5.2" N, 85° 47' 52.8" E	1
Ghatgaon	Barabanka RF near Patabari	2015-16	NA	1
Barbil	Thakurani RF	2015-16	22° 04' 22.6" N, 85° 25' 38.3" E	1
Barbil	Kandara 'C' RF [2 x 1 Nos)	2015-16	22° 03' 56.6" N, 85° 29' 54.1" E	1
Barbil	Uliburu RF	2015-16	22° 08' 53.5" N, 85° 22' 30.1" E	1
Champua	Kalikaprasad RF [3 x 1 Nos) near Rajia of Champua Range	2015-16	22° 00' 16.58" N, 85° 37' 18.44" E	1
Champua	Bardhana RF near Parudiposi of Champua Range	2015-16	21° 53' 50.7" N, 85° 45' 41.0" E	1
Telkoi	Bandhanjhari RF near Akul	2016-17	21° 16' 46.16" N, 85° 24' 45.72" E	1
Ghatgaon	Atei RF, compt No- 27	2016-17	21° 25' 47.4" N, 85° 56' 28.2" E	1
Barbil	Anseikala KF	2016-17	22° 03' 40.4" N, 85° 32' 17.9" E	1
Barbil	Nayakrushnapur	2016-17	22° 04' 41.6" N, 85° 33' 54.9" E	1
Barbil	Uliburu RF	2016-17	22° 08' 26.3" N, 85° 22' 10.1" E	1
Champua	Mirigisinga KF	2016-17	22° 03' 31.70" N, 85° 54' 12.38" E	1
Champua	Kalikaprasad RF [Gadhasahi)	2016-17	22° 00' 23.85" N, 85° 36' 31.49" E	1
BJP	Khajurimundi RF	2016-17	21° 36' 04.8" N, 85° 26' 51.9" E	1
Barbil	Uliburu RF	2016-17	22° 09' 8.3" N, 85° 22' 31.9" E	1
Barbil	Uliburu RF	2016-17	NA	1
			Total	113

The range wise abstract is furnished below.

Table no 5.2(a) Range wise abstract		
Sl No	Range	No of waterbody created within plan period
1	Barbil	18
2	BJP	6
3	Champua	12
4	Ghatgaon	18
5	Keonjhar	16
6	Patna	15
7	Telkoi	28



	Total	113

5.2 Duration of Water Flow In The Selected Seasonal Streams

There are number of nalla /stream in the forest and outside the forest. Most of nall are of seasonal in nature. Water flows in it mostly up to February /March and thereafter, the nalla dries up.

5.3 Wetland In Forest Areas:

Wetlands are one of the crucial natural resources. Wetlands are areas of land that are either temporarily or permanently covered by water. This means that a wetland is neither truly aquatic nor terrestrial; it is possible that wetlands can be both at the same time depending on seasonal variability. Thus, wetlands exhibit enormous diversity according to their genesis, geographical location, water regime and chemistry, dominant plants and soil or sediment characteristics. Because of their transitional nature, the boundaries of wetlands are often difficult to define. Wetlands do, however, share a few attributes common to all forms. Of these, hydrological structure (the dynamics of water supply, throughput, storage and loss) is most fundamental to the nature of a wetland system. It is the presence of water for a significant period of time which is principally responsible for the development of a wetland. One of the first widely used classifications systems, devised by Cowardin et al., (1979), was associated to its hydrological, ecological and geological aspects, such as: marine (coastal wetlands including rock shores and coral reefs, estuarine (including deltas, tidal marshes, and mangrove swamps), lacustrine (lakes), riverine (along rivers and streams), palustarine ('marshy'- marshes, swamps and bogs). Given these characteristics, wetlands support a large variety of plant and animal species adapted to fluctuating water levels, making the wetlands of critical ecological significance. Utility wise, wetlands directly and indirectly support millions of people in providing services such as food, fiber and raw materials, storm and flood control, clean water supply, scenic beauty and educational and recreational benefits. The Millennium Ecosystem Assessment estimates conservatively that wetlands cover seven percent of the earth's surface and deliver 45% of the world's natural productivity and ecosystem services of which the benefits are estimated at \$20 trillion a year (Source : www.MAweb.org). The Millennium Assessment (MA) uses the following typology to categories ecosystem services:

Provisioning services	The resources or products provided by ecosystems, such as food, raw materials (wood), genetic resources, medicinal resources, ornamental resources (skin, shells, flowers)
Regulating services	Ecosystems maintain the essential ecological processes and life support systems, like gas and climate regulation, water supply and regulation, waste treatment, pollination etc.
Cultural and	Ecosystems are a source of inspiration to human culture and



Amenity services education through recreation, cultural, artistic, spiritual and historic information, science and education Supporting services
Supporting services Ecosystems provide habitat for flora and fauna in order to maintain biological and genetic diversity

Despite these benefits, wetlands are the first target of human interference and are among the most threatened of all natural resources. Around 50% of the earth's wetlands are estimated to have already disappeared worldwide over the last hundred years through conversion to industrial, agricultural and residential developments. Even in current scenario, when the ecosystem services provided by wetlands are better understood, degradation and conversion of wetlands continues. This is largely due to the fact that the 'full value' of ecosystem functions is often ignored in policy-making, plans and corporate evaluations of development projects.

This division has no remarkable natural wetland. However, it is blessed with so many manmade wetlands which are the most suitable habitats for the different life forms that are most evitable part of the ecosystem. Several water bodies have been created in different forests as measures of conservation of water to support the eco system and formation of wetlands. The details of water bodies so created under different schemes have already been given above. Other than these there are some more catchment areas as mentioned in Table No. 5.3.

Table No.5.3: List of water bodies available: Keonjhar Division				
Range	Sl No	Name of the site	GPS Location	
			Latitude	Longitude
Keonjhar	1	Nalapanga Dam	21° 25' 42.2" N	85° 38' 17.6" E
	2	Badasasana Pond	21° 37' 51.98" N	85° 37' 40.64" E
	3	Badasasana Pond	21° 37' 51.98" N	85° 37' 40.64" E
	4	Tikarapada Dam	21° 41' 12" N	85° 33' 43" E
	5	ChandiniPokhari	21° 37' 13.33" N	85° 34' 29.18" E
	6	Sapua Dam	21° 20' 15.23" N	85° 37' 29.00" E
	7	Kodipasa Dam	21° 34' 41.3" N	85° 37' 44.5" E
Ghatagaon	8	Kureijodi Dam	21° 22' 29.2" N	85° 43' 0.2" E
	9	Kalimati Dam	21° 28' 6" N	85° 53' 37" E
	10	Kandasara Dam	21° 23' 19.3" N	85° 44' 45.3" E
BJP	11	Badaghagera	21° 36' 29.9" N	85° 33' 18.4" E
Telkoi	12	Khajuria Dam	21° 16' 49.4" N	85° 25' 43.3" E
	13	Dandadhar Dam	21° 11' 23.5" N	85° 36' 17.7" E
	14	Khuntapada Dam	21° 19' 57.4" N	85° 29' 23.1" E
	15	Kakudiamba Dam	21° 28' 27.01" N	85° 21' 4" E
	16	Saleikena Dam	21°20' 2.4" N	85° 19' 17.9" E



Champua	17	Slime Dam	22° 2' 15.74" N	85° 26' 34.86" E
Patna	18	KhireitangriBadabandha	21° 42' 23.54" N	85° 42' 11.39" E

The type of wetlands and their area in Keonjhar Division is given below in table 5.4.

Table No.5.4 Type and Area of Wetlands						
Range	Name of the site	Area Ha.	Wetland type	Annual Rainfall (mm)	Maximum depth of water	Vegetation type
Keonjhar	Nalapanga Dam	22.83	i. Fresh water lake ii. Reservoir	1210	6 m	Growing on bank
	Badasana Pond	4.00	i. Fresh water lake ii. Reservoir	1210	2m	Submerged in water
Keonjhar	Tikarapada Dam	8.00	i. Fresh water lake ii. Reservoir	1210	2m	Growing on bank
	Chandini Pokhari	2.00	i. Fresh water lake ii. Reservoir	1210	2m	Submerged in water
	Sapua Dam	24.77	i. Fresh water lake ii. Reservoir	1210	8m	Growing on bank
	Kodipasa Dam	5.00	i. Fresh water lake ii. Reservoir	1210	5m	Growing on bank
	Kanjhari Dam	50.00	i. Fresh water lake ii. Reservoir	1210	30m	Submerged in water
	Jagadala Dam	10.00	i. Fresh water lake ii. Reservoir	1210	25m	Submerged in water
Ghatagaon	Kureijodi Dam	15.00	i. Fresh water lake ii. Reservoir	1210	10m	Emergent
	Kalimati Dam	28.00	i. Fresh water lake ii. Reservoir	1210	7m	Growing on bank
	Kandasara Dam	10.00	i. Fresh water lake ii. Reservoir	1210	5m	Growing on bank
BJP	Badaghagera	85.32	i. Fresh water lake ii. Reservoir	1210	25.0m	Growing on bank
Telkoi	Khajuria Dam	50.00	i. Fresh water lake ii. Reservoir	1210	5m	Growing on bank
	Dandadhar Dam	100.0	i. Fresh water lake ii. Reservoir	1210	15m	Growing on bank

**Table No.5.4 Type and Area of Wetlands**

Range	Name of the site	Area Ha.	Wetland type	Annual Rainfall (mm)	Maximum depth of water	Vegetation type
	Khuntapada Dam	20.00	i. Fresh water lake ii. Reservoir	1210	4m	Growing on bank
	Kakudiamba Dam	50.00	i. Fresh water lake ii. Reservoir	1210	6m	Growing on bank
	Saleikena Dam	25.00	i. Fresh water lake ii. Reservoir	1210	4m	Growing on bank
Champua	Slime Dam	2.00	i. Fresh water lake ii. Reservoir	1210	5m	Submerged in water
Patna	Khireitangri Badabandha	4.00	i. Fresh water lake ii. Reservoir	1000	4m	Free floating

5.4 Wetland in Keonjhar District:

The total geographical area of Kendujhar district is 8336 sq km. The district comprises of 4676 wetlands occupying an estimated area of 21089 ha. This includes 4390 wetlands smaller than 2.25 ha. Wetlands of the district constitute about 3 per cent of total wetland area in the state. The major wetland types are River/Stream (about 49 %) comprising 10200 ha of area followed by Reservoir/Barrage (5649 ha). The small wet lands constitute about 21 per cent, which is very significant. Open water extent has shown a reduction of about 23 per cent from post-monsoon (16143 ha) to 12451 ha in pre-monsoon season. Aquatic vegetation has shown a seven-fold increase from 421 ha to 3143 ha in post-monsoon and pre-monsoon. Overall turbidity of open water is observed to be of moderate in both the seasons followed by low and high. However, high turbidity has not been observed in pre-monsoon

Modified National Wetland Classification system is used for wetland delineation and mapping comprising of 19 wetland classes which are organized under a Level III hierarchical system. Level one has two classes: Inland and coastal, these are further bifurcated into two categories as: natural and man-made under which the 19 wetland classes are suitably placed. Two date data pertaining to pre- monsoon and post monsoon was used to confirm the classes. Wetlands put to agriculture use in any of the two dates are not included as wetland class. Definitions of wetland categories used in general is as follows.

5.6 Wetland Classification System and coding

WettCode	Level-I	Level-II	Level-III
1000	Inland Wet Lands		
1100		Natural	
1101			Lakes



1102			Ox- Bow lakes / Cut-Off Meanders
1103			High altitude wet lands
1104			Riverine Wet Lands
1105			Waterlogged
1106			River / Stream
1200		Manmade	
1201			Reservoirs / Barrages
1202			Tanks / Ponds
1203			Waterlogged
1204			Saltpans
2000	Coastal Wetlands		
2100		Natural	
2101			Lagoons
2102			Creeks
2103			Sand / Brach
2104			Intertidal Mud flats
2105			Salt marsh
2106			Mangroves
2107			Coral Reefs
2200		Man- made	
2201			Salt Pans
2202			Aquaculture Ponds

The district data on wetland is furnished below

Table No 5.7 District data on Wetland

Name	Geographical Area in (km ²)	Wetland in ha	% of Wet land area	% of Geographic area	Open Water in ha		Seasonal reduction in open water extent (%)
					Post Monsoon	Pre Monsoon	
Keonjhar District	8336	21089	3.1	0.1	16143	12451	23

The extent of wet land as mapped through Satellite is furnished below.

Table No 5.8 Wetland in Keonjhar District

Sl No	Wett Code	Wetland Category	No of Wetlands	Total Wetland area (in	% of Wetland	Open Water in ha	
						Post Monsoon	Pre Monsoon



				ha)			
	1100	Indian Wetlands - Natural					
1	1101	Lakes / Ponds	-	-	-	-	-
2	1102	Ox-bow lakes / Cut-off meanders					
3	1103	High altitude wetlands					
4	1104	Riverine wetland	5	70	0.33	70	70
5	1105	Waterlogged	23	244	1.16	161	161
6	1106	River / Stream	62	10200	48.37	10037	9068
	1200	Inland Wetlands- Man made					
7	1201	Reservoirs / Barrages	58	5649	2679	5425	2709
8	1202	Tanks / Ponds	138	536	2.54	450	443
9	1203	Waterlogged					
10	1204	Salt pans					
		Total inland	286	16699	79.18	16143	12451
		Sub Total	286	16699	79.18	16143	12451
		WetLand <2.25 ha	4390	4390	20.82	0	0
		Total	4676	21089	100.00	16143	12451
	Area under aquatic vegetation					421	3143
	Area under Turbidity Level						
	Low					3516	2428
	Moderate					11899	10023
	High					728	

5.4.1 Wetlands & Mile stone for Notification:

This division has no remarkable natural wetland. However, it is blessed with so many manmade wetlands which are the most suitable habitats for the different life forms that are most evitable part of the ecosystem. Several water bodies have been created in different forests as measures of conservation of water to support the eco system and formation of wetlands. The details of water bodies so created under different schemes have already given above.

There is no water body suitable / confirming to the standard for notification under various laws / protocols (as Wet land / Ramsar Site etc).

5.5 Water Level In The Wells In The Vicinity (Up To 5 Km) Of Forest Area

No systematic study has ever been carried out to record and observe the water level in the wells in the vicinity (up to 5 km) of forest area. However, During ongoing plan, each Beat



Forest Guard would record the water level in the wells in the vicinity (up to 5 km) of the forest area within his jurisdiction at least twice a year i.e. pre monsoon (April) and post monsoon (November) and report to the Divisional Forest Officer, Keonjhar Division through his Range Officer. On the other hand, the Divisional Forest Officer, Keonjhar division would prepare a database of the same along with the GPS coordinates of the wells.

Depth to Water (DTW) level in Phreatic Aquifer: The Phreatic zone constitutes the most potential groundwater reservoir in the district. The depths to water levels (DTWs) in aquifers depend on several factors like rainfall, topography, drainage characteristics, and proximity to drainage channels, lithology, water bearing and water yielding properties of the rocks, as also land use. With a view to ascertain the changes in the groundwater regime and make an overall assessment of the groundwater resources, the assistance of CGWB was taken. The CGWB had established 69 National Hydrograph Network Stations (NHNS) throughout the district which are monitored manually 4 times a year, during the months of January, April, August and November. Besides the monitoring of NHS dug wells, 130 key wells during the pre-monsoon and 149 key wells during the post monsoon were established to monitor the DTWs in the Keonjhar district.

Pre-monsoon (April): The DTWs levels during the pre-monsoon period (year 2018) varied between the minimum of 0.95 m below ground level (m bgl) at Childa (Patna block) and the maximum of 13.8 m bgl at Khajurimundi (Banspal block). The average water level stood at 6.07 m bgl. About 8% and 38% of the wells exhibited water levels less than 2.0 m and 5.0 m bgl respectively in the district. Only ~6% of the measurements showed water levels exceeding 10 m bgl. The Percentage (%) of area of Keonjhar district and its blocks falling under different DTW (in m) ranges during pre-monsoon (April 2018) period are furnished in Table No. 5.9.

Table 5.9: Block Wise % of area under Different DTW ranges							
Sl No	Name of block	% of area falling under different DTW (in m) ranges					
		1.0 - 2.5	2.5 - 5.0	5.0 - 7.5	7.5 - 10.0	10.0 - 12.5	12.5 - 14.0
1.	Banspal	0.0	0.8	36.4	56.8	5.5	0.5
2.	Champua	0.7	10.6	48.4	39.7	0.6	0.0
3.	Ghatgaon	0.4	19.2	75.1	5.2	0.1	0.0
4.	Harichandanpur	1.0	27.2	60.7	9.1	2.0	0.0
5.	Jhumpura	0.8	20.4	21.9	1.5	0.0	0.0
6.	Joda	0.0	5.7	71.3	21.0	1.9	0.1
7.	Keonjhar	0.2	10.1	69.5	19.7	0.5	0.0
8.	Patna	1.8	27.7	67.5	3.0	0.0	0.0
9.	Saharpada	0.0	29.7	65.9	4.4	0.0	0.0
10.	Telkoi	0.0	6.1	74.5	18.7	0.8	0.0



Post-monsoon (November): The post-monsoon DTWs reflect good recharge of the phreatic aquifer from the rainfall. The water levels varied between 0.4 – 9.3 m bgl; the minimum at Rimuli in Champua block and the maximum at Goudasahi in Keonjhar block. Percentage (%) of different revenue blocks within Keonjhar Division falling under different DTW (in m) ranges during post-monsoon (Nov 2018) period are furnished in Table No. 5.10.

Table No 5.10 Block Wise % of area under Different DTW ranges (post Monson)					
Sl No	Name of block	% of area falling under different DTW ranges			
		0.43 – 2.5	2.5 – 5.0	5.0 - 7.5	7.5 - 9.3
1	Banspal	2.3	42.8	40.2	14.7
2	Champua	22.6	70.2	6.9	0.3
3	Ghatgaon	8.8	78.9	11.4	0.8
4	Harichandanpur	24.1	61.1	12.0	2.8
5	Jhumpura	46.0	49.0	4.6	0.4
6	Joda	10.1	55.8	32.0	2.0
7	Keonjhar	22.4	67.0	9.8	0.8
8	Patna	46.8	52.9	0.2	0.0
9	Saharpada	12.6	71.1	16.4	0.0
10	Telkoi	4.4	84.2	11.2	0.2

Longterm trend in water level in phreatic aquifer:

The decadal (2009–2018) water level trends (monitored from the district NHS wells) during pre-monsoon period (n=114) indicated rising trend in water level in 33% (n=38) of the monitoring stations with the maximum being at 0.71 m/year. The falling trend of water level was shown by about 20% (n=23) of the stations and maximum fall recorded is 0.52 m/yr. In about 70% of the stations (n=16) where falling trend was observed, the fall exceeded the critical limit of 0.1 m/yr. In these areas, intervention is required to restore the water level. The decadal water level trend analysis data (n=114) of post-monsoon period (2009–2018) indicated rising trend of water level in 31% cases (n=35) and falling trend in about 32% cases (n=36). At rest of the monitoring stations no trend was observed. The maximum rise recorded is 0.79 m/yr including the 63% of them where the values exceeded 0.10 m/yr. The maximum fall was around 0.71 m/yr with around 44% of them showing water level decline at rates exceeding 0.1 m/yr. The data of rise and fall in water level of hydrograph stations during pre- and post-monsoon periods are presented **Table No. 5.11**.

Table No. 5.11 Decadal trend in the pre-monsoon depth to water levels in different revenue blocks within Keonjhar Division						
SL No	Name of Blok	Loation of well	No. of data points	Rise (m/yr)	Fall (m/yr)	Intercept
1.	Banspal	Banspal	3	-	-	0
		Banspal-li	5	-	-	0



		Baradevata	5	-	-	0
		Baraguda	1	-	-	0
	Banspal	Kanjipani	10	-	0.1122	5.5434
		Suakati	10	-	0.0244	6.2794
		Tarmakant	0	-	-	0
2.	Champua	Belaipada	4	-	-	0
		Champua 1	9	0.3537	-	10.7264
		Jaymangalpur	10	0.0754	-	5.7931
		Jodipada	4	-	-	0
		Karanjia	2	-	-	0
		Parsola	9	-	0.1239	6.9382
		Sasang	5	-	-	0
3.	Ghatgaon	Baxibarigan	9	0.2781	-	7.58
		Dhangadiha	10	0.341	-	10.1287
		Dhenkikot	3	-	-	0
		Dhenkikote	5	-	-	0
		Dhenkikot-li	2	-	-	0
	Ghatgaon	Gadadharpur	6	0.2805	-	7.9068
		Ghatgaon	10	0.5599	-	9.0563
		Ghatgaon-I	4	-	-	0
		Ghatgaon-II	1	-	-	0
		Janghira	9	0.5988	-	10.2735
		Melana	4	-	-	0
		Patilo	6	-	0.1459	5.9577
		Pipilia	0	-	-	0
		Pipilia1	4	-	-	0
		Rajpat	3	-	-	0
4.	Harichandanpur	Baxibargaon	4	-	-	0
		Harichandanpur	10	-	0.0176	4.7007
		Harichandanpur-ii	6	0.1514	-	6.8429
		Jhangira	6	0.3258	-	8.4224
		Sonapent	9	-	0.5204	0.9749
5.	Jhumpura	Badaposhi	6	-	0.4238	2.7568
		Jhumpura	10	-	0.2655	4.795
		Jhumpura-ii	5	-	-	0
		Karanjia 1	9	0.6328	-	9.9861
		Katalaposhi	5	-	-	0
		Ukhunda	0	-	-	0
		Ukunta	9	0.0027	-	4.1982
6	Joda	Barbil	9	-	0.1278	5.1835
		Bhadrasahi	10	-	0.303	4.2846
		Bolani	0	-	-	0
		Guali	5	-	-	0



		Joda	10	-	0.0333	5.7801
		Nalda2	2	-	-	0
		Rugudi	8	0.2692	-	9.0773
		Rugudi 1	3	-	-	0
7.	Keonjhar	Brahmandgram	3	-	-	0
		Gopalpur2	10	0.4723	-	8.4556
		Haridagot	10	0.5709	-	8.9862
	Keonjhar	Jhadbelda 1	2	-	-	0
		Keonjhar	0	-	-	0
		KeonjharSadar	1	-	-	0
		Keonjhargarh	10	0.1172	-	7.1518
		Keonjhar-li Old Town	3	-	-	0
		Muktapur	3	-	-	0
		Naranpur	5	-	-	0
		Padampur2	8	0.1638	-	11.4057
		Padampur-li	5	-	-	0
		Palasponga	8	0.5311	-	8.7139
8.	Patna	Balaniposi	5	-	-	0
		Burikapuri	10	0.0122	-	6.545
		Kendeiposhi	8	0.4563	-	8.3368
		Khiritangiri	10	0.0851	-	9.0758
		Khiritangiri-li	2	-	-	0
		Kothaghar	8	0.0881	-	4.7553
		Malliposi	9	0.5221	-	8.969
		Swampatna-li	5	-	-	0
	Patna	Tangarpada	6	0.0822	-	4.4954
		Turmunga	10	-	0.0606	5.3041
9.	Saharpada	Badbil	6	-	0.3278	3.646
		Gajitangri	6	0.7077	-	11.3134
		Saharapada	0	-	-	0
		Saharpara	8	0.519	-	10.3076
		Swampatna	9	0.1271	-	4.8925
		Udaipur	9	0.3805	-	7.9329
		Udaipur-li	6	0.6502	-	9.5001
10.	Telkoi	Akul	6	0.1487	-	6.3027
		Balijhodi	5	-	-	0
		Benamunda	4	-	-	0
		Bimala	9	-	0.0842	5.0732
		Gonasika	4	-	-	0
		Jagmohanpur	9	0.0468	-	7.1963
		Jagmohanpur-li	6	0.1647	-	8.431
		Kaliahata	10	-	0.121	4.5395



	Khuntapada	5	-	-	0
	Padang	10	-	0.0575	5.1546
	Patakhali	2	-	-	0
	Pitanali	5		-	0
	Telkoi	10	0.1014		7.4993

Similarly, the Decadal trend in the post-monsoon depth to water levels in different revenue blocks within the jurisdiction of Keonjhar Division is furnished below in **Table No. 5.12**.

Table 5.12 Decadal trend in the post-monsoon depth to water levels in different revenue blocks within Keonjhar Division.						
SL No	Name of Blok	Loation of well	No. of data points	Rise (m/yr)	Fall (m/yr)	Intercept
1.	Banspal	Banspal	4	-	-	0
		Banspal-li	7	0.3909	-	8.6703
		Baradevata	6	-	0.7141	-0.2044
		Baraguda	0	-	-	0
		Kanjipani	9	0.143	-	4.1546
		Suakati	10	0.0692	-	3.8867
		Tarmakant	1	-	-	0
2.	Champua	Belaipada	5	-	-	0
		Champua 1	10	0.1772	-	5.4977
		Jaymangalpur	10	-	0.0344	2.2861
		Jodipada	6	0.0391	-	3.1231
		Karanjia	1	-	-	0
		Parsora	9	0.3745	-	4.5547
		Sasang	6	-	0.1346	1.3812
3.	Ghatgaon	Baxibarigan	10	-	0.0145	3.3793
		Dhangadiha	10	0.0477	-	4.2021
		Dhenkikot	4	-	-	0
		Dhenkikote	5	-	-	0
		Dhenkikot-li	2	-	-	0
		Gadadharpur	6	0.1166	-	4.328
		Ghatgaon	9	-	0.1	2.374
		Ghatgaon-l	4	-	-	0
		Ghatgaon-li	2	-	-	0
		Janghira	9	0.3137	-	5.2874
		Melana	5	-	-	0
		Patilo	6	-	0.1524	2.3708
		Pipilia	0	-	-	0
		Pipilia1	4	-	-	0
		Rajpat	3	-	-	0



4.	Harichandanpur	Baxibargaon	7	0.0336	-	3.3707
		Harichandanpur	9	-	0.1636	1.0273
		Harichandanpur-li	5	-	-	0
		Jhangira	6	-	0.0943	2.2843
		Sonapent	8	-	0.4833	0.1348
5.	Jhumpura	Badaposhi	6	-	0.0712	1.5613
		Jhumpura	10	-	0.1752	0.473
		Jhumpura-li	7	0.0152	-	2.5458
		Karanjia 1	7	0.2998	-	4.5789
		Katalaposhi	6	0.0991	-	2.9613
		Ukhunda	0	-	-	0
5.	Jhumpura	Ukunta	10	-	0.095	2.066
6.	Joda	Barbil	8	-	0.0055	4.078
		Bhadrasahi	10	-	0.2955	2.3675
		Bolani	0	-	-	0
6.	Joda	Guali	4	-	-	0
		Joda	9	0.2193	-	5.833
		Nalda2	3	-	-	0
		Rugudi	9	0.1302	-	5.1258
		Rugudi 1	3	-	-	0
7.	Keonjhar	Brahmandgram	3	-	-	0
		Gopalpur2	10	-	0.047	1.9405
		Haridagot	10	-	0.1657	1.4358
		Jhadbelda 1	3	-	-	0
		Keonjhar	0	-	-	0
		KeonjharSadar	4	-	-	0
		Keonjhargarh	10	0.1344	-	4.9713
		Keonjhar-li Old Town	2	-	-	0
		Muktapur	4	-	-	0
		Naranpur	5	-	-	0
		Padampur2	10	0.3503	-	7.4173
		Padampur-li	7	0.561	-	7.4376
		Palaspanga	8	0.3441	-	4.6896
8.	Patna	Balaniposi	6	0.2208	-	4.4537
		Burikapuri	9	0.0277	-	3.5653
8.	Patna	Kendeiposhi	10	-	0.0741	2.5073
		Khiritangiri	10	0.1638	-	4.5437
		Khiritangiri-li	3	-	-	0
		Kothaghar	10	-	0.2035	0.7516
		Malliposi	10	-	0.034	2.4511
		Swampatna-li	6	-	0.0974	3.0013



		Tangarpada	6	-	0.0969	1.4555
		Turmunga	10	-	0.0041	2.4716
9.	Saharpada	Badbil	6	-	0.2399	1.7904
		Gajitangri	6	0.0876	-	4.1537
		Saharapada	0	-	-	0
		Saharpara	8	0.4585	-	6.1628
		Swampatna	10	-	0.0927	2.1792
		Udaipur	7	0.0757	-	3.8557
		Udaipur-li	7	0.1541	-	4.9682
10.	Telkoi	Akul	6	-	0.3413	-0.8453
		Balijhodi	4	-	-	0
		Benamunda	4	-	-	0
		Bimala	10	-	0.077	2.9949
		Gonasika	4	-	-	0
		Jagmohanpur	7	0.3633	-	5.729
		Jagmohanpur-li	6	0.4035	-	6.5071
		Kaliahata	9	-	0.1372	2.5853
10.	Telkoi	Khuntapada	5	-	-	0
		Padang	10	-	0.0779	2.9707
		Patakhali	6	-	0.0442	2.0899
		Pitanali	5	-	-	0
		Telkoi	10	-	0.0119	4.3045

Depth to water levels in deeper aquifer: There are 14 piezometers in the Keonjhar district which are also measured during the monitoring of hydrograph stations. The piezometers tap the fractures within the depth range of 30-50 m bgl. The depths to water levels measured in the piezometers are given in the following table. The water during the both the seasons of pre- and post-monsoon are very much similar to those observed in the shallow dug wells. During the pre-monsoon period the water levels varied in the range of 4.66 – 7.29 m bgl, whereas those in the post-monsoon period ranged between 1.96 – 5.01 m bgl.

Table No. 5.13 : Depth to water levels in the piezometers tapping the deeper fracture aquifers in different revenue blocks within Keonjhar Division

Sl. No	Block name	Village name	Longitude in DMS	Latitude in DMS	DTW_Pre (m bgl)	DTW_Post (m bgl)
1	Harichadanpur	Baxibargaon	85° 39' 0.0" E	21° 30' 0.0" N	5.22	1.96
2	Harichadanpur	Bidyadharpur	86° 16' 44.4" E	21° 15' 0.0" N	6.09	3.15
3	Harichadanpur	Ghatgaon	85° 58' 55.2" E	21° 23' 38.4" N	5.05	3.45
4	Telkoi	Harichandanpur	85° 47' 24.0" E	21° 20' 45.6" N	5.82	2.18
5	Ghatgaon	Jhangira	85° 37' 33.6" E	21° 26' 6.0" N	6.08	2.01
6	Saharapada	Jhumpura	85° 34' 1.2" E	21° 49' 40.8" N	7.29	2.36
7	Banspal	Padampur	85° 35' 16.8" E	21° 45' 50.4" N	7.13	3.90

Table No. 5.13 : Depth to water levels in the piezometers tapping the deeper fracture aquifers in different revenue blocks within Keonjhar Division

Sl. No	Block name	Village name	Longitude in DMS	Latitude in DMS	DTW_Pre (m bgl)	DTW_Post (m bgl)
8	Patana	Sainkula	86° 7' 51.6" E	21° 7' 8.4" N	7.00	2.42
9	Kendujhargarh	Swampatna	85° 39' 10.8" E	21° 30' 18.0" N	4.66	2.48
10	Jhumpura	Udaipur	85° 51' 28.8" E	21° 42' 10.8" N	4.85	2.64

Other than the regularly monitored piezometers in the district as described above, the water levels in the exploratory wells (EWs) also talk about the hydraulic regimes in the deeper fracture aquifers. It is to be noted that the EWs are constructed at different periods of time of the year and as such different water levels are recorded. Still, their range of water levels data can indicate a general scenario for comparison with the shallow aquifer water levels. The depth of the bore wells (n=87) varies between 27-203 m bgl with 87% of them exceeding the depth of 100 m bgl. The water levels are recorded between 0.62-18.37 m bgl with the average value of 6.6 m bgl. About 42% and 85% of the bore wells register water levels of <5.0 m and <10.0 m bgl respectively. At a single place (Alati, Ghasipura block) it has been recorded at 0.28 m above ground level (m agl) depicting the auto-flow condition in the well. Thus, the water levels in the deeper fracture aquifers in the district are very similar to those observed in the shallow phreatic aquifer.

5.6 Status of Aquifers

Keonjhar is very rich in Iron ore deposits. While Orissa has about 30% of the country's resources of Haematitic ore, Keonjhar district alone is contribution about 75% of the reserves of the state. Still at places like Joda, Barbil, Champua etc. some of the aquifers are found. Shale, limestone and sandstone belonging to Kolhans were deposited by the side of Baitarani river in Joda-Banspani area. The Joda-Barbil plateau extending from Chamakpur to the boarder of Singhbhum of Jharkhand in north and border of the Bonai in the west contains shale, quartzite etc. The area of central Keonjhar is known as Bhuyan- Juangpirh, which is famous for quartzite and lava deposits. The quartzites are normally seen on the hilltops extending roughly in north-south direction to west of Keonjhar. The quartzite is underlain by pyrophyllite, which forms economic deposits at some places. Due to the availability of quartz sericite schist and amphibolite predominantly in this area, better agricultural lands are found in Telkoi and Banspal. The region that stretches from south of Champua upto Anandapur is dominantly covered by granites. The granites are of different textures. They are usually coarse and porphyritic. Medium to fine grained granite exposures are also seen. They are normally gneissic in structure and are felspathic. The norms recommended for the Rainfall infiltration factor for the principal aquifers available in Keonjhar Division is furnished below in Table No. 5.14.



Table 5.14: Norms Recommended for the Rainfall Infiltration Factor.

Sl. No.	Principal Aquifer	Major Aquifer	Age	Recom(%)	Mini.(%)	Maxi.(%)
1.	Shale	Shale with limestone	Upper Palaeozoic to Cenozoic	4	3	5
2.	Shale	Shale with sandstone		4	3	5
3.	Shale	Shale, limestone and sandstone		4	3	5
4.	Shale	Shale		4	3	5
5.	Shale	Shale/Shale with sandstone		4	3	5
6.	Shale	Shale with Limestone		4	3	5
7.	Quartzite	Quartzite– Weathered, Jointed		6	5	7
8.	Quartzite	Quartzite – Massive, poorly fractured	Proterozoic to Cenozoic	2	1	3
9.	Quartzite	Quartzite– Weathered, Jointed	Azoic to Proterozoic	6	5	7
10.	Quartzite	Quartzite – Massive, Poorly fractured		2	1	3
11.	Schist	Schist- Weathered, Jointed		7	5	9
12.	Schist	Schist- Massive, Poorly fractured		2	1	3
13.	Schist	Phyllite		4	3	5
14.	Schist	Slate		4	3	5
15.	Granites	Acidic Rocks (Granite, Syenite, Rhyolite etc.) - Weathered, Jointed	Mesozoic to Cenozoic	11	10	12
16.	Granites	Acidic Rocks (Granite, Syenite, Rhyolite etc.) – Massive or poorly fractured		2	1	3
17.	Granites	Acidic Rocks (Pegmatite, Granite, Syenite, Rhyolite etc.) – Weathered, Jointed	Proterozoic to Cenozoic	11	10	12
18.	Granites	Acidic Rocks (Pegmatite, Granite, Syenite, Rhyolite etc.) – Massive, Poorly fractured		2	1	1
19.	Gneiss	Undifferentiated metasedimentaries/ Undifferentiated metamorphic –weathered, jointed	Azoic to Proterozoic	7	5	9



20.	Gneiss	Undifferentiated metasedimentaries/ Undifferentiated metamorphic–Massive poorly fractured		2	1	3
21.	Gneiss	Gneiss- Weathered, Jointed		7	5	9
22.	Gneiss	Gneiss-Massive Poorly fractured		2	1	3
23.	Gneiss	Migmatitic, Gneiss–Weathered, Jointed	Azoic	7	5	9
24.	Gneiss	Migmatitic Gneiss- Massive Poorly fractured	Azoic	2	1	3
25.	Sandstone	Sandstone/ Conglomerate	Upper Palaeozoic to Cenozoic	12	10	14
26.	Sandstone	Sandstone with shale		12	10	14
27.	Sandstone	Sandstone with shale/ coal beds		12	10	14
28.	Sandstone	Sandstone with clay		12	10	14
29.	Sandstone	Sandstone/ Conglomerate	Proterozoic to Cenozoic	6	5	7
30.	Sandstone	Sandstone with Shale		6	5	7

There are two types of Aquifer seen in the district i.e. Shallow Aquifers and Deeper Aquifers. The characteristics as described in Central Ground Water Board Report for the district are as follows.

Shallow Aquifers: Near surface aquifer in which ground water occurs under unconfined (phreatic) condition and is mainly tapped by dug wells for ground water extraction is generally identified as shallow aquifer. The specific capacity and hydraulic conductivity in different formations are stated below.

Specific capacity and hydraulic conductivity in different formations

Formation	Specific Capacity Index (m ³ /min/m)	Transmissivity (m ² / day)
Alluvium	0.0035 to 0.241	4.0 to 102
Laterite	1.1 to 2.89	3.66 to 9.23
Older Metamorphic Group	4 to 39	0.0013 to 0.0106
Proterozoic Volcanics	Low	Low
Iron Group (Shales , BHJ, BHQ and Kolhans)	Low	Low
Singbhum granites	1 to 28	0.0009 to 0.034



Deeper Aquifers: Aquifers, which occur below the phreatic zone and extends down to a greater depth, are termed as deeper aquifers. Ground water in deeper aquifers occurs under semi-confined to confined conditions. Deeper aquifers are tapped by tube/bore wells for ground water extraction. Characteristics of deeper aquifers are noted below.

Specific capacity and hydraulic conductivity in different formations in deeper aquifers

Formation	Specific Capacity Index (m ³ /min/m)	Transmissivity (m ² / day)
Older Metamorphic Group	2.5 to 38	0.8 to 13
Proterozoic Volcanics	0.4 to 80.66	0.24 to 25
Iron Group (Shales , BHJ, BHQ and Kolhans)	11.76 to 21.56	3.4 to 8.6
Singbhum granites	0.77 to 59	0.5 to 9

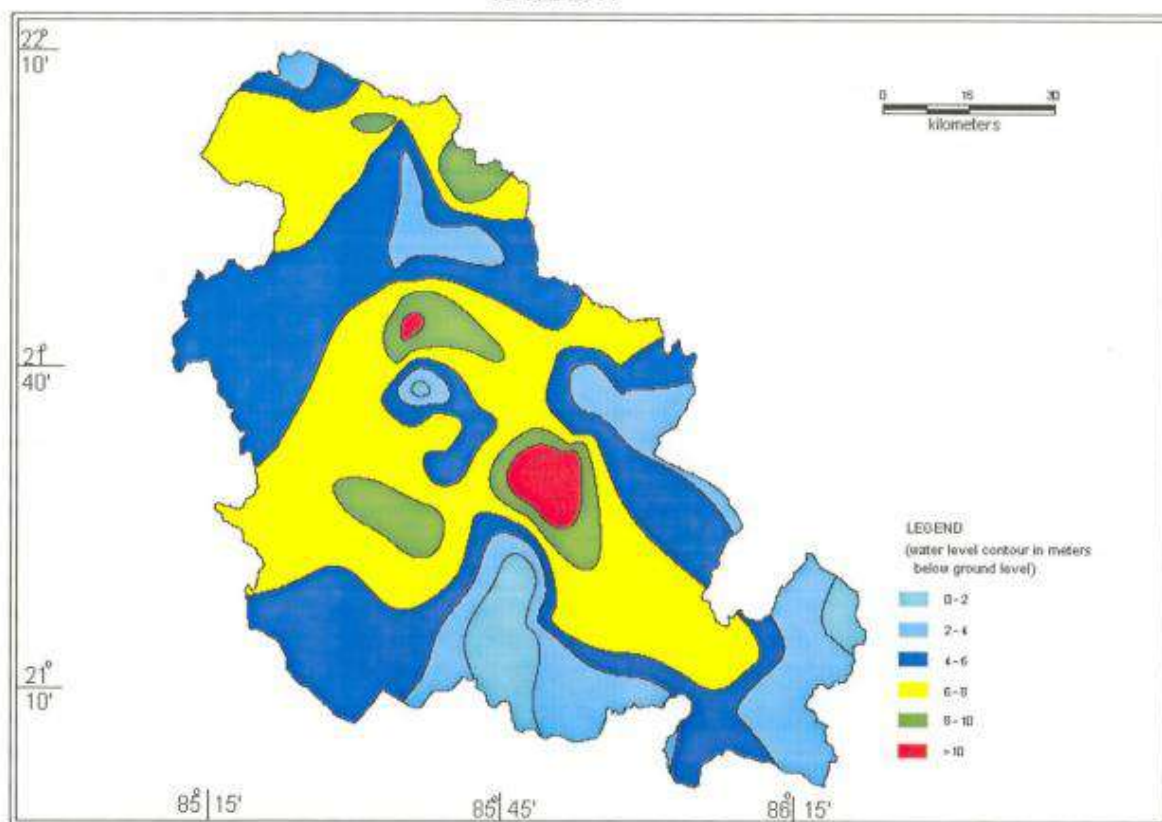
Ground Water Resources: As per the ground water resources assessed during 2009, the total annual replenishable ground water resources in the district is 81323 ham. Around 4130 ham of the total ground water is used in domestic and industrial water supply. The available ground water resource for irrigation in net terms is 61690 ham. Net ground water availability for future irrigation development is 113353 ham. Over all the present level of ground water development is only 25.55 percent in the district with the maximum in Anandapur block viz. 44.84% and minimum in Bansapal block 11.1%. Hence the district as well as all the blocks come under the white category

Details of over exploited, critical and semi critical areas – Stage of ground water development shows that all blocks fall under safe category.

5.7 Maps indication Water table in Keonjhar District:

PRE-MONSOON DEPTH TO WATER LEVEL MAP OF KEONJHAR DISTRICT, ORISSA
APRIL-2011

Plate:- 2



POST MONSOON DEPTH TO WATER LEVEL MAP OF KEONJHAR DISTRICT, ORISSA
NOVEMBER-2011

22° 10'

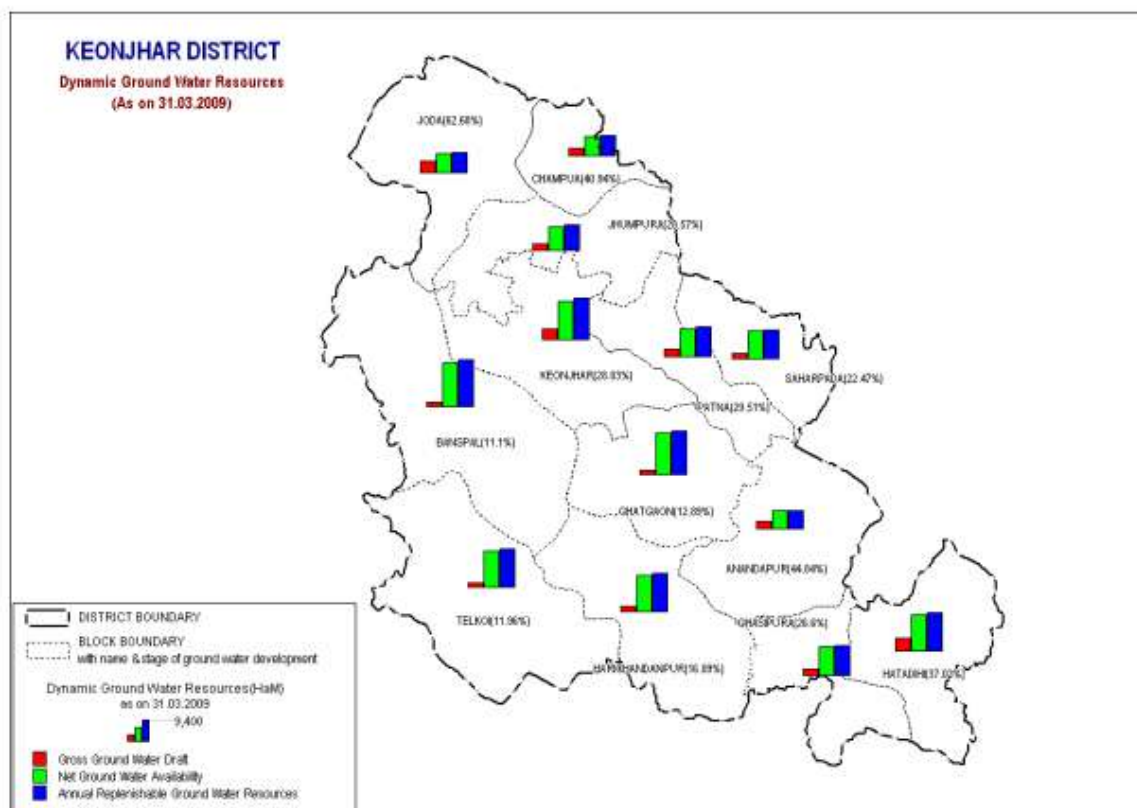
21° 40'

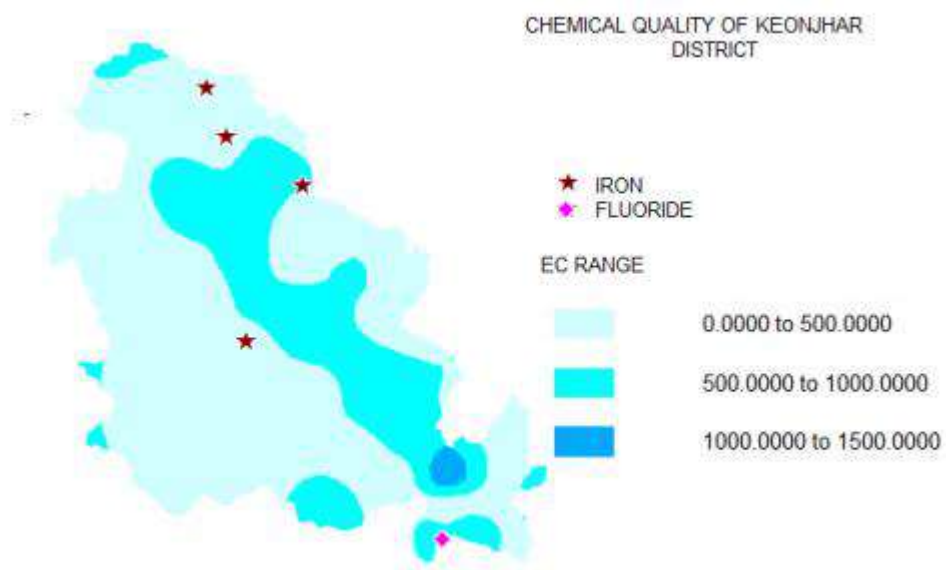
21° 10'

85° 15' 85° 45' 86° 15'

LEGEND
(water level contour in meters below ground level)

- 0 - 2
- 2 - 4
- 4 - 6
- >6







CHAPTER 6

MAINTENANCE AND ENHANCEMENT OF FOREST RESOURCE PRODUCTIVITY

6.1 Growing Stock of Wood

6.1.1 Sampling & Samplepoint distribution:

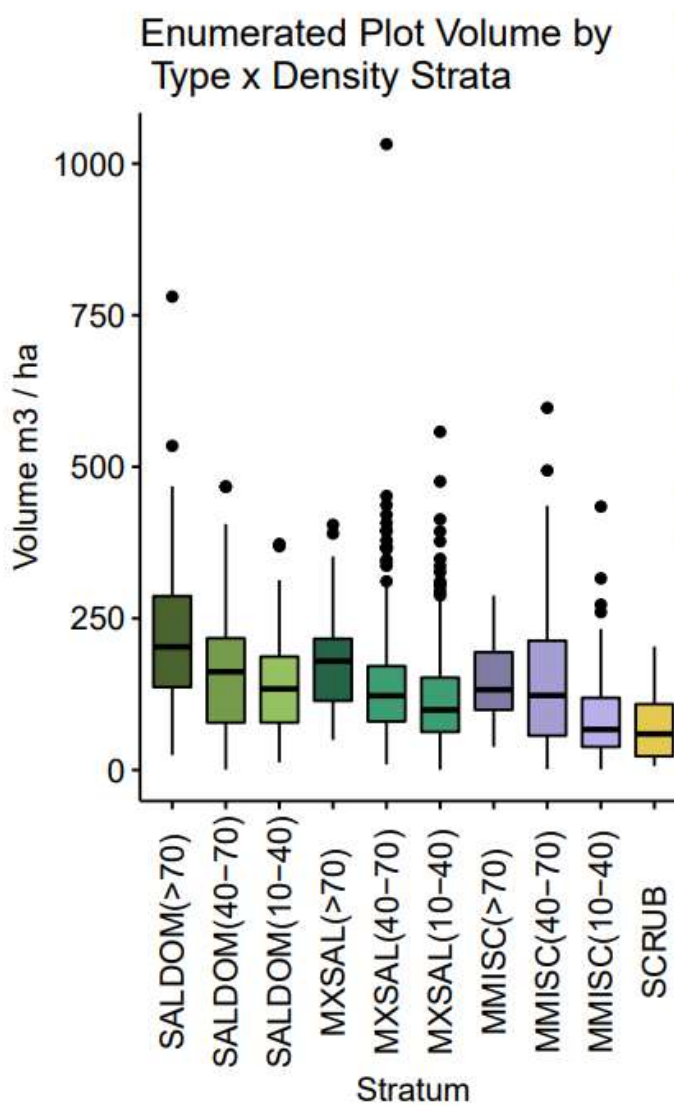
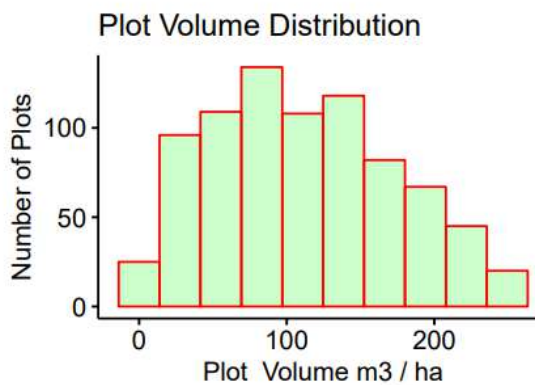
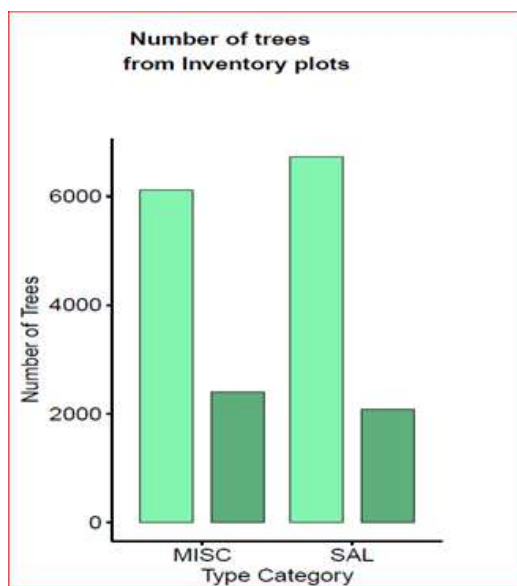
The Growing stock has been estimated basing on Sample enumeration carried out at 920 Sample points furnished by ORSAC. The field staff enumerated the trees available within 1000 m² taking the Sample points on the centre of the Square of 31.62 side. The collected data has been analysed. On analysis the Growing stock in each forest block has been computed. Distribution of Sampleplots to different density Class is furnished below. Data analysis report has been obtained for 854 points from ORSAC, Bhubaneswar.

Table No 6.1 Sample points Distribution Density class wise.						
Sl No	Range	No of sample plots under density class				
		D1	D2	D3	D4	Total
1	Barbil	3	68	45	13	129
2	BJP	0	24	18	5	47
3	Champua	1	35	33	0	69
4	Ghatgaon	2	86	61	3	152
5	Keonjhar	3	42	35	8	88
6	Patna	0	25	21	0	46
7	Telkoi	92	120	105	6	323
		101	400	318	35	854

Canopy Density Classes are D1 : > 70%, D2: 40–70% D3: 10–40%, D4: <10%

The plot volume distribution is furnished below.

Basing on sample point data analysis, the plot volume / strata etc has been projected by NRSC, Hyderabad. The plot volume graphical presentation is furnished below.





Regarding Crop composition in Sal and Misc Forests, the proportion of Sal has been depicted in the above graph.

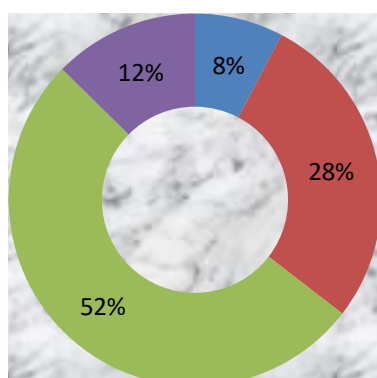
The crop density of forest area has been observed after analysis as follows.

Table No 6.2 Stand volume parameters.						
Criteria						
No of trees / ha	Basal Area per ha (M ³)	Volume per Ha (in M ³)	Mean Volume (in M ³)	Standard Error	LB (in M ³)	UB (in M ³)
388.46	14.21	111.32	119.29	0.02	114.56	124.02

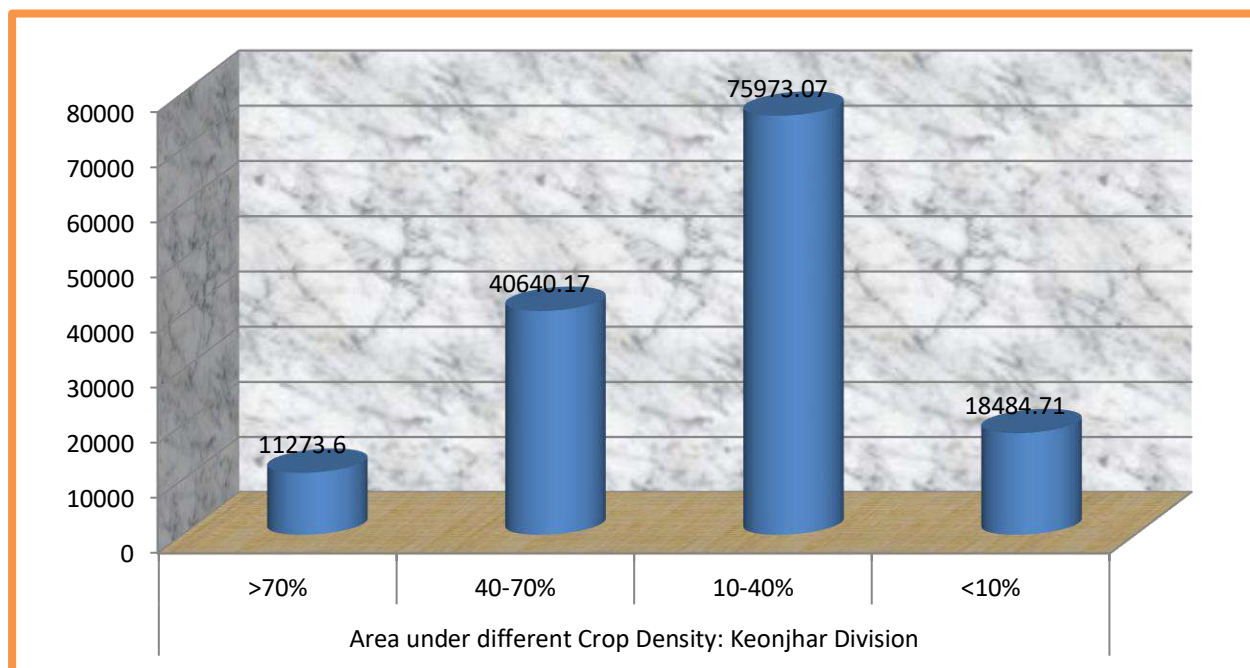
6.1.2 Distribution of Area (Density class)

The Overall crop density of the division for Sal and Non-sal Forest and area under each density class has been furnished by ORSAC. The details is as given below

Table No 6.3 Forest Area under Different density Class (Sal & Non sal)					
Category	Area under different Density class (in Ha)				Total
	>70%	40-70%	10-40%	<10%	
Sal Forest (SFC)	6875.65	7956.08	8894.65	1391.70	25118.08
No of Plots in SFC	84	89	86	6	265.00
Non Sal Forest (Non- SFC)	4397.95	32684.09	67078.43	17093	121253.47
No of Plots in Non SFC	17	311	232	29	589.00
Div. Total					
Area (All)	11273.60	40640.17	75973.07	18484.71	146371.55
Sample plots	11	400	318	35	854.00
%	7.70	27.77	51.90	12.63	100.00



■ >70%
■ 40-70%
■ 10-40%
■ <10%



The total number of stem as well as the total volume of estimated stems is analyzed by NRSC, Hyderabad taking inventory database prepared by Field staffs of this division. The NRSC, Hyderabad has classified entire database of 920 sample points as SFC and Non-SFC category and analyzed 854 sample points. The remaining 66 sample points out of 920 have not been analyzed by NRSC, Hyderabad may be due to unusual crop density.

Table No 6.4 No of stems in Keonjhar Division

RANGE	All Species	GIRTH CLASS (cm)					Total
		30-60	60-90	90-120	120-150	> 150	
Barbil	All Trees	3,025,930	1,154,474	539,045	212,200	132,766	5,064,415
B&Jp	All Trees	1,401,607	509,914	189,083	72,192	41,370	2,214,167
Champua	All Trees	2,149,837	1,008,663	245,131	72,646	46,084	3,522,361
Ghatagaon	All Trees	5,806,040	1,822,750	588,688	215,516	106,523	8,539,517
Keonjhar	All Trees	3,784,497	1,084,175	363,039	96,050	50,729	5,378,489
Patna	All Trees	1,524,710	642,104	190,170	63,211	31,689	2,451,883
Telkoi	All Trees	6,175,543	3,192,684	1,721,132	779,787	393,341	12,262,488
All Range Total		23,868,164	9,414,764	3,836,288	1,511,602	802,503	39,433,320
%		60.53	23.88	9.73	3.83	2.04	100.0

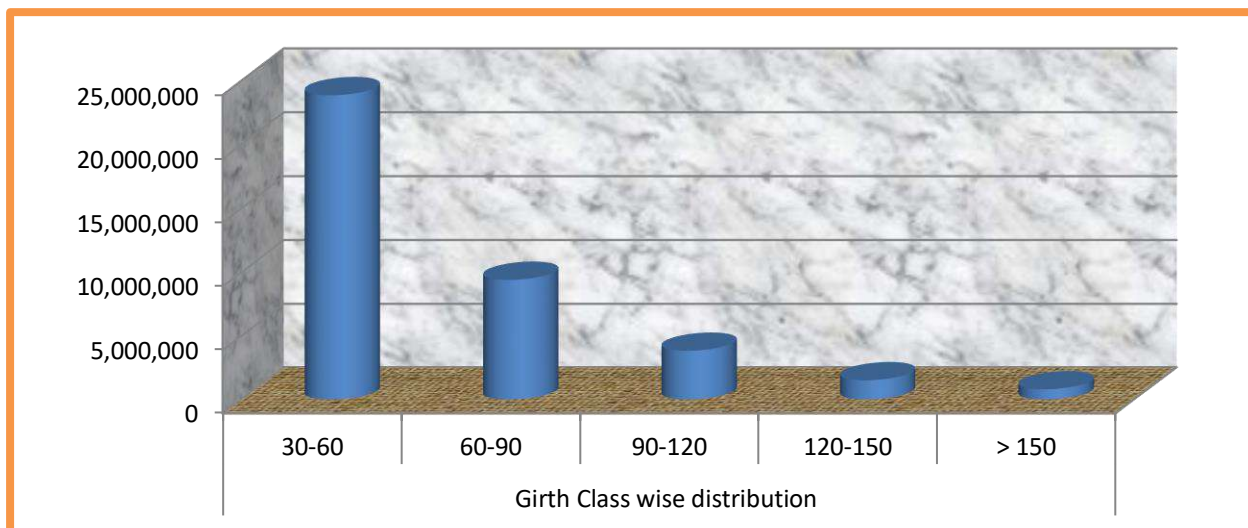
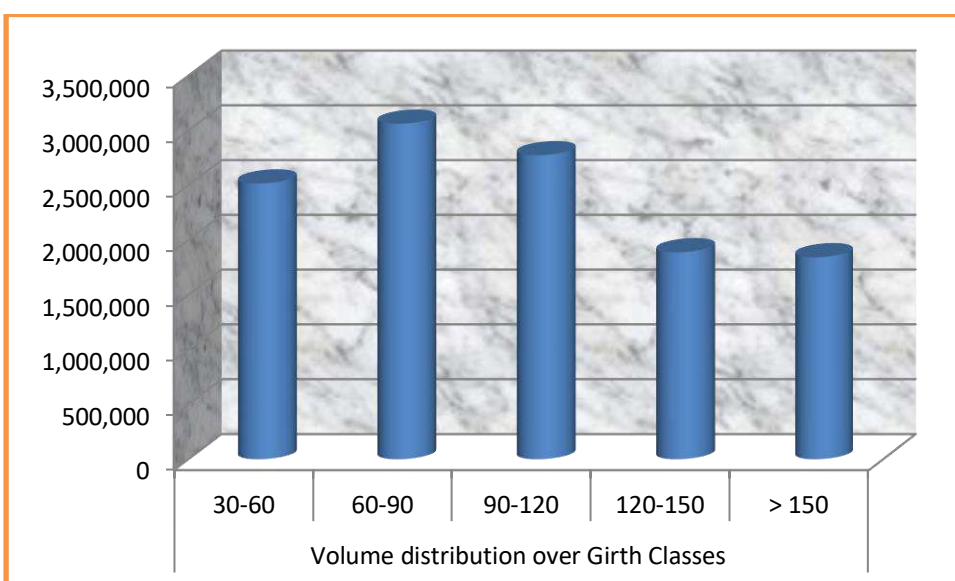
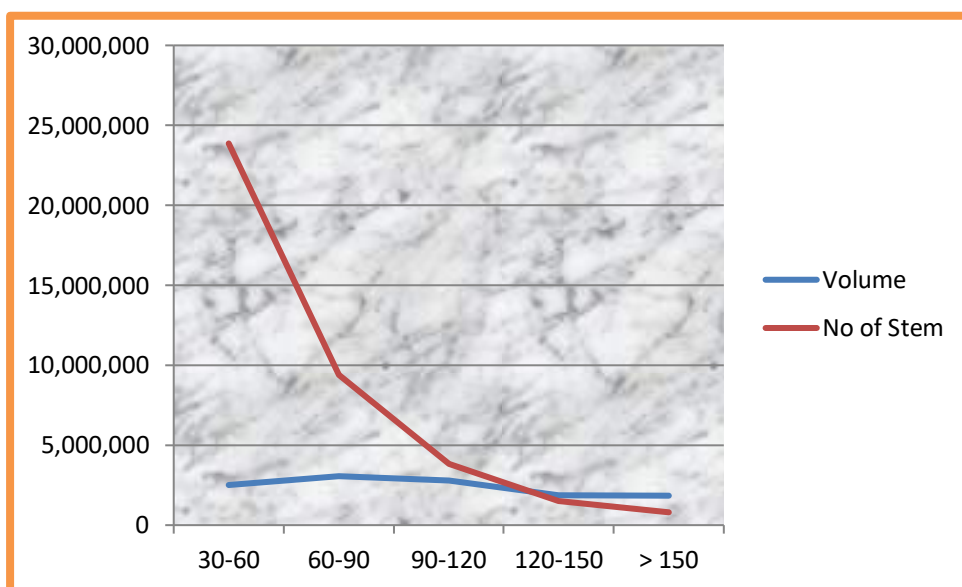
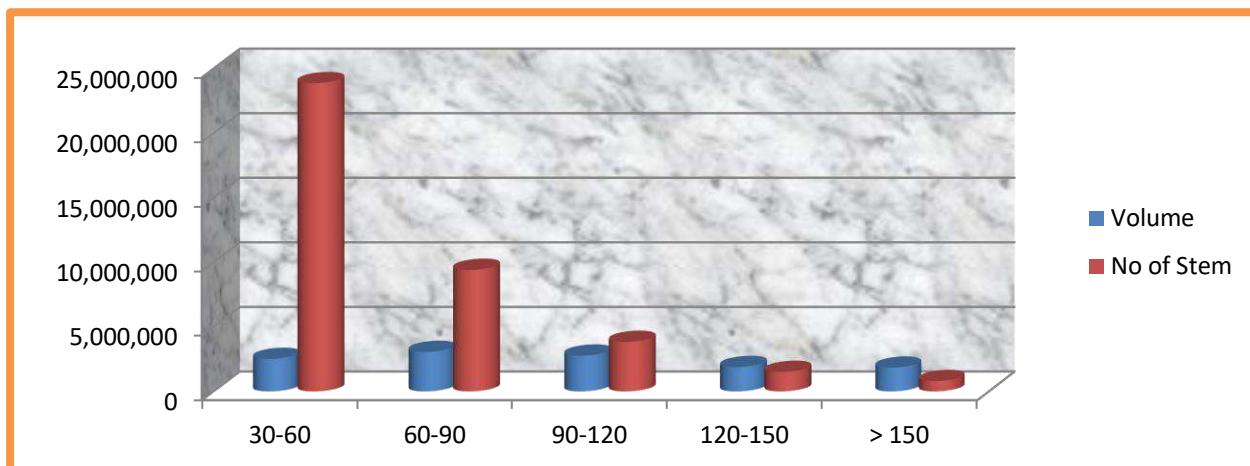


Table No. 6.5: Summary of Estimated Volume of Trees in Cum. (SFC)

Range	Major Species	Girth Class (Cm)					Total
		30-60	60-90	90-120	120-150	> 150	
Barbil	All Trees	344,506	399,030	380,307	265,404	306,683	1,695,931
B&Jp	All Trees	145,121	159,691	134,494	87,952	98,268	625,525
Champua	All Trees	205,855	278,221	165,837	87,034	118,834	855,780
Ghatagaon	All Trees	574,015	622,046	426,991	262,918	228,557	2,114,528
Keonjhar	All Trees	410,839	340,961	254,308	120,566	116,691	1,243,364
Patna	All Trees	147,447	190,045	156,871	86,649	68,616	649,628
Telkoi	All Trees	687,716	1,071,236	1,254,423	976,688	904,080	4,894,143
All Range Total		2,515,499	3,061,230	2,773,231	1,887,211	1,841,729	12,078,899
%		20.83	25.34	22.96	15.62	15.25	100.00



Basing on Sample point analysis of various modelling by NRSC, Hyderabad growing stock of timber is estimated to be **12,078,899 cum i.e. 12.078 million cum**. The growing stock is heavily on trees below 120cm Girth. Percentage of matured trees above 120cm Girth is 30.87% of the total Growing stock



From the above, it is observed that less number of matured trees (5.87%) (Contains 30.87% of growing stock). This is a very much skewed distribution of volume (Growing Stock)

6.2 Growing Stock of Bamboo:

There is no bamboo forest in the division. Bamboo growing stock is considered to be Nil.



6.3 Increment In Volume of Identified Timber Species

Field exercise has been conducted to find out the increment of important timber species like Sal, Bija, Asan, Arjun, and Teak. The Age has been ascertained, it's Girth at Breast Height and Top height measured. The data so collected are furnished below.

Table 6.6 Increment in volume of identified Timber species

Name of Species	Age	10 yr	20yr	30yr	40yr	50yr	60yr
Sal	GBH in cm	28	36	75	90	115	140
	Height in M.	6.00	8.00	15.00	18.00	21.00	25.00
	Volume in cum	0.02205	0.0486	0.395508	0.683438	1.301836	2.296875
Bija (Piasal)	GBH in cm	40	55	70	85	105	120
	Height in M.	5.00	7.50	10.00	15.00	17.50	23.00
	Volume in cum	0.0375	0.106348	0.229688	0.508008	0.904395	1.5525
Asan	GBH in cm	35	60	90	120	140	160
	Height in M.	9.00	12.00	15.00	17.00	20.0	24.00
	Volume in cum	0.05168	0.2025	0.569531	1.1475	1.8375	2.88
Arjun	GBH in cm	35	65	95	130	150	165
	Height in M.	7.5	9.50	15.00	17.00	19.00	24.00
	Volume in cum	0.043066	0.188145	0.63457	1.346719	2.003906	3.062813
Dhaura	GBH in cm	30	65	105	140	150	160
	Height in M.	7.00	9.50	13.00	14.00	15.00	17.00
	Volume in cum	0.029531	0.188145	0.671836	1.28625	1.582031	2.04
Teak	GBH in cm	25	43	60	92	130	152
	Height in M.	5.5	9.5	15.8	23.5	25.2	30.4
	Volume in cum	0.016113	0.082338	0.266625	0.932363	1.996313	3.29232

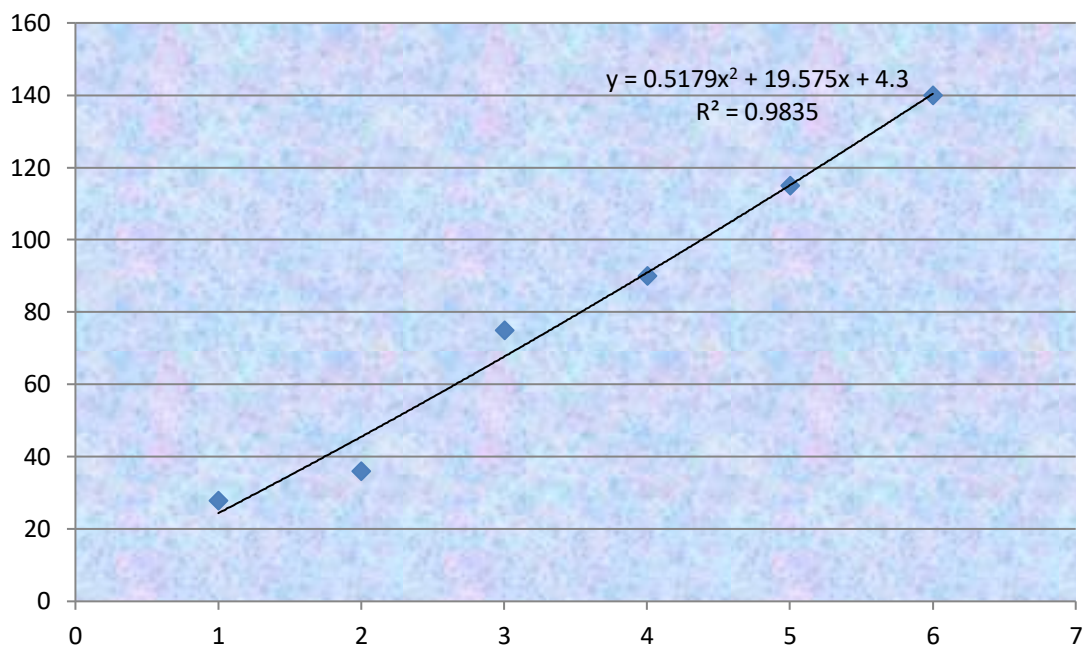
The GBH and height have been taken from field observation and calculating the average of number of data. The volume has been calculated from Quarter Girth Formula with 70% of the tree height. The average Annual increment of few important species has been predicted below.

Table No: 6.7 Average Annual increment of few important species

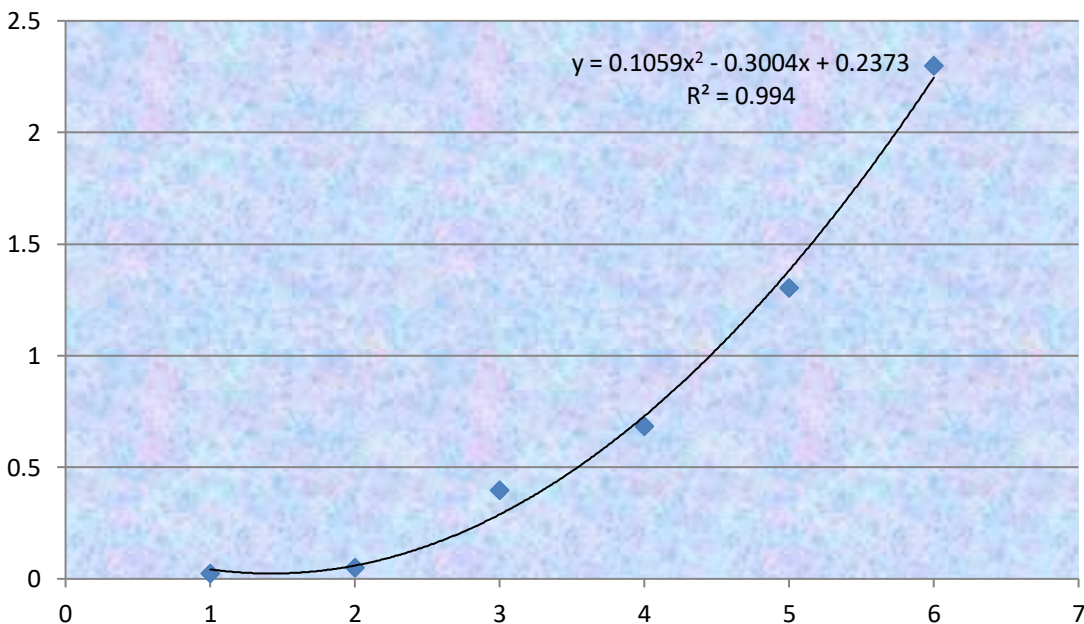
Name of Species	Growth in in cum					Annual increment predicted in Cum
	10-20 Yr	20-30 Yr	30-40Yr	40-50 Yr	50-60Yr	
Sal	0.02655	0.346908	0.28793	0.618398	0.995039	0.045497
Bija	0.068848	0.12334	0.27832	0.396387	0.648105	0.0303
Asan	0.15082	0.367031	0.577969	0.69	1.0425	0.056566
Arjun	0.145079	0.446425	0.712149	0.657187	1.058907	0.060395
Dhaura	0.158614	0.483691	0.614414	0.295781	0.457969	0.040209
Teak	0.066225	0.184287	0.665738	1.06395	1.296007	0.065524



Sal/ Age vrs GBH in cm

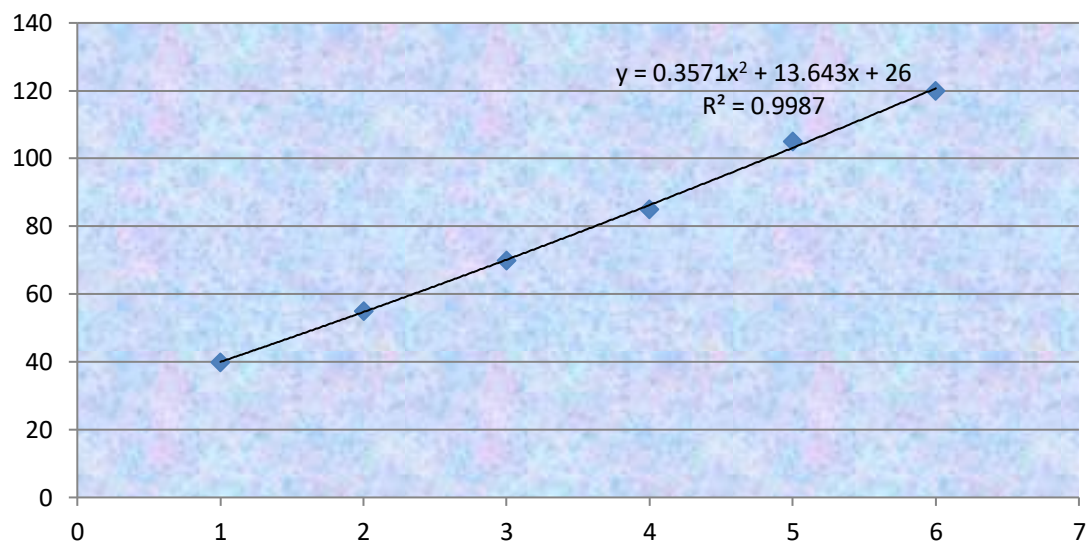


Sal Age vrs Volume in cum

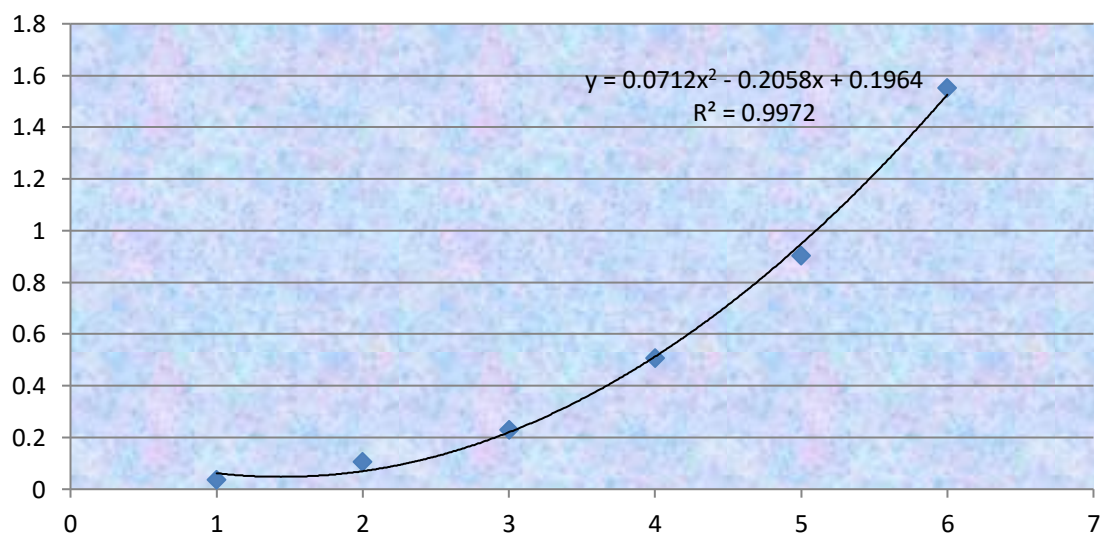




Bija Age vrs GBH in cm

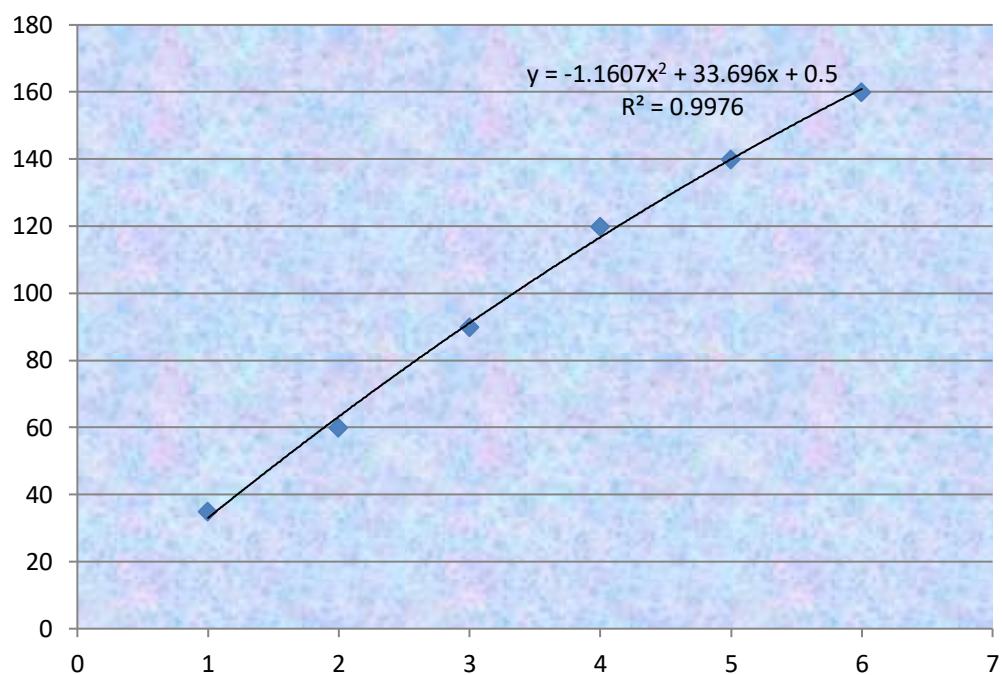


Bija Age vrs Volume in cum

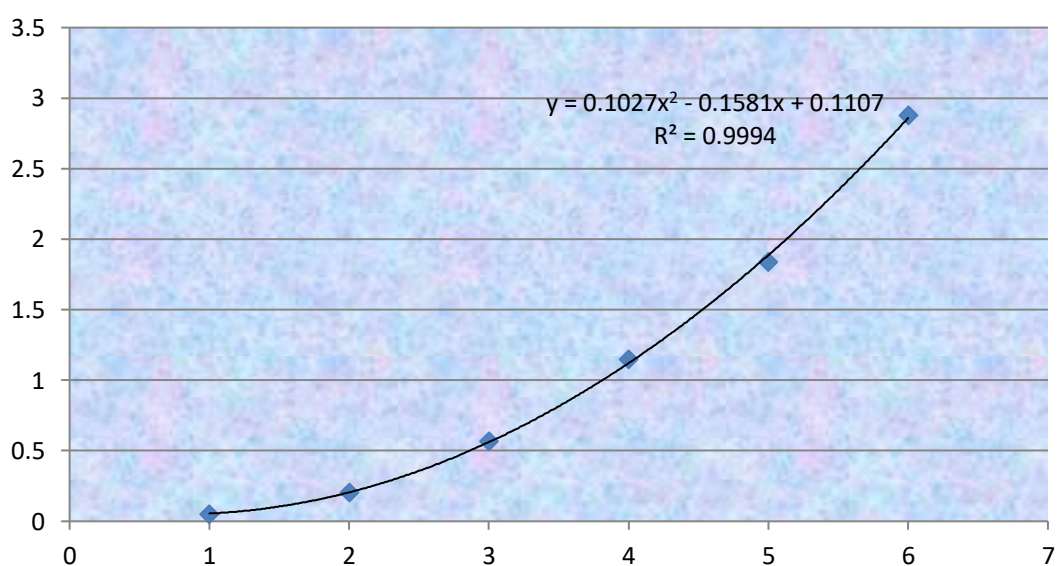




Asan Age vrs GBH in cm

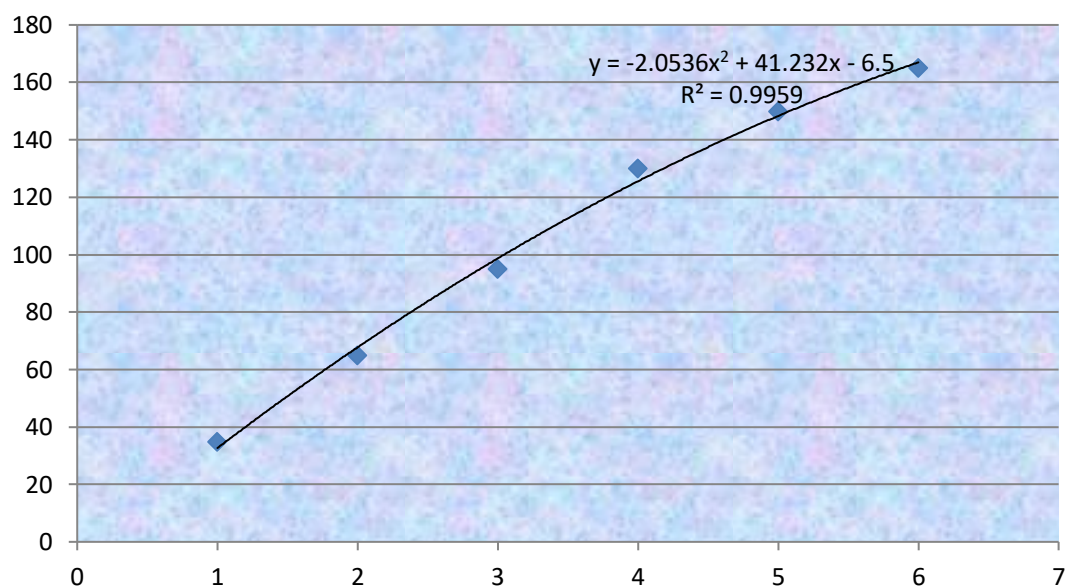


Asan- Age vrs Volume in cum

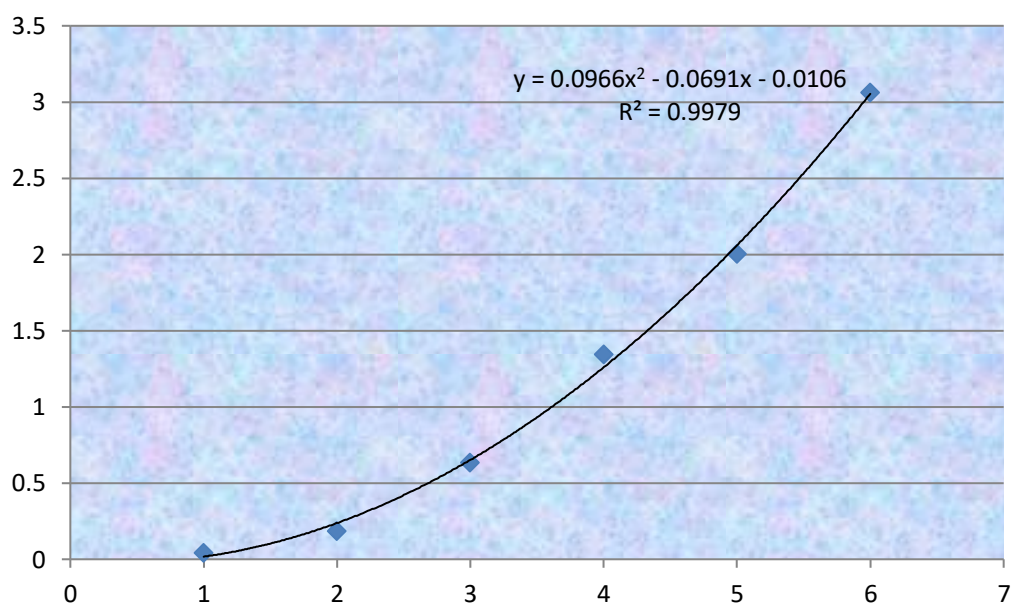




Arjun Age vrs- GBH in cm

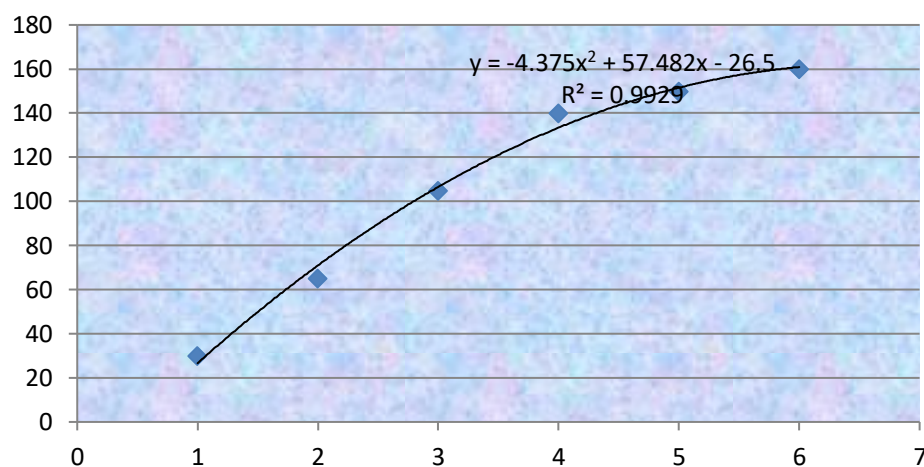


Arjun Age vrs- Volume in cum

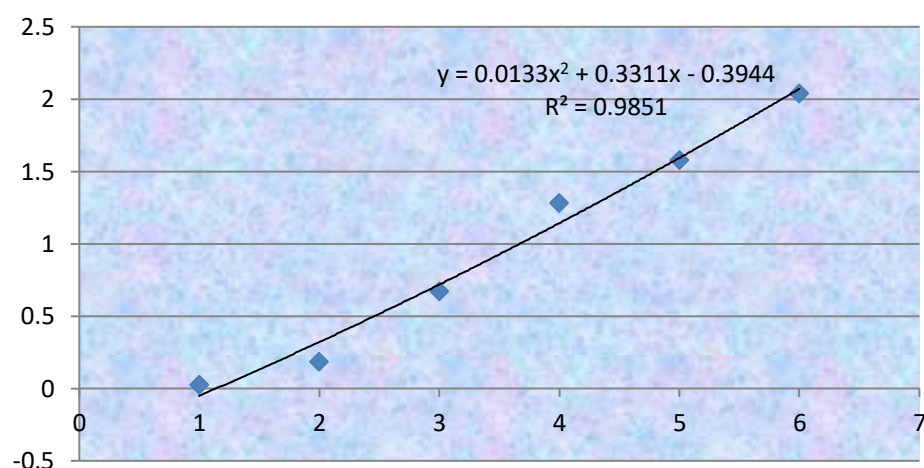




Dhaura Age- Vrs- GBH in cm

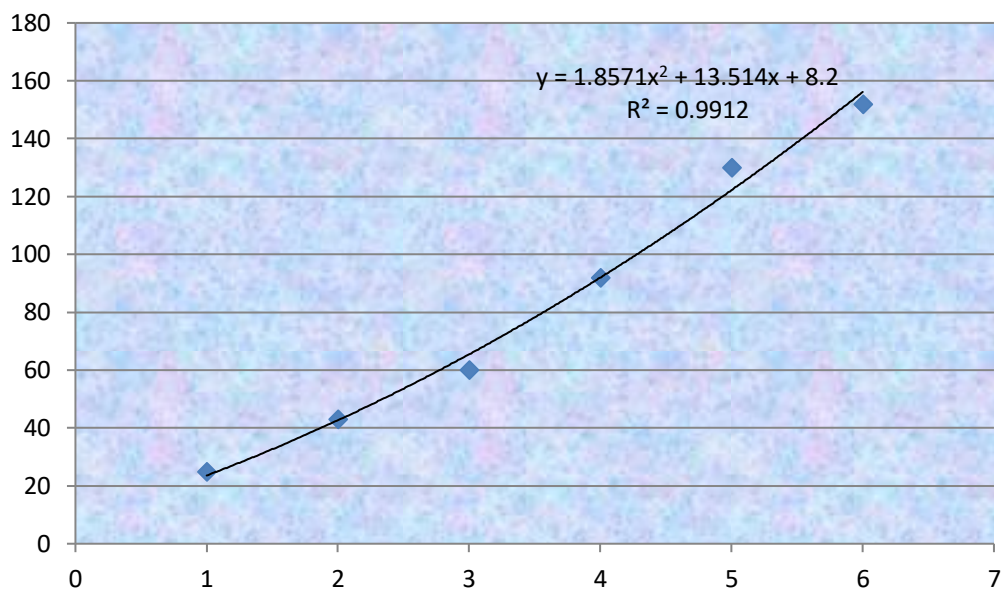


Dhaura Age vrs- Volume in cum

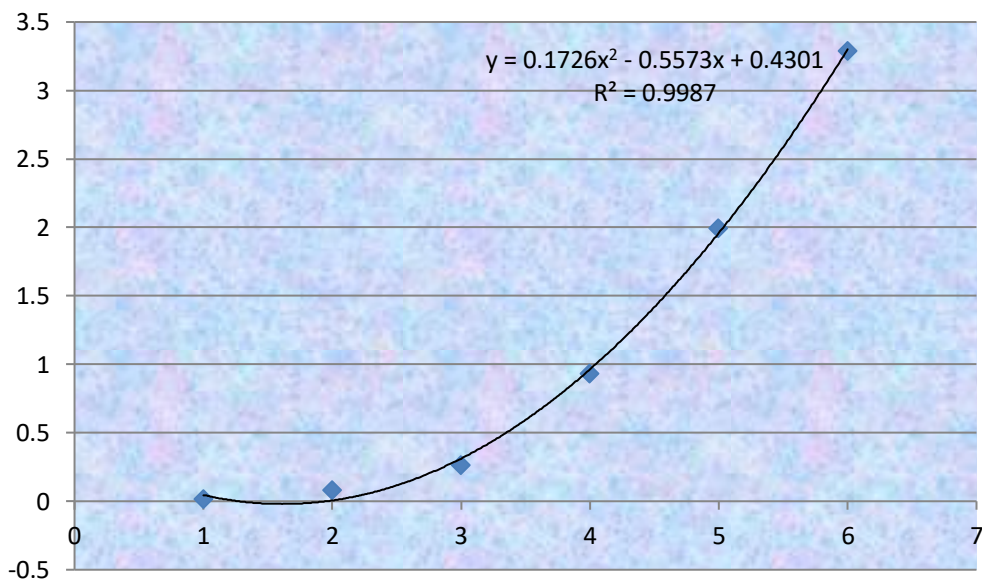




Teak Age- vrs-GBH in cm



Teak Age vrs- Volume in cum



The species wise Volume equation derived from growth data is furnished below. This gives a general clue to calculate the volume from Graph or Equation.

**Table 6.8 Volume equation for important Species of the Division.**

Sl no	Species	Volume Equation.	Remark
1	Sal	$y = 0.105x^2 - 0.300x + 0.237$	X – Age of the tree for 10 yr $x = 1$, 20 yr- $x = 2$ etc
2	Piasal (Bija)	$y = 0.071x^2 - 0.205x + 0.197$	
3	Asan	$y = 0.102x^2 - 0.158x + 0.110$	
4	Arjun	$y = 0.096x^2 - 0.069x - 0.010$	
5	Dhaura	$y = 0.013x^2 + 0.331x - 0.394$	
6	Teak	$y = 0.172x^2 - 0.557x + 0.430$	

6.4 Efforts towards Enhancement Of Forest Productivity Through Quality Plantation Activities

Enrichment of Forests through silvicultural practices and enrichment through Plantation is being practiced many decades ago. Conversion Working Circle was practised. Plantation of miscellaneous species to enrich the stock has been attempted. It is required to improve regeneration by resorting to High Forest System than coppice.

6.5 Carbon Stock Estimation

For calculation of Carbon Stock due to trees / Herbs / Leaf litters on forest floor, is required to be enumerated as per procedures led out in the National Working Plan Code-2014. No systematic study has been taken up due to funds constraint. As per thumb Rule & taking Wood Empirical Formula $C_nH_{2n}O_n$, 30 gms of Wood contain 12 gms of carbon. Considering the Ash content i.e. Metals and its oxides in plants 1 % reduction of Carbon may be safely considered.

Hence 30 Tons of Wood may contain $(12T - 0.3T)$ 11.70 Ton of Carbon. Hence 1 Ton of Wood (Dry mass) may contain 0.39 Tons of fixed Carbon. For Conversion of mass of Wood from Cum to Ton, the density factors for various species recorded in Tropical forests are furnished below.



Table No 6.8 Density of Wood

Sl No	Species	Wood density	Sl No	Species	Wood density
Tropical Asia					
1	<i>Acacia arabica</i>	0.70 *	31	<i>Amoora aherniana</i>	0.58
2	<i>Acacia catechu</i>	0.88	32	<i>Amoora macrocarpa</i>	0.55
3	<i>Acacia confusa</i>	0.75	33	<i>Amoora spp.</i>	0.6
4	<i>Acacia leucophloea</i>	0.76	34	<i>Anisophyllea zeylanica</i>	0.46 *
5	<i>Acacia richii</i>	0.69	35	<i>Anisoptera aurea</i>	0.53
6	<i>Adina cordifolia</i>	0.58, 0.59 +	36	<i>Anisoptera spp.</i>	0.54
7	<i>Aegle marmelo</i>	0.75	37	<i>Anisoptera thurifera</i>	0.54
8	<i>Agathis dammara</i>	0.41	38	<i>Anogeissus latifolia</i>	0.78, 0.79 +
9	<i>Agathis spp.</i>	0.44	39	<i>Anthocephalus chinensis</i>	0.36, 0.33 +
10	<i>Agathis vitiensis</i>	0.45	40	<i>Antidesma pleuricum</i>	0.59
11	<i>Aglaiia diffusa</i>	0.7	41	<i>Aphanamixis cumingiana</i>	0.58
12	<i>Aglaiia iloilo</i>	0.53	42	<i>Aphanamixis perrottetiana</i>	0.52
13	<i>Aglaiia llanosiana</i>	0.89	43	<i>Araucaria bidwillii</i>	0.43
14	<i>Alangium longiflorum</i>	0.65	44	<i>Artocarpus blancoi</i>	0.43
15	<i>Alangium meyeri</i>	0.63	45	<i>Artocarpus heterophylla</i>	0.6
16	<i>Albizzia amara</i>	0.70 *	46	<i>Artocarpus lakoocha</i>	0.53 *
17	<i>Albizzia falcataria</i>	0.25	47	<i>Artocarpus ovata</i>	0.47
18	<i>Albizzia lebbek</i>	0.55, 0.66 +	48	<i>Artocarpus spp.</i>	0.58
19	<i>Albizzia odoratissima</i>	0.76	49	<i>Azadirachta indica</i>	0.69
20	<i>Albizzia procera</i>	0.52 *, 0.59 +	50	<i>Azadirachta spp.</i>	0.52
21	<i>Aleurites moluccana</i>	0.25	51	<i>Balanocarpus spp.</i>	0.76
22	<i>Aleurites trisperma</i>	0.43	52	<i>Barringtonia edulis</i>	0.48
23	<i>Alnus japonica</i>	0.43	53	<i>Bauhinia spp.</i>	0.67
24	<i>Alphitonia philippinensis</i>	0.4	54	<i>Beilschmiedia tawa</i>	0.58
25	<i>Alphitonia zizyphoides</i>	0.5	55	<i>Berrya cordifolia</i>	0.78 *
26	<i>Alphonsea arborea</i>	0.69	56	<i>Bischofia javanica</i>	0.54, 0.58, 0.62 +
27	<i>Alseodaphne longipes</i>	0.49	57	<i>Bleasdalea vitiensis</i>	0.43
28	<i>Alstonia macrophylla</i>	0.62	58	<i>Bombax ceiba</i>	0.33
29	<i>Alstonia scholaris</i>	0.36	59	<i>Bombycidendron vidalianum</i>	0.53



30	<i>Alstonia spp.</i>	0.37	60	<i>Boswellia serrata</i>	0.5
31	<i>Bridelia retusa</i>	0.5	91	<i>Cedrela spp.</i>	0.42
32	<i>Bridelia squamosa</i>	0.5	92	<i>Cedrela toona</i>	0.43
33	<i>Buchanania lanzan</i>	0.45	93	<i>Ceiba pentandra</i>	0.23
34	<i>Buchanania latifolia</i>	0.45	94	<i>Celtis luzonica</i>	0.49
35	<i>Bursera serrata</i>	0.59	95	<i>Chisocheton cumingianus</i>	0.52
36	<i>Butea monosperma</i>	0.48	96	<i>Chisocheton pentandrus</i>	0.52
37	<i>Calophyllum blancoi</i>	0.51	97	<i>Chloroxylon swietenia</i>	0.76, 0.79, 0.80 +
38	<i>Calophyllum inophyllum</i>	0.57	98	<i>Chukrassia tabularis</i>	0.57
39	<i>Calophyllum neo-ebudicum</i>	0.5	99	<i>Cinnamomum mercadoi</i>	0.65
40	<i>Calophyllum obliquinervium</i>	0.58	100	<i>Cinnamomum spp.</i>	0.43
41	<i>Calophyllum spp.</i>	0.53	101	<i>Citrus grandis</i>	0.59
42	<i>Calophyllum vitiense</i>	0.5	102	<i>Cleidion speciflorum</i>	0.5
43	<i>Calycarpa arborea</i>	0.53	103	<i>Cleistanthus collinus</i>	0.88
44	<i>Cananga odorata</i>	0.29	104	<i>Cleistocalyx operculatus</i>	0.66
45	<i>Canarium asperum var. asperum</i>	0.50, 0.60 +	105	<i>Cleistocalyx spp.</i>	0.76
46	<i>Canarium hirsutum forma scabrum</i>	0.4	106	<i>Cochlospermum gossypium + religiosum</i>	0.27
47	<i>Canarium luzonicum</i>	0.51	107	<i>Cocos nucifera</i>	0.5
48	<i>Canarium spp.</i>	0.44	108	<i>Colona serratifolia</i>	0.33
49	<i>Canarium vanikoroense</i>	0.54	109	<i>Combretodendron quadrialatum</i>	0.57
50	<i>Canarium vitiense</i>	0.54	110	<i>Cordia spp.</i>	0.53
51	<i>Canarium vrieseanum forma stenophyllum</i>	0.56	111	<i>Cotylelobium spp.</i>	0.69
52	<i>Canthium monstrosum</i>	0.42	112	<i>Crataeva religiosa</i>	0.53 *
53	<i>Carallia calycina</i>	0.66 *	113	<i>Cratoxylon arborescens</i>	0.4
54	<i>Cassia fistula</i>	0.71	114	<i>Cryptocarya spp.</i>	0.59
55	<i>Cassia javanica</i>	0.69	115	<i>Cubilia cubili</i>	0.49
56	<i>Cassia spectabilis</i>	0.48	116	<i>Cullenia excelsa</i>	0.53
55	<i>Castanopsis philippensis</i>	0.51	117	<i>Cynometra insularis</i>	0.76, 0.91 +



56	<i>Casuarina equisetifolia</i>	0.83	118	<i>Cynometra ramiflora</i>	0.7
57	<i>Casuarina nodiflora</i>	0.85	119	<i>Cynometra spp.</i>	0.8
58	<i>Cedrela odorata</i>	0.38	120	<i>Dacrycarpus imbricatus</i>	0.45, 0.47 +
60	<i>Dacrydium elatum</i>	0.48	151	<i>Dipterocarpus gracilis</i>	0.61
61	<i>Dacrydium nausoriensis</i>	0.52	152	<i>Dipterocarpus grandiflorus</i>	0.62
62	<i>Dacrydium nidulum</i>	0.52	153	<i>Dipterocarpus kerrii</i>	0.56
63	<i>Dacrydium spp.</i>	0.46	154	<i>Dipterocarpus kunstlerii</i>	0.57
64	<i>Dacryodes spp.</i>	0.61	155	<i>Dipterocarpus spp.</i>	0.61
65	<i>Dalbergia latifolia</i>	0.75	156	<i>Dipterocarpus warburgii</i>	0.52
66	<i>Dalbergia paniculata</i>	0.64	157	<i>Dracontomelon dao</i>	0.52
67	<i>Decussocarpus philippinensis</i>	0.5	158	<i>Dracontomelon edule</i>	0.46
68	<i>Decussocarpus vitiensis</i>	0.37	159	<i>Dracontomelon spp.</i>	0.5
69	<i>Degeneria vitiensis</i>	0.35	160	<i>Dryobalanops spp.</i>	0.61
70	<i>Dehaasia triandra</i>	0.64	161	<i>Drypetes bordenii</i>	0.75
71	<i>Dialium spp.</i>	0.8	162	<i>Durio spp.</i>	0.53
72	<i>Dillenia luzoniensis</i>	0.69	163	<i>Durio zibethinus</i>	0.44, 0.53 +
73	<i>Dillenia megalantha</i>	0.69	164	<i>Dyera costulata</i>	0.36
74	<i>Dillenia pentagyna</i>	0.53	165	<i>Dysoxylum altissimum</i>	0.42
75	<i>Dillenia philippinensis</i>	0.61	166	<i>Dysoxylum decandrum</i>	0.51
76	<i>Dillenia spp.</i>	0.59	167	<i>Dysoxylum euphlebioides</i>	0.63
77	<i>Diospyros embryopteris</i>	0.63 *	168	<i>Dysoxylum quercifolium</i>	0.49
78	<i>Diospyros inclusa</i>	0.68	169	<i>Dysoxylum richii</i>	0.49
79	<i>Diospyros melanoxylon</i>	0.68	170	<i>Elaeocarpus serratus</i>	0.40 *
80	<i>Diospyros mindanaensis</i>	0.69	171	<i>Emblia officinalis</i>	0.8
81	<i>Diospyros nitida</i>	0.71	172	<i>Endiandra laxiflora</i>	0.54
82	<i>Diospyros philippensis</i>	0.81	173	<i>Endospermum macrophyllum</i>	0.4
83	<i>Diospyros pilosanthera</i>	0.8	174	<i>Endospermum peltatum</i>	0.31



84	<i>Diospyros poncei</i>	0.81	175	<i>Endospermum spp.</i>	0.38
85	<i>Diospyros pyrrocarpa</i>	0.6	176	<i>Enterolobium cyclocarpum</i>	0.35
86	<i>Diospyros spp.</i>	0.7	177	<i>Epicharis cumingiana</i>	0.73
87	<i>Diplodiscus paniculatus</i>	0.63	178	<i>Erythrina fusca</i>	0.25
88	<i>Dipterocarpus caudatus</i>	0.61	179	<i>Erythrina suberosa</i>	0.32
89	<i>Dipterocarpus eurychus</i>	0.56	180	<i>Erythrina subumbrans</i>	0.24
90					
91	<i>Erythrophloeum densiflorum</i>	0.65	211	<i>Heritiera sylvatica</i>	0.77
92	<i>Eucalyptus citriodora</i>	0.64	212	<i>Hevea brasiliensis</i>	0.53
93	<i>Eucalyptus deglupta</i>	0.34	213	<i>Hibiscus tiliaceus</i>	0.57
94	<i>Eugenia spp.</i>	0.65	214	<i>Homalanthus populneus</i>	0.38
95	<i>Fagraea gracilipes</i>	0.84	215	<i>Homalium spp.</i>	0.76
96	<i>Fagraea spp.</i>	0.73	216	<i>Hopea acuminata</i>	0.62
97	<i>Ficus benjamina</i>	0.65	217	<i>Hopea foxworthyi</i>	0.64
98	<i>Ficus botryocarpa</i>	0.43	218	<i>Hopea plagata</i>	0.88
99	<i>Ficus minahassae</i>	0.42	219	<i>Hopea spp.</i>	0.64
100	<i>Ficus spp.</i>	0.39	220	<i>Intsia bijuga</i>	0.61, 0.68, 0.74
101	<i>Ficus variegata</i>	0.28	221	<i>Intsia palembanica</i>	0.68
102	<i>Ganua obovatifolia</i>	0.59	222	<i>Kayea garciae</i>	0.53
103	<i>Garcinia myrtifolia</i>	0.65	223	<i>Kingiodendron alternifolium</i>	0.48
104	<i>Garcinia spp.</i>	0.75	224	<i>Kleinhovia hospita</i>	0.36
105	<i>Gardenia latifolia</i>	0.64	225	<i>Knema spp.</i>	0.53
106	<i>Gardenia turgida</i>	0.64	226	<i>Koompassia excelsa</i>	0.63
107	<i>Garuga pinnata</i>	0.51	227	<i>Koompassia malaccensis</i>	0.72
108	<i>Gluta spp.</i>	0.63	228	<i>Koordersiodendron pinnatum</i>	0.65, 0.69 +
109	<i>Gmelina arborea</i>	0.41, 0.45 +	229	<i>Kydia calycina</i>	0.72
110	<i>Gmelina vitiensis</i>	0.54	230	<i>Lagerstroemia parviflora</i>	0.62
111	<i>Gonocaryum calleryanum</i>	0.64	231	<i>Lagerstroemia piriformis</i>	0.5
112	<i>Gonystylus bancanus</i>	0.52	232	<i>Lagerstroemia speciosa</i>	0.53



113	<i>Gonystylus macrophyllus</i>	0.52	233	<i>Lagerstroemia spp.</i>	0.55
114	<i>Gonystylus punctatus</i>	0.57	234	<i>Lannea coromandelica</i>	0.54
115	<i>Grewia multiflora</i>	0.46	235	<i>Lannea grandis</i>	0.5
116	<i>Grewia tiliaefolia</i>	0.68	236	<i>Leucaena leucocephala</i>	0.64
117	<i>Hardwickia binata</i>	0.73	237	<i>Litchi chinensis</i> var. <i>philippinensis</i>	0.88
118	<i>Harpullia arborea</i>	0.62	238	<i>Lithocarpus celebica</i>	0.68
119	<i>Heritiera ornithocephala</i>	0.68	239	<i>Lithocarpus llanosii</i>	0.63
120	<i>Heritiera spp.</i>	0.56	240	<i>Lithocarpus soleriana</i>	0.63
121					
122	<i>Litsea garciae</i>	0.34	271	<i>Milliusa velutina</i>	0.63
123	<i>Litsea leytensis</i>	0.35	272	<i>Mimusops elengi</i>	0.72 *
124	<i>Litsea perrottetii</i>	0.45	273	<i>Mitragyna parviflora</i>	0.56
125	<i>Litsea spp.</i>	0.4	274	<i>Myristica castaneifolia</i>	0.49
126	<i>Lophopetalum spp.</i>	0.46	275	<i>Myristica chartacea</i>	0.49
127	<i>Macaranga bicolor</i>	0.29	276	<i>Myristica gillespieana</i>	0.49
128	<i>Macaranga denticulata</i>	0.53	277	<i>Myristica spp.</i>	0.53
129	<i>Madhuca fulva</i>	0.53	278	<i>Neesia spp.</i>	0.53
130	<i>Madhuca longifolia</i> var. <i>latifolia</i>	0.74	279	<i>Neonauclea bernardoi</i>	0.62
131	<i>Madhuca oblongifolia</i>	0.53	280	<i>Neotrewia cumingii</i>	0.55
132	<i>Mallotus multiglandulosus</i>	0.42	281	<i>Ochna foxworthyi</i>	0.86
133	<i>Mallotus philippensis</i>	0.64	282	<i>Ochroma pyramidale</i>	0.3
134	<i>Mangifera altissima</i>	0.55	283	<i>Octomeles sumatrana</i>	0.27, 0.32 +
135	<i>Mangifera indica</i>	0.52, 0.59 +	284	<i>Oroxylon indicum</i>	0.32
136	<i>Mangifera merrillii</i>	0.52	285	<i>Ougenia dalbergiodes</i>	0.7
137	<i>Mangifera spp.</i>	0.52	286	<i>Palaquium fidjiense</i>	0.48
138	<i>Maniltoa grandiflora</i>	0.76	287	<i>Palaquium hornei</i>	0.7
139	<i>Maniltoa minor</i>	0.76	288	<i>Palaquium lanceolatum</i>	0.55
140	<i>Mastixia philippinensis</i>	0.47	289	<i>Palaquium luzoniense</i>	0.45



141	<i>Melanorrhoea spp.</i>	0.63	290	<i>Palaquium philippense</i>	0.41
142	<i>Melia dubia</i>	0.4	291	<i>Palaquium spp.</i>	0.55
143	<i>Melicope triphylla</i>	0.37	292	<i>Palaquium tenuipetiolatum</i>	0.5
144	<i>Meliosma macrophylla</i>	0.27	293	<i>Palaquium vitilevuense</i>	0.48
145	<i>Melochia umbellata</i>	0.25	294	<i>Pangium edule</i>	0.5
146	<i>Mesua ferrea</i>	0.83, 0.85 +	295	<i>Parashorea malaanonan</i>	0.51
147	<i>Metrosideros collina</i>	0.70, 0.76 +	296	<i>Parashorea spp.</i>	0.44
148	<i>Michelia platyphylla</i>	0.51	297	<i>Parashorea stellata</i>	0.59
149	<i>Michelia spp.</i>	0.43	298	<i>Paratrophis glabra</i>	0.77
150	<i>Microcos stylocarpa</i>	0.4	299	<i>Parinari corymbosa</i>	0.76
151	<i>Micromelum compressum</i>	0.64	300	<i>Parinari insularum</i>	0.65
152					
153	<i>Parinari spp.</i>	0.68	331	<i>Salmaalial malabarica</i>	0.32, 0.33 +
154	<i>Parkia roxburghii</i>	0.34	332	<i>Samanea saman</i>	0.45, 0.46 4
155	<i>Payena spp.</i>	0.55	333	<i>Sandoricum koetjape</i>	0.44
156	<i>Peltophorum pterocarpum</i>	0.62	334	<i>Sandoricum vidalii</i>	0.43
157	<i>Pentace spp.</i>	0.56	335	<i>Sapindus saponaria</i>	0.58
158	<i>Phaeanthus ebracteolatus</i>	0.56	336	<i>Sapium luzonicum</i>	0.4
159	<i>Phyllocladus hypophyllus</i>	0.53	337	<i>Schleichera oleosa</i>	0.96
160	<i>Pinus caribaea</i>	0.48	338	<i>Schrebera swietenoides</i>	0.82
161	<i>Pinus insularis</i>	0.47, 0.48 +	339	<i>Semicarpus anacardium</i>	0.64
162	<i>Pinus merkusii</i>	0.54	340	<i>Serialbizia acle</i>	0.57
163	<i>Pisonia umbellifera</i>	0.21	341	<i>Serianthes melanesica</i>	0.48
164	<i>Pittosporum pentandrum</i>	0.51	342	<i>Sesbania grandiflora</i>	0.4
165	<i>Planchonella vitiensis</i>	0.77	343	<i>Shorea agsaboensis</i>	0.35
166	<i>Planchonia spectabilis</i>	0.58	344	<i>Shorea almon</i>	0.42
167	<i>Planchonia spp.</i>	0.59	345	<i>Shorea assamica forma philippinensis</i>	0.41
168	<i>Podocarpus neriifolius</i>	0.52	346	<i>Shorea astylosa</i>	0.73
169	<i>Podocarpus spp.</i>	0.43	347	<i>Shorea ciliata</i>	0.75



170	<i>Polyalthia flava</i>	0.51	348	<i>Shorea contorta</i>	0.44
171	<i>Polyscias nodosa</i>	0.38	349	<i>Shorea gisok</i>	0.76
172	<i>Pometia pinnata</i> <i>forma pinnata</i>	0.58	350	<i>Shorea guiso</i>	0.68
173	<i>Pometia spp.</i>	0.54	351	<i>Shorea hopeifolia</i>	0.44
174	<i>Pouteria villamilii</i>	0.47	352	<i>Shorea malibato</i>	0.78
175	<i>Premna tomentosa</i>	0.96	353	<i>Shorea negrosensis</i>	0.44
176	<i>Pterocarpus indicus</i>	0.52	354	<i>Shorea palosapis</i>	0.39
177	<i>Pterocarpus</i> <i>marsupium</i>	0.67	355	<i>Shorea plagata</i>	0.7
178	<i>Pterocymbium</i> <i>macrorater</i>	0.47	356	<i>Shorea polita</i>	0.47
179	<i>Pterocymbium</i> <i>tintorium</i>	0.28	357	<i>Shorea polysperma</i>	0.47
180	<i>Pygeum vulgare</i>	0.57	358	<i>Shorea robusta</i>	0.72
181	<i>Quercus spp.</i>	0.7	359	<i>Shorea spp. balau</i> <i>group</i>	0.7
182	<i>Radermachera pinnata</i>	0.51	360	<i>Shorea spp. dark red</i> <i>meranti</i>	0.55
183					
184	<i>Shorea spp. light red</i> <i>meranti</i>	0.4	391	<i>Terminalia chebula</i>	0.96
185	<i>Shorea spp. white</i> <i>meranti</i>	0.48	392	<i>Terminalia citrina</i>	0.71
186	<i>Shorea spp. yellow</i> <i>meranti</i>	0.46	393	<i>Terminalia copelandii</i>	0.46
187	<i>Shorea virescens</i>	0.42	394	<i>Terminalia</i> <i>foetidissima</i>	0.55
188	<i>Sloanea javanica</i>	0.53	395	<i>Terminalia</i> <i>microcarpa</i>	0.53
189	<i>Soymida febrifuga</i>	0.97	396	<i>Terminalia nitens</i>	0.58
190	<i>Spathodea</i> <i>campanulata</i>	0.25	397	<i>Terminalia</i> <i>pterocarpa</i>	0.48
191	<i>Stemonurus</i> <i>luzoniensis</i>	0.37	398	<i>Terminalia</i> <i>tomentosa</i>	0.73, 0.76, 0.77 +
192	<i>Sterculia ceramica</i>	0.27	399	<i>Ternstroemia</i> <i>megacarpa</i>	0.53
193	<i>Sterculia foetida</i>	0.47 *	400	<i>Tetrameles nudiflora</i>	0.3
194	<i>Sterculia urens</i>	0.67	401	<i>Tetramerista glabra</i>	0.61
195	<i>Sterculia vitiensis</i>	0.31	402	<i>Thespesia populnea</i>	0.52
196	<i>Stereospermum</i> <i>suaveolens</i>	0.62	403	<i>Toona calantas</i>	0.29



197	<i>Strombosia philippinensis</i>	0.71	404	<i>Trema orientalis</i>	0.31
198	<i>Strychnos potatorum</i>	0.88	405	<i>Trichospermum richii</i>	0.32
199	<i>Swietenia macrophylla</i>	0.49, 0.53 +	406	<i>Tristania decorticata</i>	0.91
200	<i>Swintonia foxworthyi</i>	0.62	407	<i>Tristania micrantha</i>	0.89
201	<i>Swintonia spp.</i>	0.61	408	<i>Tristania spp.</i>	0.8
202	<i>Sycopsis dunni</i>	0.63	409	<i>Turpinia ovalifolia</i>	0.36
203	<i>Syzygium cumini</i>	0.7	410	<i>Vateria indica</i>	0.47 *
204	<i>Syzygium luzoniense</i>	0.63	411	<i>Vatica mangachapoi</i>	0.65
205	<i>Syzygium nitidum</i>	0.74	412	<i>Vatica obscura</i>	1.04 *
206	<i>Syzygium simile</i>	0.56	413	<i>Vatica pachyphylla</i>	0.78
207	<i>Syzygium spp.</i>	0.69, 0.76 +	414	<i>Vatica spp.</i>	0.69
208	<i>Tamarindus indica</i>	0.75	415	<i>Vitex parviflora</i>	0.7
209	<i>Tectona grandis</i>	0.50, 0.55 +	416	<i>Vitex peduncularis</i>	0.96
210	<i>Teijsmanniodendron ahernianum</i>	0.9	417	<i>Vitex spp.</i>	0.65
211	<i>Terminalia arjuna</i>	0.68	418	<i>Vitex turczaninowii</i>	0.49
212	<i>Terminalia belerica</i>	0.72	419	<i>Wallaceodendron celebicum</i>	0.55, 0.57 +
213	<i>Terminalia catappa</i>	0.52	420	<i>Weinmannia luzoniensis</i>	0.49
214					
215	<i>Wrightia tinctoria</i>	0.75	425	<i>Zanthoxylum rhetsa</i>	0.33
216	<i>Xanthophyllum excelsum</i>	0.63	426	<i>Zizyphus spp.</i>	0.76
217	<i>Xanthostemon verdugonianus</i>	1.04	427	<i>Zizyphus talanai</i>	0.53
218	<i>Xylia xylocarpa</i>	0.73, 0.81 +	428	<i>Zizyphus xylopyra</i>	0.85

6.6 Carbon Sequestration & Mitigation:

6.6.1 Carbon sequestration:

Carbon sequestration is the process involved in carbon capture and the long-term storage of atmospheric carbon dioxide or other forms of carbon to mitigate or defer global warming. It has been proposed as a way to slow the atmospheric and marine accumulation of greenhouse gases, which are released by burning fossil fuels.

Carbon dioxide (CO₂) is naturally captured from the atmosphere through biological, chemical, and physical processes.

Carbon dioxide may be captured as a pure by-product in processes related to petroleum refining or from flue gases from power generation. CO₂ sequestration includes the storage part of carbon capture and storage, which refers to large-scale, artificial capture and



sequestration of industrially produced CO₂ using subsurface saline aquifers, reservoirs, ocean water, aging oil fields, or other carbon sinks.

Increasing yields and efficiency generally reduces emissions as well, since more food results from the same or less effort. Techniques include more accurate use of fertilizers, less soil disturbance, better irrigation, and crop strains bred for locally beneficial traits and increased yields.

Replacing more energy intensive farming operations can also reduce emissions. Reduced or no-till farming requires less machine use and burns correspondingly less fuel per acre. However, no-till usually increases use of weed-control chemicals and the residue now left on the soil surface is more likely to release its CO₂ to the atmosphere as it decays, reducing the net carbon reduction.

In practice, most farming operations that incorporate post-harvest crop residues, wastes and byproducts back into the soil provide a carbon storage benefit. This is particularly the case for Practices such as field burning of stubble – rather than releasing almost all of the stored CO₂ to the atmosphere; tillage incorporates the biomass back into the soil.

Carbon Sequestration as it relates to Forestry, the following steps are suggested:

- Planting of Species of long rotation period in order to enhance carbon storage for a longer period.
- The crop should not be harvested if the bio mass growth is faster i.e. first growing species to be favoured to slow growing species. When growth is retired the species may be harvested.
- The timber should be utilized in structures / house hold articles than use as fuel.
- Leaf litters, Twigs may be allowed to convert to compost and goes back to soil than use as fuel which immediately releases CO₂ to atmosphere.
- Steps to be taken to improve soil organic content than losing carbon to atmosphere as CO₂.

Enhancing carbon removal:

All crops absorb CO₂ during growth and release it after harvest. The goal of agricultural carbon removal is to use the crop and its relation to the carbon cycle to permanently sequester carbon within the soil. This is done by selecting farming methods that return biomass to the soil and enhance the conditions in which the carbon within the plants will be reduced to its elemental nature and stored in a stable state. Methods for accomplishing this include:

- Use cover crops such as grasses and weeds as temporary cover between planting seasons



- Concentrate livestock in small paddocks for days at a time so they graze lightly but evenly. This encourages roots to grow deeper into the soil. Stock also till the soil with their hooves, grinding old grass and manures into the soil.
- Cover bare paddocks with hay or dead vegetation. This protects soil from the sun and allows the soil to hold more water and be more attractive to carbon-capturing microbes.
- Restore degraded land, which slows carbon release while returning the land to agriculture or other use.

Agricultural sequestration practices may have positive effects on soil, air, and water quality, be beneficial to wildlife, and expand food production. On degraded croplands, an increase of 1 ton of soil carbon pool may increase crop yield by 20 to 40 kilograms per hectare of wheat, 10 to 20 kg/ ha for maize, and 0.5 to 1 kg/ha for cowpeas.

The effects of soil sequestration can be reversed. If the soil is disrupted or tillage practices are abandoned, the soil becomes a net source of greenhouse gases. Typically after 15 to 30 years of sequestration, soil becomes saturated and ceases to absorb carbon. This implies that there is a global limit to the amount of carbon that soil can hold.

Many factors affect the costs of carbon sequestration including soil quality, transaction costs and various externalities such as leakage and unforeseen environmental damage. Because reduction of atmospheric CO₂ is a long-term concern, farmers can be reluctant to adopt more expensive agricultural techniques when there is not a clear crop, soil, or economic benefit.

6.6.2 Forest Type Wise Carbon Stock:

Table No 6.9 Forest type wise Carbon Stock of Keonjhar Division.

Forest Type	Area in Ha	Growing Stock in Cum per ha	Total Growing Stock (in 10 ³ Cum	Density T/ Cum	Total Carbon in 10 ³ ton	CO ₂ Equivalent in Ton 10 ³
Moist Dec. Forest	93930.559	124.02	11649.27	0.7	3180.25	11660.92
Dry Forest	62620.3727	114.56	7173.79	0.7	1958.445	7180.964
Total	156550.9		18823.06		5138.695	18841.88

The Carbon stock estimated to be 51.38×10^5 T or say 5.138 Million Tons of Carbon.

6.6.3 Mitigation Measures:

It is a common knowledge that Green House Gases are the cause of Global Warming. The entire world is greatly concerned to increase of GHG specially the CO₂. Photosynthesis is the simplest method to reduce the GHG in the atmosphere. The mitigation measures that can be practiced by a Forester are



- Increase tree cover by woody vegetation on Blank Areas.
- Enrich the existing forest by plantation and crop density may be maintained above 70%
- Allow Ground Flora to cover the Forest Floor.
- Long term Rotation to be adopted than a short term rotation.
- Reduce Forest Fire and release of CO₂.
- Allow a good humus cover to retain soil fertility and vigour.
- Reduce Fire wood consumption in rural areas through improved Chulla / Fire Place.
- Increase life of wooden materials through seasoning & treatment.





CHAPTER – 7

OPTIMIZATION OF FOREST RESOURCE UTILIZATION

7.1 Recorded Removal of Timber:

The outgoing Plan by Sri Narayan Samal for the Period 2007-08 to 2016-17 though not approved in toto, the working prescriptions were approved in shape of Annual Schemes. In the outgoing plan, there are three Felling Series, namely Kaliahata Felling Series (KLH FS), Padang Felling Series (PDG FS) and Talapada Felling Series (TLP FS). The coupe working from 2011-12 has been taken for analysis. The coupe wise area, trees marked and timber obtained is at Table No 7.1 below.

Table No 7.1 Production of Timber from Coupe Area						
Working Year	Name Of The Coupe	Area In Ha	No Of Trees Marked	No Of Trees Felled	No Of Trees Surrenderd	Timber in Cum
2011-12	KLH-V	960.3145	578	578	0	183.2828
2012-13	KLH-VI	655.3063	271	271	0	55.5624
2013-14	KLH-VII	469.4347	260	260	0	38.7156
2014-15	KLH-VIII	509.8227	731	731	0	33.7008
2015-16	KLH-IX	927.3484	1098	1098	0	119.9055
2016-17	KLH-X	1437.3115	383	383	0	128.0261
2017-18	KLH-I & II	1238.001	1673	26	1647	17.5463
		6197.5391	4994	3347	1647	576.7395
2011-12	PDG-V	909.2003	286	286	0	145.2211
2012-13	PDG-VI	1177.3463	282	282	0	103.5068
2013-14	PDG-VII	408.3542	225	225	0	84.2582
2014-15	PDG-VIII	345.2093	519	519	0	209.7951
2015-16	PDG-IX	515.8886	61	61	0	25.7755
2016-17	PDG-X	1229.8612	536	463	73	146.6489
2017-18	PDG-I & II	2100.4996	1407	96	1311	62.2957
2018-19	PDG-III	1223.6473	342	342	0	121.7212
2019-20	PDG-IV	414.8676	110	110	0	65.1951
		8324.8744	3768	2384	1384	964.4176
2011-12	TLP-V	553.2168	307	307	0	164.8499
2012-13	TLP-VI	628.0097	389	389	0	148.4544
2013-14	TLP-VII	782.806	561	561	0	265.1380
2014-15	TLP-VIII	795.3593	429	429	0	187.1103
2015-16	TLP-IX	750.7947	473	473	0	58.2410
2016-17	TLP-X	978.0917	1153	1153	0	83.7531
2017-18	TLP-I & II	1467.5924	991	101	890	49.7130
		5955.8706	4303	3413	890	957.2597
2011-12	GNK-V-IWC	303.3964	19	19	0	20.4009
	G. Total	20781.681	13084	9163	3921	2518.8177
No of Trees per Ha			0.63			



Timber productivity per ha in cum		0.121			

7.2 Recorded Removal of Fuel Wood:

During Coupe working Fire wood has been obtained as indicated below. (Table No 7.2)

Table No 7.2 Production of Fire wood from coupes.							
Working Year	Name Of The Coupe	Area In Ha	No Of Trees Marked	No Of Trees Feilled	No Of Trees Surrendered	Fire wood in Stacks	FW in Tons
2011-12	KLH-V	960.3145	578	578	0	300	450.0
2012-13	KLH-VI	655.3063	271	271	0	65	97.5
2013-14	KLH-VII	469.4347	260	260	0	46	69.0
2014-15	KLH-VIII	509.8227	731	731	0	212	318.0
2015-16	KLH-IX	927.3484	1098	1098	0	300	450.0
2016-17	KLH-X	1437.3115	383	383	0	70	105.0
2017-18	KLH-I & II	1238.0010	1673	26	1647	4	6.0
	Total	6197.5391	4994	3347	1647	997	1495.5
2011-12	PDG-V	909.2003	286	286	0	120	180.0
2012-13	PDG-VI	1177.3463	282	282	0	107	160.5
2013-14	PDG-VII	408.3542	225	225	0	46	69.0
2014-15	PDG-VIII	345.2093	519	519	0	197	295.5
2015-16	PDG-IX	515.8886	61	61	0	18	27.0
2016-17	PDG-X	1229.8612	536	463	73	166	249.0
2017-18	PDG-I & II	2100.4996	1407	96	1311	60	90.0
2018-19	PDG-III	1223.6473	342	342	0	30	45.0
2019-20	PDG-IV	414.8676	110	110	0	12	18.0
		8324.8744	3768	2384	1384	756	1134.0
2011-12	TLP-V	553.2168	307	307	0	150	225.0
2012-13	TLP-VI	628.0097	389	389	0	98	147.0
2013-14	TLP-VII	782.806	561	561	0	194	291.0
2014-15	TLP-VIII	795.3593	429	429	0	120	180.0
2015-16	TLP-IX	750.7947	473	473	0	201	301.5
2016-17	TLP-X	978.0917	1153	1153	0	319	478.5
2017-18	TLP-I & II	1467.5924	991	101	890	40	60.0
		5955.8706	4303	3413	890	1122	1683.0
2011-12	GNK-V-IWC	303.3964	19	19	0	2	3.0
	G. Total	20781.681	13084	9163	3921	2877	4315.5
FW Ton per ha		0.207					

(NB: 1 Stack of 12'x3'x3'= 1.50 Ton)

7.3 Recorded Removal of Bamboo/Rattans:

There is no Bamboo forest in the division. Hence Production of Bamboo is Nil.



7.4 Recorded Removal of Locally Important NTFPs Including MAPs:

The important NTFP including MAPs of this division mostly classified into different categories like Fiber yielding, Fruit Bearing trees, Oil yielding Species, Gum and Resin yielding Species, Tannin Yielding species etc. which is provided below in table No. 7.3. These NTFPs are removed from the forests for their own consumption as well as a source of income for their livelihood support by selling these products in the local market. These products are then exported to the local small-scale industries for preparation of different material as demand is very high.

7.4.1 Fiber yielding Plants:

Fiber yielding plants of the division are furnished in Table No 7.3 below.

Table No. 7.3: Important Fiber yielding species found in Keonjhar Division				
Sl. No	Local Name	Botanical Name	Useful Part	Uses
01	Aswastha	<i>Ficus religiosa</i>	Tree	Rope making
02	Bara	<i>Ficus bengalensis</i>	Tree	Rope making
03	Jaisanda	<i>Litsia glutinosa</i>	Fibre	Rope making
04	Palasa	<i>Butea monosperma</i>	Root	Rope making
05	Siali	<i>Bauhinia vahlii</i>	Fibre	Rope making
06	Aswastha	<i>Ficus religiosa</i>	Tree	Rope making
07	Genduli	<i>Sterculia urens</i>	Tree	Rope making

Table No. 7.4: Important Fruit Bearing trees found in Keonjhar Division			
Sl.No	Local Name	Scientific Name	Part Used
01	Amba	<i>Mangifera indica</i>	Fruit is edible
02	Amla	<i>Emblica officinalis</i>	Medicinal
03	Aswastha	<i>Ficus religiosa</i>	Fruit for animals, Birds
04	Bara	<i>Ficus bengalensis</i>	Fruits eaten by Birds & animals
05	Bahada	<i>Terminalia belerica</i>	Medicinal and Edible for animal
06	Barkoli	<i>Zizyphus mauritiana</i>	Fruit is edible
07	Baula	<i>Mimusops elengii</i>	Fruit is edible
08	Bela	<i>Aegle marmelos</i>	Edible Fruit
09	Bhalia	<i>Semicarpus anacardium</i>	Fruit is edible
10	Chara	<i>Buchanania lanzan</i>	Edible Fruit
11	Dimiri	<i>Ficus racemosa</i>	Fruits by Birds & Animals
12	Gambhar	<i>Gmelina arborea</i>	Fruits for Animals
13	Harida	<i>Terminalia chebula</i>	Fruit for Medicine
14	Jamu	<i>Syzygium cumini</i>	Edible Fruit
15	Kendu	<i>Diospyros melanoxylon</i>	Edible Fruit
16	Kochila	<i>Strychnos nuxvomica</i>	Fruit for Medicine Birds



17	Kusum	<i>Schleichera oleosa</i>	Edible Oil, Fruit
18	Mahua	<i>Madhuca indica</i>	Edible Oil, Fruit
19	Neem	<i>Azadirachta indica</i>	Ripen fruit edible by birds
20	Panas	<i>Artocarpus integrifolia</i>	Edible Fruit
21	Sal	<i>Shorea robusta</i>	Edible Oil
22	Tentuli	<i>Tamarindus indica</i>	Edible Fruit for Man

Table No. 7.5: Important Oil yielding Species found in Keonjhar Division

Sl. No	Local Name	Scientific Name	Part Used	Products
01	Champa	<i>Michelia champaca</i>	Flower	Perfumes
02	Chandan	<i>Santalum album</i>	Wood	Perfume, soap
03	Karanja	<i>Pongamia pinnata</i>	Seed	Oil in Medicines
04	Kochila	<i>Strychnos nuxvomica</i>	Seed	Medicines
05	Kusum	<i>Schleichera oleosa</i>	Seed	Cooking and soap making
06	Mahua	<i>Madhuca indica</i>	Seed	Oil Edible
07	Neem	<i>Azadirachta indica</i>	Seed	Oil in Medicines
08	Polanga	<i>Callophyllum inophyllum</i>	Seed	Soap making
09	Sal	<i>Shorea robusta</i>	Seed	Oil
10	Sinduri gundi	<i>Mallotus phillipinensis</i>	Seed	Colour and Medicine

Table No. 7.6: Important Gum and Resin yielding Species found in Keonjhar Division

Sl. No	Local Name	Botanical Name	Useful Parts	Uses
01	Babul	<i>Acacia nilotica</i>	Gums	Calico-printing, dyeing and as sizing material for silk, cotton.
02	Dhaura	<i>Anogeissus latifolia</i>	Gum	Sizing paper and in printing
03	Genduli	<i>Sterculia urens</i>	Gum	Gum is edible and Used in preparation of Confectionaries
04	Khair	<i>Acacia catechu</i>	Khaira	Katha (Pan) making industry
05	Salai	<i>Boswellia serrata</i>	Gum	Pleasant smell when burnt
06	Sal	<i>Shorea robusta</i>	Resin from heart wood	Manufacture of varnish, paint,

**Table No. 7.7: Important Tannin yielding Species found in Keonjhar Division**

Sl. No	Local Name	Botanical Name	Part Yielding Oil	Uses
01	Anla	<i>Emblia officinalis</i>	Fruit	Medicinal, leather
02	Arjuna	<i>Terminalia arjuna</i>	Bark and fruits	Leather
03	Babul	<i>Acacia nilotica</i>	Bark and fruits	Leather
04	Bahada	<i>Terminalia belerica</i>	Myrobalans (Fruit)	Medicinal, leather
05	Dhaura	<i>Anogeissus latifolia</i>	Leaves	Leather
06	Harida	<i>Terminalia chebula</i>	Fruit	Medicinal, leather

Previously, different NTFP items were collected through Private Agencies and Government Agencies e.g. OFDC Ltd., TDCC Ltd. TRIFED etc. Sal seeds were being collected and marketed by the OFDC Ltd. up to 2005. But subsequently collection of Sal seeds is entrusted to the Grama Panchayats vide notification No.5F(C) 2/2006-3673 F&E date.1.3.2006 of Forest and Environment Department.

In order to streamline the system of collection and disposal of NTFP, which are major source of livelihood of the rural poor, especially women, the State Government came out with a new policy guideline on 31.03.2000. This gives ownership rights to the Gram Panchayat (village councils - lowest unit of local self-governance) not only in scheduled areas but also in the entire State. The policy had become over due after promulgation of PESA and subsequent state confirmatory act, Orissa Gram Panchayat Act in 1997. Initially there was confusion about the authority to fix the price of different NTFP items. In some areas the District Collectors were fixing its prices. Later, it was decided that the prices would be fixed in September in a meeting attended by the DFO, representatives of TDCC, OFDC and TRIFED. Once the prices are being fixed it would be discussed in Gram Sabha and Gram Panchayat to approve it. The GP can also make some changes in the prices based on the local needs. If the Panchayat Samiti fails to fix up the prices then the District Collector would call for a meeting to fix up the prices.

Further, the Government of Odisha promulgated Odisha Grama Panchayats (Minor Forest Produce Administration) Rules, 2002 extending power to the Gram Panchayats to deal with 68 numbers of MFP items vide Gazette Notification No. SRO No. 934/2002 dated. 14.11.2002 of the Panchayat Raj (GP) Department. The Notification is provided in **Annexure-VIII**.

No systematic data regarding collection of NTFP at Panchayat level is maintained in Keonjhar Division. However, the quantity of NTFP collected and recorded in Keonjhar Division from 2001-02 up to 2014-15 is provided in the table No. 7.8.



Table No. 7.8: Production of NTFP in Qtl.

Name of NTFP	Year and production in quintal from 2011-12 to 2014-15									
	2011-12		2012-13		2013-14		2014-15		2015-16	
	Qnty	Value	Qnty	Value	Qnty	Value	Qnty	Value	Qnty	Value
Tassar	4385-14-11	NA	7471-97-57	NA	4185-86-85	NA	2395-03-04	NA	1292-65-51	NA
Siali fiber	74.68	53695	47.41	37501	79.71	69348	85.19	89790	67.96	78766
Sal leaves	9048	542880	7718	463080	7980	538728	7874	566928	5170	372240

For detailed analysis of available units or quantities of different NTFPs in Keonjhar Division a product mapping tool is developed on the basis of available resources along with its potentiality. The future prospective can be more helpful towards developing the availability of these resources, if it could be linked with the grassroot people. The detail production/surplus of highly produced/collected forest products is provided at table No 7.9 below.

Table No 7.9 NTFP species / Utility and Price structure: Keonjhar Division.

Sl. No.	Common Name	Maturity Period	Botanical Name or Family	Parts used	Average Price	Medicinal Use
1	Amla (T)	After 4th year	<i>Emblia officinalis</i> Fam - Euphorbiaceac	Fruit	Rs 15 - 45/kg	Vitamin - C, Cough, Diabetes, cold, Laxative, hyper acidity.
2	Ashok (T)	10 years onward	<i>Saracaasoca</i> Fam :Caesalpinanceac	Bark Flower	Dry Bark Rs 125/kg	Menstrual Pain, uterine, disorder, Diabetes
3	Aswagandha(H)	One year	<i>Withaniasomnifera</i> Fam: Solanaccac	Root, Leafs	Rs 140/ Kg	Restorative Tonic, stress, nerves disorder, aphrodisiac
4	Bael / Bilva (T)	After 4-5 year	<i>Aegle marmelous</i> Fam: Rutaccac	Fruit, Bark	Fruit - Rs 125 / kg Pulp - Rs 60 / Kg	Diarrhea, Dysentery, Constipation.
5	Bhumi Amla (H)	Within one year	<i>Phyllanthousamarus</i> Fam:Euphorbiaccac	Whole Plant	Rs 40 / Kg	Anemic, jaundice, Dropsy.
6	Brahmi (H)	Indian penny worth/one year	<i>Bacopa monnieri</i> Fam: Scrophulariaccac	Whole plant	Rs 20 per kg	Nervous, Memory enhancer, mental disorder.
7	Chiraita (H)	Within one year	<i>Swertia chiraita</i> Fam:Gentianaccac	Whole Plant	Rs 300-350 / per kg	Skin Disease, Burning sensation, fever.
8	Gudmar / madhunasini	After Four year (C)	<i>Gymnemasylvestre</i> Fam: Asclepiadaccac	Leaves	Rs 50 -75 per kg	Diabetes, hydrocil, Asthma.
9	Guggul (T)	After 8 years	<i>Commiphorawightii</i> Fam: burseraccac	Gum resin	Rs 80 - 100 per kg	Rheumatism, arthritis, paralysis, laxative



10	Guluchi / Giloe(C)	Within one year	<i>Tinospora cordifolia</i> Fam: Menispermaceae	Stem	Rs 20 - 25 per kg	Gout, Pile, general debility, fever, Jaundice.
11	Calihari / panchangulia/ Glori Lily	Five years	<i>Gloriosa superba</i> Fam: Liliaceae	Seed, tuber	Rs 60	Skin Disease, Labor pain, Abortion, General debility.
12	Kalmegh/ Bhui neem (H)	Within one year	<i>Andrographis paniculata</i> Fam: Scrophulariaceae	Whole Plant	Rs 12 - 20	Fever, weakness, release of gas.
13	Long piper / Pippali (C)	After two to three years	<i>Piper longum</i> Fam: Piperaceae	Fruit, Root	Rs 100 - 150 per kg Root - 150 per kg	Appetizer, enlarged spleen, Bronchitis, Cold, antidote.
14	Makoi(H)Kakamachi	Within one year	<i>Solanum nigrum</i> Fam: Solanaceae	Fruit/whole plant	Rs 40 per kg Seed - 200 per kg	Dropsy, General debility, Diuretic, antidiarrhetic.
15	PashanBheda / Pathar Chur (H)	One year	<i>Coleus barbatus</i> Fam: Lamiaceae	Root	Rs 40-50 per kg	Kidney stone, Calculus.
16	Sandal Wood (T)	Thirty years onward	<i>Santalum album</i> Fam: Santalaceae	Heart wood, oil	Rs 350 per kg	Skin disorder, Burning sensation, Jaundice, Cough.
17	SarpaGandha(H)	After 2 year	<i>Ranunculus acris</i> Fam: Ranunculaceae	Root	Root - Rs 60 per kg Seed - Rs 300 per kg	Hyper tension, insomnia.
18	Satavari(C)	After 2-3 year	<i>Asparagus racemosus</i> Family: liliaceae	Tuber, root	Rs 20 -50 per kg	Enhance lactation, general weakness, fatigue, and cough.
19	Senna (S)	Within 1 year	<i>Cassia angustifolia</i> Fam: Leguminosae	Dry Tubers	Rs 500/kg seed Rs 1200/kg dry	Rheumatism, general debility tonic, aphrodisiac.
20	Tulsi (perennial)	Each 3 months	<i>Ocimum sanctum</i> Fam: Lamiaceae	Leaves/Seed	Leaves Rs 10/kg	Cough, Cold, bronchitis, expectorant.
21	VaiVidanka(C)	2nd year onward	<i>Emblica officinalis</i> Fam: Myrsinaceae	Root, Fruit, Leaves	Rs 40-50 per kg	Skin disease, Snake Bite, Helminthiasis.
22	Pepper mint(h)	Perennial	<i>Mentha piperita</i> Fam: Lamiaceae	Leaves, Flower, Oil	-	Digestive, Pain killer.
23	Henna/Mehdi (S)	1/25 years	<i>Lawsonia inermis</i> Fam: Lythraceae	Leaf, Flower, Seed	L - 50 /kg Powder- Rs 75 per kg	Burning, Steam, Anti Inflammatory.
24	Gritkumari (H)	2nd-5th yr	<i>Aloe vera</i> Fam: Liliaceae	Leaves	Fresh L- Rs 5 kg Juice 90 Per Kg	Laxative, Wound healing, Skin burns & care, Ulcer.



25	SadaBahar(H) Periwinkle/ Nyantara		<i>Vincea rosea/ Catharanthus roseus</i> Fam:apocyanace	Whole Plant	R-Rs50 per kgL- Rs 25S- Rs 10 kg	Leukemia, Hypertensive, Antispasmodic, Antidote.
26	Vringraj(H)		<i>Eclipta alba</i> Fam: Compositae	Seed/w hole	Powder-Rs 60/kg	Anti-inflammatory, Digestive, hair tonic.
27	Swetchitrak Perennial (h)		<i>Plumbago zeylanica</i> Fam: Plumbaginaceae	Root, Root bar	-	Appetizer, Antibacterial, Anticancer.
28	RaktaChitrak(H)		<i>Plumbago indica</i> Fam:Plumbaginaceae	Root, Root bar	-	Indyspeisia, colic, inflammation, cough.
29	Kochila(T)	15 yrs	<i>Strychnosnuxvomica</i> Fam: Loganiaceae	Seed	-	Nervous, Paralysis, healing wound.
30	Harida (T)		<i>Terminalia chebula</i> Fam: Combretaceae	Seed	Rs. 80 per K Powder	Trifala, wound ulcer, leprosy, inflammation, Cough.
31	Bahada (T)		<i>Terminalia bellerica</i> Fam:Comretaceae	Seed, Bark	Fruit - Rs 20/k Powder- Rs 100/k	Cough, Insomnia, Dropsy, Vomiting, Ulcer, Trifala.
32	Gokhur (H) Crawling Puncture Vine	1 yr	<i>Tribulus terrestris</i> Fam: Lygophyllaceae	Whole Plant	Plant-Rs 10/K Fruit -Rs 15/k	Sweet cooling, Aphrodisiac, appetizer, Digestive, Urinary.
33	Neem (T)		<i>Azardirchata – indica</i> Fam :Mahaceae	Rhizom e	Rs 45/k	Sedative, analgesic, epilepsy, hypertensive.
34	Anantamool/sariv a(S) Indian Sarapsarilla		<i>Hemibismus indicus</i> Fam: Asclepiadaceae	Root/ Leaf	Rs 45/k root Rs 90/k Powder	Appetizer, Carminative, aphrodisiac, Astringent.
35	Bach (H) Sweet Flag	1 yr	<i>Acorus calamus</i> Fam:Araceae	Rhizom e	Rs 45/K	Sedative, analgesic, epilepsy, hypertensive.
36	Vasa (S)		<i>Adhatoda vesica</i> Fam:Sacanthaceae	Whole Plant	Leaf - Rs 25/ k	Antispasmodic, respiratory, Stimulant.
37	Nageswar(T) Nag Champa		<i>Mesua ferrea</i> Fam:Guttiferae	Bark, Leaf, Flower	Flower - Rs 120/k Powder Rs 175/k	Asthma, Skin, Burning, Vomiting, Dysentery, Piles.
38	Benachar (S) Khus/khus		<i>Vetiveriaziziinoides</i> Fam:Toaceae / Graminae	Root	Flower - Rs 120/k Powder Rs 175/k	Hyperpiesia, Burning, ulcer, Skin, Vomiting.



39	Mandukparni(H) Indianpennywort		<i>Centella asiatica</i> Fam:Umdelliferae	Whole plant	-	Anti-inflammatory, Jaundice, Diuretic, Diarrhea.
40	Kaincha/Creeper Baidanka		<i>Mucuna pruriens</i> Fam: Fabaceae	Root, Hair, Seed, Leaf	-	Nervous, Disorder, Constipation, Nephropathy, Dropsy
41	Dalchini-Perennial Shrub		<i>Cinnamomum zeylanicum</i> Fam:Lauraceae	Bark, Oil	-	Bronchitis, Asthma, Cardiac, Disorder, Fever.
42	Kurai (S)		<i>Holorheenaantidysentric a</i> Fam:Apocyaceaceae	Bark, Seed	-	Scabies, Antipyretic, Amoebic dysentery.
43	Kantakari / Akranti Perennial(H)		<i>Solanum Xanthocarpum</i> Fam: Solanaceae	Whole Plant, Fruit, Seed	-	Diuretic, Anti- inflammatory, Appetizer, Stomachic

7.5 Demand & Supply of Timber and Important Non-Timber Forest Produce:

7.5.1 Demand of Timber:

According to the census of 2011, the population of Keonjhar Division is 13,39,296. The bulk of the populations depend entirely on agriculture. They require small timber, poles, bamboos and grasses for house building and firewood for fuel. The demand of timber is quantified on the basis of report of Forest Survey of India, 1996. The timber requirement projection in different census year is given in the table 7.10

Table No. 7.10 Demand of Timber						
Year	Annual timber demand per head in cum				Total population	Total timber demand in cum
	House	Furniture	Agriculture	Total		
2011	0.0435	0.0115	0.053	0.108	1339296	144644

Source – District Statistical Handbook

7.5.2 Demand of Firewood:

There is heavy demand of firewood since most of the population is rural and depends much upon firewood for cooking purpose. The requirement of fuel wood, based on census is given in the table 7.11.

Table No. 7.11: Demand of Firewood					
Year	Annual fuel demand per head in kg			Total population	Total fuel demand in Ton
	Rural	Urban	Average		
2011	168	140	154	1339296	2,06,251.6



7.5.3 Demand for NTFPs:

In Keonjhar Division, Medicinal and Aromatic Plants (MAPs) have a new area of interest. Its potential can generate high revenue in the field of NTFPs collection. The livelihood opportunities hence have got importance at significant level for the grass root poor people. No attempt has been made to quantify the requirement of NTFP

The main aspect of procurement of the MAPs is availability of market and its approach towards the benefit and cost analysis of MAP harvesting and marketing. A better market strategy can enhance the value addition of the products to eliminate the intervention of middle man. There could be free of unnecessary stress upon the harvesting the NTFPs in a profitable manner. Some of the market analysis is given to plan a proper harvesting methodology for the farmers in **Table No. 7.12**.

Table No. 7.12: Market analysis of NTFPs in the Keonjhar Division							
Sl.No	Common Name	Botanical Name	Harvest in Year	Yield Qtl/Ha	Price in Rs/Kg	Approx. Cost Rs. /Ha	Approx. Net Profit Lakh Rs. /Ha
1	Safed Musli (Tuber)	<i>Chlorophytum borivilianun</i>	1	60	1200/- to 2000/	62500	10.75
2	Amla (Fruit)	<i>Emblica officinalis</i>	3-4	50-200	15-45	10200	0.6 -2.0
3	Satavari (Tuber)	<i>Asparagus racemousus</i>	2	80-100	20-50	18,000	1.9
4	Bach (Rhizome)	<i>Acorus calamus</i>	1	40	45-50	70,000	0.5
5	Ashwa-gandha	<i>Withamnia somnifera</i>	1	7-10		8,000	0.32
6	Long Piper (F/R)	<i>Piper longum</i>	2-3	15		80,000	1.5
7	Sarpagandha (R)	<i>Rowvolfia serpentina</i>	2	15-25		12,500	1.5
8	Brahmi (herbage)	<i>Bacopa monnieri</i>	1	50		35,000	1.65
9	Kalmegh/ Bhuineem	<i>Andrographis paniculata</i>	1	30		15,000	0.35
10	Senna (Leaves)	<i>Cassia angustifolia</i>	1	0.05-0.5		7,000	0.3
11	Gudmar (L)	<i>Gymnema sylvestre</i>	4	6-10		20,000	0.35 to 0.5
12	Sadabahar (WP)	<i>Catharanthus roseus</i>	1	12-15		10,000	0.12



13	Pashanbheda (R)	<i>Coleus barbatus</i>	1	15-20 Q		35,000	0.75
14	Guluchi (stem)	<i>Tinospora cordifolia</i>	1	10-15	20- 25	5,000	0.25
15	Ghritkumari(L)	<i>Aloe vera</i>	1	150-150	15-90	45,000	1.4
16	Kalihari (S/Tub)	<i>Gloriosa superba</i>	5	35	60	2,50,000	10
17	Liquorice (R/UDstem)	<i>Glycyrrhiza glabra</i>	3	75	150	12,000	1.8
18	Baidanka (R/Seed)	<i>Mucuna pruriens</i>	1	15-20	10 - 15	8,500	0.8
19	Bhui Amla (W/ Plant)	<i>Phyllanthus amarus</i>	1	15	40	5,000	1.5
20	Gugul (gumresin)	<i>Commiphora wightii</i>	8	20	80-100	2,50,000	2.5
21	Makoy (F/Plant)	<i>Solanum nigrum</i>	1	15	40	15,000	0.35
22	VaiBaidanka (R, F, L)	<i>Embellia ribes</i>	2	25	40-50	1,00,000	1.5
23	Ashok (Bark/F)	<i>Saraca asoca</i>	10	20	125	15,000	0.35
24	Bael (F, Bark)	<i>Aegle marmelos</i>	5-6	200-400	25	10,000	1.0

The timber and firewood requirement is projected at 1.45 Lakh Cum and 2.06 Lakh Ton respectively. From legal sources timber availability is about 250 cum and Firewood about 450 Ton. Hence there is a great gap in between Demand and supply of these major forest produce.

7.5.4 Timber & Firewood depot:

The OFDC Ltd is maintaining four Timber and Firewood depot at various places as furnished below.

**Table No 7.13 OFDC Ltd Depot in Keonjhar Division**

Sl No.	Name of the Timber Depot	Name of the GP: Timber Depot	Range	Validity period
1	Naranpur Timber & Firewood Depot of Naranpur BRF (Owned by OFDC Ltd, Keonjhar(C-KL) Division.	Naranpur	Keonjhar	13.08.2021 to 12.08.2022
2	Sikulabahal Timber & Firewood Depot, At- Sikulabahal, (Owned by OFDC Ltd, Keonjhar(C-KL) Division.	Sikulabahal	Telkoi	01.05.2021 to 30.04.2022
3	Ghatgaon Timber & Firewood Depot, Uperdiha, (Owned by OFDC Ltd, Keonjhar(C-KL) Division.	Ghatgaon	Ghatgaon	01.05.2021 to 30.04.2022
4	Barbil Timber & Firewood Depot at Sundara, Barbil Tahasil (Owned by OFDC Ltd, Keonjhar(C-KL) Division.	Barbil Municipality	Barbil	01.05.2021 to 30.04.2022

7.5.5 Private Timber / Firewood depot:

There are 11 private depots in Keonjhar Division. The details of depot is furnished at Table No 7.14

Table No 7.14 Private Timber / Firewood depot: Keonjhar Division

Sl No.	Name of the Timber Depot	Location of Timber Depot	Range	Validity period	Remarks
1.	M/s Sk. Samsul Alam Timber Depot, At/Po- Raisuan, Dist- Keonjhar	Raisuan	Keonjhar	07.02.2019 to 06.02.2020	Validity expired
2.	M/s Bapi Timber Depot, At- Babulal Colony, Po/Dist- Keonjhar	Keonjhar Municipality Area	Keonjhar	06.11.2021 to 05.11.2022	
3.	M/s Bhairabi Sales Timber Depot, At/Po- Ranki, Dist- Keonjhar	Sirispal	Keonjhar	01.01.2018 to 31.12.2018	Validity expired
4.	Azad Firewood Depot, Alinagar, Champua, At/Po- Champua, Dist- Keonjhar	Champua NAC	Champua	07.02.2019 to 06.02.2020	Validity expired
5.	M/s Akbar Timber Depot, At/Po- Raisuan, Dist- Keonjhar	Raisuan	Keonjhar	12.11.2021 to 11.11.2022	
6.	M/s Nanda Sales, At- Hatia Tangar, Po/Dist- Keonjhar	Keonjhar Municipality Area	Keonjhar	01.01.2021 to 31.12.2022	



7.	Adhunik Timber Depot, At-Dhangarpada, Dist- Keonjhar	Keonjhar Municipality Area	Keonjhar	05.02.2021 to 04.02.2022	
8.	M/s Sai Sarthak Timber & Firewood Depot, At- New Colony, Dist- Keonjhar	Keonjhar Municipality Area	Keonjhar	31.12.2020 to 30.12.2021	
9.	Sai Prasad Timber & Firewood Depot, At/Po- Sankarpur, Dist- Keonjhar	Bodapalasa	Keonjhar	19.03.2021 to 18.03.2022	
10.	Das Timber & Firewood Depot, At- Gurandijoda, Po- Machhagarh, Dist- Keonjhar	Saharpada	Patna	12.10.2019 to 11.10.2020	Validity expired
11	M/s Nanda Sales, At- Jamunalia, Po-Naranpur, Dist- Keonjhar	Naranpur	Keonjhar	29.08.2021 to 28.08.2022	

All the above depots are bridging the Gap between Demand & Supply in Timber and Fire wood.

7.5.6 Saw Mill:

There is no Licenced saw Mill in the Division. People are sawing their timbers at Jajpur Road saw mill under OFDC Limited.

7.6 Import & Export of Wood & Wood Products:

There is no record of Import / Export of timber in this division.

The General sale value of Timber as per OFDC Ltd rate is furnished at **Annexure-IX**

7.7 Import & Export of NTFPs:

Non-timber forest products available inside forest area can be classified under various heads. (a) Fiber and flosses; (b) grass, bamboo and canes; (c) edible MFPs; (d) essential oil including those from grasses; (e) medicinal plants; (f) tans and dyes; (g) gums and resins; (h) leaves, fruits and seeds. Some of these are very useful to the local population for meeting their subsistence consumption need while other is of commercial importance. The ethno botanical resources not only provide the three basic needs of life, i.e. food, shelter and clothing but also strengthen the economic status of the forest dwellers. These resources provide incentives to rural poor for maintaining the sustainability of forest ecosystem and help to preserve biological diversity and traditional knowledge. The important NTFP's are Sal Leaf, myrobolans, honey, wax, resin, mahua flowers, mahula seeds, kusum seeds, Sal seeds, lac, tamarind and different types of other fruits and seeds. It is noted that except a few, most of the NTFPs are restricted to a particular season and they are not common to all seasons. Normally, the tribal women along with their children collect the NTFPs in different pockets of district. Apart from local consumption, NTFPs are exported to different parts of



India. There are a large number of medicinal fruits, seeds, roots and barks that are collected and exported. Most of the non timber forest products are transported away from the area due to lack of processing facilities locally, resulting in loss of value that could have been added to them by village and cottage industries. The NTFP Items send to outside the state is furnished at table No 7.15 below.

Table No 7.15 NTFP items collected and send to outside the State.

Sl No	Local name	Botanical name	Family	Parts usually collected.
1	Aonla	<i>Phyllanthus emblica</i>	Euphorbiaceae	Fruits
2	Bahada	<i>Terminalia bellirica</i>	Combretaceae	Fruits
3	Bhuineema	<i>Andrographis paniculata</i>	Acanthaceae	Whole plant
4	Char	<i>Buchanania lanzan</i>	Anacardiaceae	Seeds
5	Datepalm	<i>Pheonix sylvestris</i>	Palmae	Leaves
6	Dhatki	<i>Woodfordia fruticosa</i>	Lythraceae	flower
7	Harida	<i>Terminalia chebula</i>	Combretaceae	Fruits
8	Kochila	<i>Strychnos nux- vomica</i>	Loganiaceae	Fruits
9	Mahula	<i>Madhuca indica</i>	Sapotaceae	Flowers
10	Sal	<i>Shorea robusta</i>	Dipterocarpaceae	Leaf
11	Siali	<i>Bauhinia vahlii</i>	Caesalpiniaceae	Leaf / fiber
12	Tentuli	<i>Tamarindus indica</i>	Caesalpiniaceae	Fruits

7.8 Removal of Fodder:

The economy of Keonjhar Forest Division is mainly based on Mining and agriculture especially in rural area. The cattle population is directly related in the human population. Every village has its own pasture land which is somehow able to mitigate the current fodder requirement of the village cattle population. Earlier the rights of grazing is permitted inside RF, PRF by simply collecting the grazing fees, but now the collection of grazing fees is not in use. The cattle and buffaloes graze the new recruits and seedling whereas goats and sheep's browse the tip of the seedlings and the new shoot of the bushes.

During the lean period the grazers community lop the branches of Bija, Bandhan, Gambhar , Siris, and other todda species for fodder as the grazing materials becomes scare. Nearly 30 % of the fodder requirement is met from the forest. The total requirement of fodder per day of the division is as below: (Table No 7.16)

**Table No 7.16 Fodder requirement Estimation – Keonjhar Division**

Sl No	Category of livestock	In Ton per day
1	Cattle	825.24
2	Buffalo	246.35
3	Sheep	83.25
4	Goat	90.27
Total		1245.11

Grazing in forests is a common sight. Rearing of Goat is extensively adopted in villages. They usually feed on forests. The ground floor of forest is highly disturbed and there is lack of grasses for herbivorous in forest. There is also lopping of trees for feeding to goats. It has a very adverse effect on plant growth. Physically there is no removal of fodders for cattle / domestic animals. Removal by way of grazing is rampant.

7.9 Valuation of Products:

The NTFP items are sold in local markets. The list of Local market is furnished at table No

No Pricing Committee report is available fixing the minimum price for NTFP items. The market price as collected from local Hat (Market) is as at Table No 7.17

Table No 7.17 List of Local markets & distance from Range Hqs: Keonjhar Division.

Sl. No	Name of the Range	Name of market place	Market day in week	Distance from Range Office in km.
1	B & JP	Banspal	Thursday	35
		Tarmakanta	Saturday	45
		Suakati	Sunday	8
		Kanjipani	Tuesday	25
		Pandadhar	Friday	20
		Gonasika	Sunday	15
2.	Telkoi	Telkoi	Friday	1
		Akul	Thursday	15
		Chhamunda	Saturday	10
		Baradevata	Monday	16
		Bimala	Saturday	22
		Benamunda	Sunday	35
3	Barbil	x	x	x
4	Champua	Jhumpura	Wednesday	30
		Rimuli	Monday	12
		Jurudi	Tuesday	45
		Tuntuna	Wednesday	5
		Champua	Friday	1
		Ukhunda	Saturday	22
5	Patna	Saharpada	Sunday	12
		Patna	Wednesday	0.5
		Kendeiposi	Friday	10



6	Ghatagaon	Ghatgaon	Tuesday	1
		Dhenkikote	Saturday	13
		Pipilia	Wednesday	22
7	Keonjhar	Old town	Sun day	3
		Belda	Sun day	6
		Keonjhar town	Daily	0.50
		Bankapatuli	Friday	15
		Janghira		30

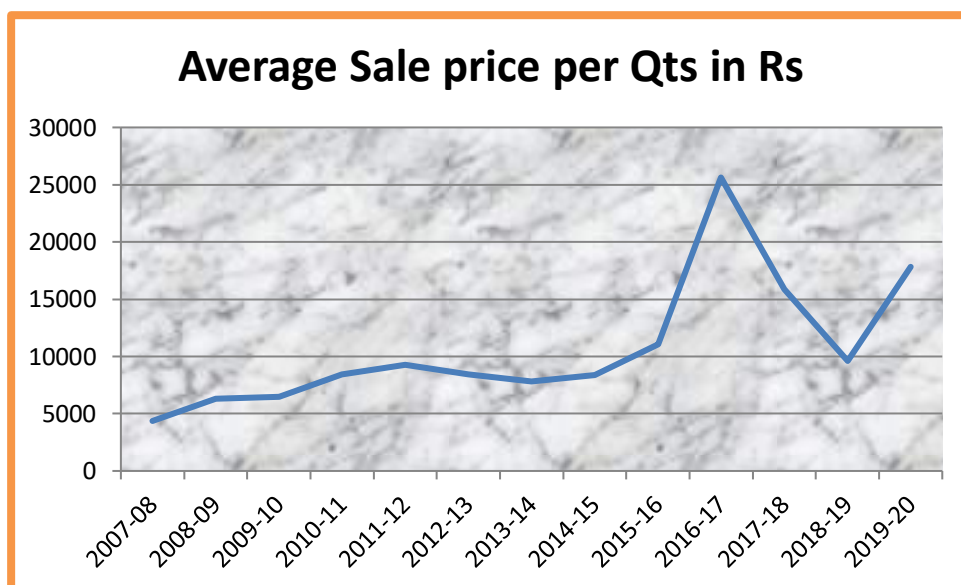
The average sale price has been assessed through local inquiry and the market price is as follows. (Table No 7.18)

Table 7.18 Value of NTFP				
Sl No	Name of product	Unit	Sale Price in Rs	Source of information.
1	Mahula	Per Kg	50/-	Weekly Market
2	Kochila	Per Kg	19/-	
3	Char	Per Kg	250/-	
4	Kusuma	Per Kg	15/-	
6	M. Kendu	Per Kg	12/-	
7	Anantamula	Per Kg	90/-	
8	Fenfena	Per Kg	300/-	
9	Dombhurulu	Per Kg	15/-	
10	Piasal	Per Kg	18/-	
11	Sal Leaf	Per Kg	70/-	
12	Patalgaruda	Per Kg	140/-	
13	Ramdantuni	Per Kg	80/-	
14	Tentuli	Per Kg	80/-	
15	Gaichira	Per Kg	800/-	
16	Ratna	Per Kg	15/-	
17	Anla	Per Kg	90/-	
18	Harida	Per Kg	100/-	
19	Bahada	Per Kg	12/-	
20	Resin	Per k.g	100	
21	Honey	Per ltr	400/-	
22	Sal Seed	Per Kg	25/-	
23	Sal Tooth Brush	Per Bundal	20/-	
24	Mushroom	Per Kg	130/- to 200/-	
25	Giler Flower	Per Kg	750/- to 800/-	
26	Barda Saga	Per Kg	800/-	
27	Mahua Cornel	Per Kg	300/-	
28	Siali Leaf	Per bundle	50/-	
29	Sal Resin	Per Kg	300/-	
30	Kendu	Per Kg	50/-	

**7.9.1 Production and sale of Kenduleaves:**

The sale value of Kenduleaf as obtained from Auction is furnished below. (Table No 7.19)

Table No 7.19 Sale of KL : Keonjhar division.					
Sl. No.	Year	Production (In Qntl.)	Expenditure incurred (In Rs.)	Sale value (in Rs.)	Average sale value per Qntl.
1	2007-08	19092.0	49315182/-	83366288/-	4366.55
2	2008-09	18257.4	51461563/-	115412443/-	6321.40
3	2009-10	20076.0	60961623/-	129873544/-	6469.09
4	2010-11	20007.6	66080366/-	168971563/-	8445.36
5	2011-12	13562.4	53957686/-	125695781/-	9267.96
6	2012-13	18269.4	70807592/-	154510275/-	8457.32
7	2013-14	19672.8	121975500/-	154186432/-	7837.54
8	2014-15	16001.4	105394252/-	133809315/-	8362.35
9	2015-16	13991.4	112597901/-	154510275/-	11043.23
10	2016-17	12892.8	113060820/-	330320230/-	25626.16
11	2017-18	16226.4	137893840/-	257875586/-	15892.34
12	2018-19	11900.4	120809372/-	114211232/-	9597.25
13	2019-20	6526.8	93530251/-	115347232/-	17836.83





CHAPTER-8

MAINTENANCE AND ENHANCEMENT OF SOCIAL, ECONOMIC, CULTURAL AND SPIRITUAL BENEFITS

8.1 Number of JFM Committees and area assigned to them:

The process of Joint Forest Management initiated during Social Forestry Project in 1985. Under Social Forestry Project, The Village Forest so created assigned to Village Forest Committee for its management under Village Forest Rule -1985. Subsequently Forest Protection Committee was constituted under Resolution 1988 and protection of forest fringe area was assigned. Afterwards a comprehensive JFM Resolution came up during 1993 with elaborated provisions. Vana Samrakshyana Samiti 684 VSS developed / Constituted under the provisions of Resolution. Afterwards Forest Development Agency (FDA) – a common forum of VSS developed under National Afforestation Program (NAP) from 2002 onwards. There after OFSDP sector operated in 11 divisions with full scale participatory approach from 2006. With a view to consolidate all developments in joint forest management and address legal matters those came up in the management process, JFM Resolution 2011 formulated (**Annexure-X**). Subsequently amendment has been made to provisions of JFM Resolution 2011 vide Notification No 9182/ F&E dated 1st June 2015 and 2019 (copy at **Annexure-XA and XB**)

8.1.1 VSS(Vana Surakshya Samiti) Constituted

In Keonjhar Division 636 VSS in operation . The Range wise list of VSS, area assigned etc are furnished at Table no 8.1(A), (B), (C), (D), (E), (F) , (G)

A) Barbil Range

Table no 8.1 (A) VSS list of Barbil Range					
Sl. No	Range	Name of the V.S.S.	Name of the Forest Block	Legal status of Land	Area assigned
1	Barbil	Dumurda	Dumurda	K.F.	44.000
2	Barbil	Naya Krushnapur	Naya Krushnapur	K.F.	22.000
3	Barbil	Purusattampur	Purusattampur	K.F.	22.000
4	Barbil	Kudapi	Kudapi	K.F.	22.000
5	Barbil	Kudapi	Kudapi	K.F.	28.670
6	Barbil	Jatiapata-Kutaripasi	Kutaripasi	K.F.	30.370
7	Barbil	Ma Thakurani	Anseikala	K.F.	50.000
8	Barbil	Lahanda	Lahanda	K.F.	50.000
9	Barbil	Ma Laxmi	Kuldum	K.F.	50.000
10	Barbil	Baitarani	Putugaon	K.F.	50.000



11	Barbil	Balita	Balita	K.F.	61.000
12	Barbil	Ma Mangala	Balagoda	K.F.	50.000
13	Barbil	Sri Ganesh	Balagoda	K.F.	50.000
14	Barbil	Baba Swapneswar	Bolani	K.F.	50.000
Total Barbil KF					580.040
15	Barbil	Kanarda	Sidhamatha	R.F.	34.000
16	Barbil	Lasarda	Sidhamatha	R.F.	41.000
17	Barbil	Radha Krushna	Uliburu	R.F.	50.000
18	Barbil	Latapani	Sidhamatha	R.F.	51.000
19	Barbil	Sankhajhara	Thakurani	R.F.	51.000
20	Barbil	Kandra	Kandra	R.F.	24.00
21	Barbil	Gamalei	Sidhamatha	R.F.	41.000
22	Barbil	Kendudihi	Karo	R.F.	50.000
23	Barbil	Badajala	Sidhamatha	R.F.	50.000
24	Barbil	Panduliposi	Karo	R.F.	50.000
25	Barbil	Kashia(Kha)	Sidhamatha	R.F.	51.000
26	Barbil	Kundurupani	Sidhamatha	R.F.	51.000
27	Barbil	Karo Khendra	Thakurani	R.F.	42.000
Total Barbil RF					586.00

b) BJP Range

Table No 8.1(B) List of VSS BJP Range					
Sl. No	Range	Name of the V.S.S.	Name of the Forest Block	Legal status of Land	Area assigned
1	BJP	Tanta Dihi	Tanta Dihi	K.F.	40.000
2	BJP	Lata	Lata	K.F.	50.450
3	BJP	Upar Raidiha	Upar Raidiha	K.F.	55.000
4	BJP	Talapada	Talapada	K.F.	60.000
5	BJP	Nippo	Nippo	K.F.	50.000
6	BJP	Rangadihi(Kha)	Rangadihi(Kha)	K.F.	50.000
7	BJP	Irida	Irida	K.F.	50.000
8	BJP	Kadalibadi	Kadalibadi	K.F.	92.000
9	BJP	Uper-Baitarani	Baitarani Uper Forest	K.F.	100.000
10	BJP	Karalaposhi	Karalaposhi	K.F.	51.880
11	BJP	Nandapani	Nandapani	K.F.	50.000
12	BJP	Nitigotha	Sanaghagara	K.F.	50.000
13	BJP	Talaradhuan	Talaradhuan	K.F.	50.000
14	BJP	Tiribo	Tiribo	K.F.	51.620
15	BJP	Sundura	Sundura	K.F.	51.900



16	BJP	Rengalbeda	Rengalbeda	K.F.	51.950
17	BJP	Deri	Deri	K.F.	52.030
18	BJP	Upar Gundula	Upar Gundula	K.F.	52.200
19	BJP	Kadalibadi	Kadalibadi	K.F.	52.660
20	BJP	Panasadihi	Panasadihi	K.F.	53.000
21	BJP	Talabarbeda	Talabarbeda	K.F.	53.000
22	BJP	Ambadali	Ambadali	K.F.	53.110
23	BJP	Sukadola	Sukadola	K.F.	53.390
24	BJP	Kadadiha	Kadadiha	K.F.	53.480
25	BJP	Kandesahi	Kandesahi	K.F.	53.710
26	BJP	Upar Birikala	Upar Birikala	K.F.	53.720
27	BJP	Panasuan	Panasuan	K.F.	53.900
28	BJP	Sagapali	Sagapali	K.F.	54.220
29	BJP	Gudabhanda	Gudabhanda	K.F.	54.610
30	BJP	Kadamdihi	Kadamdihi	K.F.	55.000
31	BJP	Andiamara	Andiamara	K.F.	55.600
32	BJP	Gajapur	Gajapur	K.F.	56.250
33	BJP	Chandaposi	Chandaposi	K.F.	57.000
34	BJP	Adhal	Adhal	K.F.	80.000
35	BJP	Singhpur	Singpur	K.F.	80.000
36	BJP	Luhakala	Luhakala	K.F.	53.720
37	BJP	Mayuradihi	Mayuradihi	K.F.	53.760
38	BJP	Badbil	Badbil	K.F.	44.000
39	BJP	Talachampe	Talachampe	K.F.	100.000
40	BJP	Uper-raidiha	Uper-raidiha	K.F.	100.000
41	BJP	Sankarapasi	Sankarapasi	K.F.	90.000
42	BJP	Podadihi	Podadihi	K.F.	100.000
43	BJP	Uchumadihi	Uchumadihi	K.F.	100.000
44	BJP	Padakasada	Padakasada	K.F.	145.000
45	BJP	Nippo	Joda East Complnt Non-forest 02-03	K.F.	100.000
Total BJP KF					2868.160
46	BJP	Mamalapasi	Pandadara Bayakumutia	D.P.F.	30.000
47	BJP	Tangarpoda	Kuanr	D.P.F.	61.350
48	BJP	Guptaganga	Guptaganaga	D.P.F.	70.000
49	BJP	Kuanr	Kuanr	D.P.F.	75.490
50	BJP	Jamudiha	Sidhamatha	D.P.F.	37.390
51	BJP	Kalanda (Ka)	Kalanda	D.P.F.	40.000
52	BJP	Ambadahara (Pathuribanisahi)	Sanghagara	D.P.F.	40.000
53	BJP	Dangapani	Sidhamatha	D.P.F.	40.000
54	BJP	Kantakuli	Sidhamatha	D.P.F.	50.000



55	BJP	Talabirkala	Kakharua	D.P.F.	60.170
56	BJP	Kadakala	Khandadhar	D.P.F.	64.680
57	BJP	Talakaipur	Sunduria	D.P.F.	65.500
58	BJP	Sandha Balidiha	Sidhamatha	D.P.F.	71.110
59	BJP	Bhaliadala	Sidhamatha	D.P.F.	106.000
60	BJP	Medinipur	Sidhamatha	D.P.F.	131.600
61	BJP	Baitarani bhuyan	Kuanr	D.P.F.	135.900
62	BJP	Sagapoda	Taramakanta	D.P.F.	151.930
63	BJP	Taramakanta	Taramakanta	D.P.F.	167.390
64	BJP	Tangarpoda	Guptaganga	D.P.F.	179.483
65	BJP	Baragada	Katira	D.P.F.	211.000
66	BJP	Gopapur	Taramakanta	D.P.F.	221.500
67	BJP	Kumudi	Kumudi (B)	D.P.F.	88.000
Total BJP DPF					2098.493
68	BJP	Kalanda (Kha)	Kalanda	P.F.	83.000
69	BJP	Podadiha	Bayakumutia	P.R.F.	118.00
70	BJP	Podadiha	Lunaghar	P.R.F.	39.000
71	BJP	Uparkaipur	Digchampai	P.R.F.	39.039
72	BJP	Danla	Danla	P.R.F.	40.756
73	BJP	Raduan	Champai	P.R.F.	107.000
74	BJP	Lunaghar	Lunaghar	P.R.F.	131.888
75	BJP	Gonasika	Gonasika	P.R.F.	100.000
76	BJP	Sapakanta	Raiguda	P.R.F.	0.000
77	BJP	Talakainsary	Suakati	P.R.F.	42.730
78	BJP	Rangadihi	Dumuridihi	P.R.F.	60.000
79	BJP	Nilambaradihi	Lunaghar	P.R.F.	64.360
80	BJP	Uperraigoda	Raigoda	P.R.F.	71.600
81	BJP	Sirishkhunta	Champai	P.R.F.	102.000
82	BJP	Sarukudar	Champai	P.R.F.	108.000
83	BJP	Tentuli	Suakati	P.R.F.	159.000
84	BJP	Uparsumatha	Dig champai	P.R.F.	166.862
PRF BJP Range					1350.235
85	BJP	Talapada	Kanjipani	R.F.	40.000
86	BJP	Gadagadei	Gadagadei	R.F.	49.460
87	BJP	Keri Kanjipani	Kanjipani	R.F.	50.000
88	BJP	Mundala	Mundala	R.F.	90.000
89	BJP	Anasuan	Saharpur	R.F.	93.000
90	BJP	Kanjipani	Kanjipani	R.F.	100.000
91	BJP	Sikulapoda	Mundaula Sikulapada	R.F.	104.700
92	BJP	Kadakasada	Saharpur	R.F.	39.450
93	BJP	Khajurimundi	Khajurimundi	R.F.	55.000
94	BJP	Saharpur	Saharpur	R.F.	67.000



95	BJP	Banspal	Saharpur	R.F.	102.000
96	BJP	Khuntakata	Khajurimundi	R.F.	60.000
97	BJP	Kasada	Khajurimundi	R.F.	65.500
Total BJP RF					916.1100

C) Champua Range

Table No 8.1 (C) List of VSS Champua Range					
Sl. No	Range	Name of the V.S.S.	Name of the Forest Block	Legal status of Land	Area assigned
1	Champua	Kankana	Kankana	D.P.F.	50.000
2	Champua	Naradapur	Naradapur	K.F.	50.000
3	Champua	Jamudalak	Jamudalak	K.F.	60.000
4	Champua	Jaypur	Jaypur	K.F.	15.000
5	Champua	Brahmandihi	Brahmandihi	K.F.	50.000
6	Champua	Belda	Belda	K.F.	50.000
7	Champua	Brahmanjhari	Brahmanjhari	K.F.	55.000
8	Champua	Kutugaon	Kutugaon	K.F.	55.000
9	Champua	Baghianasa	Baghianasa	K.F.	55.000
10	Champua	Balabhadrapur	Balabhadrapur	K.F.	55.000
11	Champua	Sana Hundula	Sana Hundula	K.F.	55.000
12	Champua	Asanpat (Dipasahi)	Asanpat	K.F.	80.000
13	Champua	Asanpat(Kha) (Mamulijoda Sahi)	Asanpat	K.F.	85.000
14	Champua	Ashoki	Ashoki	K.F.	100.000
15	Champua	Kanjipani	Kanjipani	K.F.	100.000
16	Champua	Asanpat(Ka)	Asanpat	K.F.	110.000
17	Champua	Kasia	Chatrabandha	K.F.	200.000
18	Champua	Katuli kana (Ka)	Katuli kana (ka)	K.F.	12.970
19	Champua	Jayantinapur	Jayantinapur	K.F.	13.180
20	Champua	Jayantinapur	Jayantinapur	K.F.	15.000
21	Champua	Bidyadharpur	Bidyadharpur	K.F.	15.370
22	Champua	Dudukudia	Dudukudia	K.F.	20.000
23	Champua	Tuntuna	Tuntuna	K.F.	24.000
24	Champua	Maheswarapur	Maheswarapur	K.F.	25.000
25	Champua	Katuli kana (Kha)	Katuli kana (Kha)	K.F.	25.430
26	Champua	Balabhadrapur	Balabhadrapur	K.F.	27.630
27	Champua	Kanchanpur	Kanchanpur	K.F.	31.000
28	Champua	Hunjipasi	Hunjipasi	K.F.	53.000



29	Champua	Sana-neuli	Sana-neuli (Pandamara)	K.F.	202.000
30	Champua	Bandhuabeda	Bandhuabeda	K.F.	80.000
31	Champua	Uchabali	Unchabali	K.F.	10.950
32	Champua	Hurdarampur	Hurdaramapur	K.F.	11.330
33	Champua	Rangamatia	Rangamatia	K.F.	14.040
34	Champua	Rengalbeda	Rengalbeda	K.F.	28.070
35	Champua	Jamunaposi	Jamunaposi	K.F.	29.000
36	Champua	Kaunrikala	Kaunrikala	K.F.	42.000
37	Champua	Tangar bantala	Tangar bantala	K.F.	51.000
38	Champua	Rimuli	Rimuli	K.F.	17.000
39	Champua	Mahimasamaj (Bhagianasa)	Bhagianasa	K.F.	50.000
40	Champua	Banika	Banika	K.F.	52.000
Total Champua KF					2024.970
41	Champua	Barkhandia	Laxmiposi	R.F.	70.000
42	Champua	Patabila	Balibandha	R.F.	71.200
43	Champua	Salagoda(Kha)	Laxmiposi	R.F.	100.000
44	Champua	Salagoda (Ka)	Laxmiposi	R.F.	150.000
45	Champua	Murusuan	Balibandha	R.F.	400.000
46	Champua	Maheswarapur	Muni RF	R.F.	50.000
47	Champua	Krushnapur	Kalikaprasad	R.F.	64.000
48	Champua	Sibasankar	Baitarini B	R.F.	64.600
49	Champua	Basira (uper sahi)	Kalikaprasad	R.F.	80.000
50	Champua	Sridharapur	Kalikaprasad	R.F.	106.880
51	Champua	Maa Gramshree	Kalikaprasad	R.F.	125.068
52	Champua	Kalikaprasad	Kalikaprasad	R.F.	150.000
53	Champua	Kainta	Kalikaprasad	R.F.	164.410
54	Champua	Sunapasi	Kalikaprasad	R.F.	116.238
55	Champua	Gopibalbhapur	Ukhunda	R.F.	20.000
56	Champua	Jyotipur (Karana Sahi)	Jyotipur	R.F.	25.000
57	Champua	Banakati	Jyotipur	R.F.	30.000
58	Champua	Rajabandha	Jyitopur	R.F.	46.680
59	Champua	Tangarpada	Bardhana	R.F.	48.920
60	Champua	Jyotipur Bhuyansahi	Jyotipur	R.F.	50.000
61	Champua	Niundi	Jyotipur	R.F.	50.000
62	Champua	Nischintapur	Ukhunda	R.F.	50.000
63	Champua	Moudi(Chatrisahi)	Bardhana	R.F.	55.000
64	Champua	Parudiposi	Bardhana	R.F.	56.000



65	Champua	Mangalpur	Bardhana	R.F.	60.000
66	Champua	Jyotipur	Jyotipur	R.F.	90.000
67	Champua	Gandabarei	Ukhunda	R.F.	150.000
68	Champua	Rajia (KA)	Kalikaprasad	R.F.	160.000
69	Champua	Patala (Kha)	Kalikaprasad	R.F.	193.870
70	Champua	Kasira	Kalikaprasad	R.F.	200.000
71	Champua	Jhaliabeda (Mahanta Sahi)	Bardhana	R.F.	93.310
72	Champua	Maa Ranjeisuri (Khuntapada)	Laxmiposi	R.F.	80.000
73	Champua	Laxmipasi	Laxmiposi	R.F.	80.000
74	Champua	Asuria	Laxmiposi	R.F.	80.000
75	Champua	Balibandha	Balibandha	R.F.	100.000
76	Champua	Balipasi	Laxmiposi	R.F.	150.000
77	Champua	Jally	Jyotipur	R.F.	100.000
78	Champua	Giridharipur	Kalikaprasad	R.F.	50.000
Total Champua RF					3731.1760
79	Champua	Mukundeswar	Baitarani East-B	PRF	151.00
80	Champua	Mukundeswar	Baitarani East-A	PRF	52.400
81	Champua	Mukundeswar	Baitarani East-A	PRF	95.00
Total Champua PRF					298.400
82	Champua	Chauthia	Chauthia	V.F.	42.000
83	Champua	Mangalpur	Champua	V.F.	50.000
84	Champua	Pokharia	Champua	V.F.	40.000
Total Champua VF					132.000

D) Ghatgaon Range

Table No 8.1 (D) List of VSS of Ghatgaon Range					
Sl. No	Range	Name of the V.S.S.	Name of the Forest Block	Legal status of Land	Area assigned
1	Ghatgaon	Gadadharpur	Barabanka	R.F.	50.000
2	Ghatgaon	Dandiposhi	Ghatagaon	R.F.	50.000
3	Ghatgaon	Bankapatuli	Pipilia	R.F.	40.000
4	Ghatgaon	Gopinathpur	Balipokhari	R.F.	71.041
5	Ghatgaon	Pochia	Balipokhari	R.F.	83.539
6	Ghatgaon	Balipokhari	Balipokhari	R.F.	90.000
7	Ghatgaon	Piplilia	Pipilia	R.F.	126.400
8	Ghatgaon	Chhotraypur	Kalimati	R.F.	63.449
9	Ghatgaon	Kalimati	Kalimati	R.F.	183.009
10	Ghatgaon	Kamarnali	Ghatagaon	R.F.	13.000
11	Ghatgaon	Kuajharan	Barbank	R.F.	58.900
12	Ghatgaon	Gayalmunda	Barbank	R.F.	62.200



13	Ghatgaon	Purumunda	Ghatagaon	R.F.	68.900
14	Ghatgaon	Jamposi	Barabanka	R.F.	76.000
15	Ghatgaon	Badajiuli	Barabanka	R.F.	85.000
16	Ghatgaon	Rangamatia	Barabank	R.F.	100.000
17	Ghatgaon	Chakradharpur	Barabank	R.F.	100.000
18	Ghatgaon	Asanabahali	Barabank	R.F.	100.000
19	Ghatgaon	Manpur	Barabank	R.F.	100.000
20	Ghatgaon	Jamujodi	Barbank	R.F.	100.000
21	Ghatgaon	Medinipur & Gadadharpur	Barbank	R.F.	100.000
22	Ghatgaon	Binida	Nalapanga	R.F.	100.000
23	Ghatgaon	Kundalapani	Barabanka	R.F.	150.000
24	Ghatgaon	Laxmipur	Ghatgaon	R.F.	19.000
25	Ghatgaon	Dakhiniposi	Ghatagaon	R.F.	23.000
26	Ghatgaon	Gandasila	Barabanka	R.F.	52.200
27	Ghatgaon	Patabari	Barabanka	R.F.	100.000
28	Ghatgaon	Adakata	Barabanka	R.F.	100.000
29	Ghatgaon	Madhupur	Ghatagaon	R.F.	40.000
30	Ghatgaon	Mathuraposi	Ghatagaon	R.F.	45.000
31	Ghatgaon	Dhangadiha	Ghatagaon	R.F.	50.000
32	Ghatgaon	Banachakulia	Ghatagaon	R.F.	50.000
33	Ghatgaon	Mundatagar	Ghatagaon	R.F.	50.000
34	Ghatgaon	Sanamasinabilla, Badamasinabilla	Ghatagaon	R.F.	50.000
35	Ghatgaon	Sitabinj	Barbank	R.F.	51.300
36	Ghatgaon	Bankapatuli	Ghatagaon	R.F.	56.000
37	Ghatgaon	Parsurampur	Barabanka	R.F.	90.000
38	Ghatgaon	Chhatia	Barabanka	R.F.	92.000
39	Ghatgaon	Melana	Atei	R.F.	100.000
40	Ghatgaon	Nusurupasi	Barabank	R.F.	100.000
41	Ghatgaon	Danguaposi	Barabanka	R.F.	100.000
42	Ghatgaon	Asanabani	Barabanka	R.F.	200.000
43	Ghatgaon	Dukhabahali	Ghatagaon	R.F.	50.000
44	Ghatgaon	Khandigudasahi	Ghatagaon	R.F.	50.000
45	Ghatgaon	Palabanisahi (Melan)	Ghatagaon	R.F.	50.000
46	Ghatgaon	Badajamposi	Atai	R.F.	210.000
47	Ghatgaon	Kumuda	Atei	R.F.	40.000
48	Ghatgaon	Nalabilla	Atei	R.F.	60.000
49	Ghatgaon	Kadabahali Badajodi	Atei	R.F.	71.000
50	Ghatgaon	Kanto	Atei	R.F.	90.900
51	Ghatgaon	Dehuripasi	Atei	R.F.	92.000



52	Ghatgaon	Nuapada	Atei	R.F.	98.500
53	Ghatgaon	Arjunabila	Atei	R.F.	100.000
54	Ghatgaon	Ghatgaon (Kenduapada)	Ghatagaon	R.F.	100.000
55	Ghatgaon	Benajhari	Ghatagaon	R.F.	100.000
56	Ghatgaon	Kolipasi	Ghatagaon	R.F.	64.90
57	Ghatgaon	Murgapahadi	Atei	R.F.	103.000
58	Ghatgaon	Balijodi	Atei	R.F.	120.000
59	Ghatgaon	Kundapitha	Atei	R.F.	130.000
60	Ghatgaon	Baiganpal VSS	Atei	R.F.	160.000
61	Ghatgaon	Kaduabahali	Atei	R.F.	280.000
62	Ghatgaon	Dargudisila	Atei	R.F.	124.000
63	Ghatgaon	Santrapur	Barabanka	R.F.	91.906
64	Ghatgaon	Sagadapota	Kalimati	R.F.	135.414
65	Ghatgaon	Dehuripoda	Barabanka	R.F.	179.000
66	Ghatgaon	Sanjiuli	Barabanka	R.F.	46.013
67	Ghatgaon	Patilo	Barabanka	R.F.	64.892
68	Ghatgaon	Deobandh	Barabanka	R.F.	43.916
69	Ghatgaon	Hatinota Tangartali	Balipokhori	R.F.	110.408
70	Ghatgaon	Dubulabeda	Balipokhori	R.F.	114.700
71	Ghatgaon	Dudhianali	Barabanka	R.F.	127.423
72	Ghatgaon	Kolimati	Atei	R.F.	99.176
73	Ghatgaon	Poijamula	Atei	R.F.	105.641
74	Ghatgaon	Upardiha	Atei	R.F.	154.690
Total Ghatgaon RF					6707.417
75	Ghatgaon	Khajurijuani	Khajurijuani	K.F.	85.000
76	Ghatgaon	Tara	Tara (B)	K.F.	110.000
77	Ghatgaon	Dhalpur	Dhalpur	K.F.	13.000
78	Ghatgaon	Santoshpur	Santoshpur	K.F.	16.000
79	Ghatgaon	Dhogatha	Dhogatha	K.F.	119.000
80	Ghatgaon	Penthadihi	Penthadihi	K.F.	54.000
81	Ghatgaon	Gidhibasa	Gidhibasa	K.F.	8.000
82	Ghatgaon	Ambuapada	Ambuapada	K.F.	9.000
83	Ghatgaon	Mahulgadia	Mahulgadia	K.F.	9.000
84	Ghatgaon	Khantaghara	Khantaghara	K.F.	10.000
85	Ghatgaon	Baghaghara	Baghaghara	K.F.	40.000
86	Ghatgaon	Bholbeda	Bholbeda	K.F.	50.000
87	Ghatgaon	Kasibeda	Kasiabeda	K.F.	100.000
88	Ghatgaon	Ambuapada	Ambuapada	K.F.	150.000
89	Ghatgaon	Asanabahali	Asanabahali	K.F.	20.240
90	Ghatgaon	Jatrakusum	Jatrakusum	K.F.	30.000
91	Ghatgaon	Kaduadiha	Kaduadiha	K.F.	90.000
92	Ghatgaon	Manaharpur	Manaharpur	K.F.	48.000



93	Ghatgaon	Laxmiposi	Laxmiposi	K.F.	99.500
94	Ghatgaon	Kapasoda	Kapasoda	K.F.	102.000
95	Ghatgaon	Makasukila	Makasukila	K.F.	12.150
96	Ghatgaon	Laxmipur	Laxmipur	K.F.	12.150
97	Ghatgaon	Raghuabeda	Raghubeda	K.F.	12.150
98	Ghatgaon	Denabandhupur	Denabandhupur	K.F.	13.530
99	Ghatgaon	Sadanandapur	Sadanandapur	K.F.	16.190
100	Ghatgaon	Jhadapokhari	Jhadapokhari	K.F.	20.240
Total Ghatgaon KF					1249.150

E) Keonjhar Range**Table No 8.1 (E) List of VSS of Keonjhar Range**

Sl. No	Range	Name of the V.S.S.	Name of the Forest Block	Legal status of Land	Area assigned
1	Keonjhar	Dimiribahal	Sidhamatha	KF	25.000
2	Keonjhar	Sarasbelda	Sidhamath	KF	28.320
3	Keonjhar	Atibudhipada	Sidhamatha	KF	40.480
4	Keonjhar	Sidhamath	Sidhamatha	KF	200.000
5	Keonjhar	Khantamora	Khajuribani	KF	145.330
6	Keonjhar	Bolaniposi(A)	Bolaniposi(A)	K.F.	50.000
7	Keonjhar	Bolaniposi(B)	Bolaniposi(B)	K.F.	50.000
8	Keonjhar	Upercompodihi	Upercompodihi	K.F.	50.000
9	Keonjhar	Boxibarigaon	Boxibarigaon	K.F.	30.000
10	Keonjhar	Kuladhankuni	Kuladhankuni	K.F.	50.000
11	Keonjhar	Alanga	Alanga	K.F.	50.000
12	Keonjhar	Tankujoda	Tankujoda	K.F.	200.000
13	Keonjhar	Dharapada	Dharpada	K.F.	20.000
14	Keonjhar	Gohitangiri	Gohitangiri	K.F.	20.240
15	Keonjhar	Baijapada	Baijapada	K.F.	40.480
16	Keonjhar	Sunatangiri	Sunatangiri	K.F.	40.480
17	Keonjhar	Gopalpur (Baruidsahi)	Gopalpur	K.F.	100.000
18	Keonjhar	Naigoda	Naigoda	K.F.	100.000
19	Keonjhar	Dhenkikote	Raghunathpur	K.F.	100.000
20	Keonjhar	Tulasichaura	Tulasichaura	K.F.	101.210
21	Keonjhar	Bad-berbeda (Mahabir Tamkeswar)	Bad-berbeda	K.F.	200.000
22	Keonjhar	Dumurinali	Dumurinali	K.F.	200.000
23	Keonjhar	Khadiadiha	Khadiadiha	K.F.	15.000
24	Keonjhar	Bhatunia	Bhatunia	K.F.	50.000



25	Keonjhar	Rengalbeda	Rengalbeda (Sahebkata)	K.F.	100.000
26	Keonjhar	Balabhadrapur	Balabhadrapur	K.F.	25.000
27	Keonjhar	Deobandh	Deobandh	K.F.	50.000
28	Keonjhar	Sendkap	Sendkap	K.F.	200.000
29	Keonjhar	Hunda	Hunda	K.F.	50.000
30	Keonjhar	Kodiposa	Kodipasa	K.F.	50.000
31	Keonjhar	Ratanpur	Ratanpur	K.F.	50.000
32	Keonjhar	Sunapasi	Sunapasi	K.F.	40.000
Total Keonjhar KF					2032.410
33	Keonjhar	Dumuria	khajuribani	P.R.F.	70.000
34	Keonjhar	Jhumukaposi	khajuribani	P.R.F.	70.000
35	Keonjhar	Khuntabandh	Khajuribani	P.R.F.	45.000
36	Keonjhar	Hatinota	Khajuribani	P.R.F.	70.00
37	Keonjhar	Khajuribani	Khajuribani	P.R.F.	80.000
38	Keonjhar	Khantamora	Khajuribani	P.R.F.	145.33
Total Keonjhar PRF					535.33
39	Keonjhar	Nalapanga (Gajapathar	Nalapanga	R.F.	70.000
40	Keonjhar	Kajalipasi	Raghunathpur	R.F.	60.000
41	Keonjhar	Dhalipat	Naranpur	R.F.	100.000
42	Keonjhar	Badudighara	Naranpur	R.F.	100.000
43	Keonjhar	Rangapat	Raghunathpur	R.F.	100.000
44	Keonjhar	Banasree (Chaka)	Raghunathpur	R.F.	100.000
45	Keonjhar	Gramasree	Naranpur	R.F.	125.000
46	Keonjhar	Jamunalia	Naranpur	R.F.	162.000
47	Keonjhar	Mahapat	Barbank	R.F.	50.000
48	Keonjhar	Dhanuguru	Balabhadrapur	R.F.	72.000
49	Keonjhar	Masinabilla	Nalaponga	R.F.	123.150
50	Keonjhar	Panasia	Barabanka	R.F.	141.907
51	Keonjhar	Somagiri	Barabanka	R.F.	170.000
52	Keonjhar	Banadurga	Maidankel	R.F.	50.000
53	Keonjhar	Ananteswar	Nelung	R.F.	50.000
54	Keonjhar	Kanaposhi	Jodipada	R.F.	130.000
55	Keonjhar	Jodichatar	Patna	R.F.	50.000
56	Keonjhar	Nudurupada	Basantapur	R.F.	25.000
57	Keonjhar	Laxmipitha	Raghunathpur	R.F.	50.000
58	Keonjhar	Rugudisahi	Raghunathpur	R.F.	50.000
59	Keonjhar	Khandapathara (Chaka)	Raghunathpur	R.F.	85.000
60	Keonjhar	Badapichhula	Basantapur	R.F.	100.000
61	Keonjhar	Dimirimunda	Raghunathpur	R.F.	100.000
62	Keonjhar	Dhenkikote (B)	Raghunathpur	R.F.	100.000



63	Keonjhar	Guhalchatua (Totalsahi Kha)	Raghunathpur	R.F.	102.000
64	Keonjhar	Badapasi	Naranpur	R.F.	121.460
65	Keonjhar	Basantapur	Basantapur	R.F.	136.000
66	Keonjhar	Kaliabeda	Raghunathpur	R.F.	40.000
67	Keonjhar	Dhabaleswar	Balabhadrapur	R.F.	50.000
68	Keonjhar	Maa Bana Durga	Barbank	R.F.	50.000
69	Keonjhar	Jamunalia	Naranpur	R.F.	50.000
70	Keonjhar	Haridagotha	Naranpur	R.F.	50.000
71	Keonjhar	Saharposi	Naranpur	R.F.	50.000
72	Keonjhar	Haridagotha (Ratna Sahi)	Naranpur	R.F.	50.000
73	Keonjhar	Jalangadiha	Naranpur	R.F.	60.000
74	Keonjhar	Salabeda	Balabhadrapur	R.F.	72.000
75	Keonjhar	Kholpa	Naranpur	R.F.	82.000
76	Keonjhar	Nunjharan	Raghunathpur	R.F.	90.000
77	Keonjhar	Alanapada	Naranpur	R.F.	98.000
78	Keonjhar	Dhudurupal	Raghunathpur	R.F.	100.000
79	Keonjhar	Talpada	Raghunathpur	R.F.	100.000
80	Keonjhar	Bada monaharpur	Nelung	R.F.	112.000
81	Keonjhar	Karanjiapada	Raikala	R.F.	50.000
82	Keonjhar	Baneikala	Raikala	R.F.	50.000
83	Keonjhar	Sariaposhi	Raikala	R.F.	20.000
84	Keonjhar	Kandraposhi	Tangarani	R.F.	50.000
85	Keonjhar	Amrutapada	Nayagarh	R.F.	50.000
86	Keonjhar	Jagannathpur	Nayagarh	R.F.	50.000
87	Keonjhar	Girigobardhan	Nayagarh	R.F.	50.000
88	Keonjhar	Talakusumita	Nayagarh	R.F.	50.000
89	Keonjhar	Maa Tarini Kasira	Nayagarh	R.F.	50.000
90	Keonjhar	Maa Tarini Naigaon	Nayagarh	R.F.	50.000
91	Keonjhar	Kalanda	Nayagarh	R.F.	50.000
92	Keonjhar	Sandiaposi	Raikala	R.F.	50.000
93	Keonjhar	Baulmal	Raikala	R.F.	50.000
94	Keonjhar	Tiadiposhi	Raikala Tangrani	R.F.	73.000
95	Keonjhar	Bhagabandha	Raikala	R.F.	73.282
96	Keonjhar	Poipani	Nayagarh	R.F.	85.000
97	Keonjhar	Dhanurjaypur	Nayagarh	R.F.	90.000
98	Keonjhar	Satikudar	Nayagarh	R.F.	100.000
99	Keonjhar	Hatikucha	Nayagarh	R.F.	100.000
100	Keonjhar	Aharpasi	Tangarani	R.F.	100.000



101	Keonjhar	Saraskola	Tangrani	R.F.	15.000
102	Keonjhar	Belda	Maidankel	R.F.	48.580
103	Keonjhar	Bhalugharsahi	Patna	R.F.	50.000
104	Keonjhar	Jodipada (Jharalasahi)	Jadipada	R.F.	50.000
105	Keonjhar	Jadikhunta	Nelung	R.F.	80.000
106	Keonjhar	Nelung	Nelung	R.F.	90.000
107	Keonjhar	Hariharpur	Maidankel	R.F.	100.000
108	Keonjhar	Maidankel	Maidankel	R.F.	100.000
109	Keonjhar	Palasapokhari	Jodipada	R.F.	102.000
110	Keonjhar	Tangarani	Belda	R.F.	150.000
111	Keonjhar	Keri	Maidankel	R.F.	200.000
112	Keonjhar	Mathuramandali	Belda	R.F.	245.000
113	Keonjhar	Jadipada	Jodipada	R.F.	500.000
114	Keonjhar	Tolanodam	Barabanka	R.F.	158.359
115	Keonjhar	Baliposi	Barabanka	R.F.	180.333
116	Keonjhar	Baiganposi	Nelung	R.F.	37.476
117	Keonjhar	Dhogotha	Raghunathpur	R.F.	44.000
118	Keonjhar	Champadihi	Basantapur	R.F.	130.000
119	Keonjhar	Rangapat Raghunathpur	Raghunathpur	R.F.	100.38
120	Keonjhar	Kamargoda	Balabhadrapur	R.F.	184.233
121	Keonjhar	Kandarkola	Raikala "B"	R.F.	74.811
122	Keonjhar	Kasirapatna	Nayagarh	R.F.	113.146
123	Keonjhar	Beloposi	Belda	R.F.	37.880
Total Keonjhar RF					7609.997

F) Patna Range

Table No 8.1 (F) List of VSS, Patna Range.					
Sl. No	Range	Name of the V.S.S.	Name of the Forest Block	Legal status of Land	Area assigned
1	Patna	Ghuntijhar	Musakhori-B	D.P.F.	50.8829
2	Patna	Musakhori	Musakhori-A	D.P.F.	54.161
3	Patna	Bhandabilla	Chemna-II	D.P.F.	23.97
Total Patna DPF					129.0139
4	Patna	Rajnagar	Rajnagar	K.F.	20.000
5	Patna	Karanjiapada	Karanjiapada	K.F.	13.150
6	Patna	Brahmanideo	Brahmanideo	K.F.	14.000
7	Patna	Jhaliapada	Jhaliapada	K.F.	16.000
8	Patna	Saraskela	Sarashkela	K.F.	30.000
9	Patna	Badajamposi	Badjamposi	K.F.	45.000
10	Patna	Jamuleibeda	Jamuleibeda	K.F.	47.000
11	Patna	Dalangapani	Dalangapani	K.F.	60.000



12	Patna	Ramachandrapur	Ramachandrapur (Musakhri)	K.F.	87.869
13	Patna	Khamuan	Khamuan	K.F.	150.000
14	Patna	Bhaliadhipa	Bhaliadhipa	K.F.	20.500
15	Patna	Raipur	Saharpada	K.F.	26.000
16	Patna	Khadibeda	Khadibeda	K.F.	37.900
17	Patna	Katabeda	Katabeda	K.F.	46.878
18	Patna	Jayapur	Joypur	K.F.	100.000
19	Patna	Kundula (Khadibahal)	Kundula	K.F.	100.000
20	Patna	Kuchibeda	Kucheipeda	K.F.	101.900
21	Patna	Rasapada	Saharpada	K.F.	12.000
22	Patna	San Talapada	San Talapada	K.F.	26.000
23	Patna	Anladiha	Anladiha	K.F.	16.000
24	Patna	Bhalughar	Bhalughar	K.F.	16.000
25	Patna	Begunakhaman	Begunakhaman	K.F.	22.000
26	Patna	Sabaranibeda	Sabaranibeda	K.F.	14.000
27	Patna	Khadikapada	Khadikapada	K.F.	33.000
28	Patna	Banbir	Banbir	K.F.	40.000
Total Patna KF					1095.197
29	Patna	Budhikapudi	Budhikapudi	P.R.F.	31.02
Total Patna PRF					31.02
30	Patna	Putulia	Patna	R.F.	60.000
31	Patna	Kudakhman	Padmapur	R.F.	39.000
32	Patna	Barudiposhi	Baunsuli	R.F.	30.000
33	Patna	Baradangua	Chemna	R.F.	26.89
34	Patna	Kantiapada	Padmapur	R.F.	33.620
35	Patna	Purunia	Padmapur	R.F.	40.000
36	Patna	Belaposi	Belposi	R.F.	42.000
37	Patna	Dalanga	Baunsuli	R.F.	45.000
38	Patna	Laxmiposi	Laxmiposi	R.F.	16.09
39	Patna	Jamunaposi	Padmapur	R.F.	46.000
40	Patna	Dasarathipur	Bausuli	R.F.	50.000
41	Patna	Ninuan	Ninuna	R.F.	50.000
42	Patna	Padmapur	Padmapur	R.F.	50.000
43	Patna	Manpur	Padmapur	R.F.	50.000
44	Patna	Hiraposi (Ghuntia Sahi)	Baunsuli	R.F.	52.000
45	Patna	Godipokhari	Baunsuli	R.F.	65.000
46	Patna	Saraspasi	Saraspasi	R.F.	13.48
47	Patna	Bhalupahadi	Padmapur	R.F.	112.000
48	Patna	Baunsuli	Baunsuli	R.F.	210.000
49	Patna	Kumudabahali	Poipani	R.F.	25.350
50	Patna	Tando	Tando	R.F.	15.000



51	Patna	Jaganathpur	Poipani	R.F.	35.000
52	Patna	Goldipasi	Patna	R.F.	40.000
53	Patna	Kalighai	Atei	R.F.	50.000
54	Patna	Poipani-B	Patna	R.F.	53.000
55	Patna	Sadangabahali	Atei	R.F.	54.000
56	Patna	Poipani	Poipani	R.F.	60.000
57	Patna	Pichhulabeda	Atei	R.F.	62.000
58	Patna	Khajuripani	Poipani	R.F.	80.000
59	Patna	Dhanurjappur	Patna	R.F.	100.000
60	Patna	Madhapur	Patna	R.F.	74.45
61	Patna	Barigaon	Poipani	R.F.	120.000
62	Patna	Gopapur	Poipani	R.F.	132.000
63	Patna	Gobarabeda	Patna	R.F.	144.000
64	Patna	Dhobapitna	Poipani	R.F.	100.56
65	Patna	Banamahuldiha	Atei	R.F.	200.000
66	Patna	Rasapada	Rasapada	R.F.	9.500
67	Patna	Barbil	Barbil	R.F.	17.86
68	Patna	Pradhanpada	Pradhanpada	R.F.	21.06
69	Patna	Rengalbeda	Baunsuli	R.F.	30.000
70	Patna	Galafula- Balibandha	Patna	R.F.	34.000
71	Patna	Chadeibhola	Chadeibhol	R.F.	48.000
72	Patna	Billa	Billa	R.F.	43.08
73	Patna	Purunapani	Purunapani	R.F.	89.52
74	Patna	Khireitangiri	Belda	R.F.	71.000
75	Patna	Nischinpur	Jodipada	R.F.	80.000
76	Patna	Brundabanpur	Patna	R.F.	42.320
77	Patna	Ghatbalijodi	Atei	R.F.	44.000
78	Patna	Jhatipada	Patna	R.F.	30.000
79	Patna	Rohiniduma	Atei	R.F.	85.000
80	Patna	Maa bana Durga	Patna	R.F.	89.422
81	Patna	Dumuria	Atei	R.F.	114.000
Total Patna RF					3225.202
82	Patna	Balaniposi	Balaniposi	V.F.	34.000
83	Patna	Dianali	Dianali	V.F.	14.000
84	Patna	Kendaiposhi	Kendaiposhi	V.F.	17.000
85	Patna	Mahisamundi	Mahisamundi	V.F.	29.000
86	Patna	Saranibeda	Saranibeda	V.F.	20.000
87	Patna	Sunaposi	Sunaposi	V.F.	25.000
88	Patna	Radhapur	Radhapur	V.F.	25.000
89	Patna	Phulpahadi	Phulpahadi	V.F.	28.000
90	Patna	Kapundi	Kapundi	V.F.	30.000
Total Patna VF					222.000

G) Telkoi Range



Table No 8.1(G) List of VSS of Telkoi Range

Sl. No	Range	Name of the V.S.S.	Name of the Forest Block	Legal status of Land	Area assigned
1	Telkoi	Ramchandrapur	Oriya	D.P.F.	50.000
2	Telkoi	Oriya	Oriya	D.P.F.	109.000
3	Telkoi	Tungubahal	Tungurubahal	D.P.F.	114.680
4	Telkoi	Saruuli (Maa bishri)	Binjabahal Saruuli(C)	D.P.F.	125.000
Total Telkoi DPF					398.68
5	Telkoi	Siriabahal	Siriablahal	K.F.	89.000
6	Telkoi	Jhatikiposi	Jhatikiposi	K.F.	15.100
7	Telkoi	Gopinathpur	Gopinathpur	K.F.	20.200
8	Telkoi	Kalima Jharasahi	Kalima	K.F.	25.100
9	Telkoi	Bimala(Road sahi)	Jharbeda	K.F.	50.000
10	Telkoi	Joypursahi Bhimakanda	Jhatikibana Taila	K.F.	50.000
11	Telkoi	Patakholi	Patakholi	K.F.	50.500
12	Telkoi	Baleswar	Baleswar	K.F.	52.500
13	Telkoi	Samanali	Samanali	K.F.	53.230
14	Telkoi	Ghodabeda	Ghodabeda	K.F.	55.100
15	Telkoi	Bimala(Patra sahi)	Bimala	K.F.	60.000
16	Telkoi	Ma Hingula	Marda	K.F.	101.230
17	Telkoi	Bali	Bali	K.F.	50.000
18	Telkoi	Kateriposi	Kateriposi	K.F.	53.700
19	Telkoi	Bena	Bena	K.F.	85.160
20	Telkoi	Benamunda	Bandhanhudi	K.F.	100.000
21	Telkoi	Nuagaon	Nuagaon	K.F.	200.000
22	Telkoi	Purujoda	Purujoda	K.F.	200.000
23	Telkoi	Ghunthaposi	Ghunthaposi	K.F.	55.100
24	Telkoi	Saleikena	Saleikena (sunakhani)	K.F.	74.927
25	Telkoi	Namkani	Namkani	K.F.	75.000
26	Telkoi	Damodar-Gouni	Saleikena	K.F.	88.000
27	Telkoi	Jansanpur	Jansanpur	K.F.	88.100
28	Telkoi	Chhamunda	Chhamunda (Sagabhana)	K.F.	160.000
29	Telkoi	Godikansa	Godikansa	K.F.	10.000
30	Telkoi	Nuagaon Balangisahi	Nuagaon Balangisahi	K.F.	60.900
31	Telkoi	Bhaliadala	Bhaliadala (Dandahudi)	K.F.	200.000
Total Telkoi KF					2122.847



32	Telkoi	Sirigida	Sikheswari	P.R.F.	50.000
33	Telkoi	Sarei	Sikheswari	P.R.F.	80.000
34	Telkoi	Dimirimunda	Sikheswari	P.R.F.	89.429
35	Telkoi	Sirigida Nayak Sahi	Sikheswari	P.R.F.	50.000
36	Telkoi	Bimala Simuliasahi	Sikheswari	P.R.F.	70.000
37	Telkoi	Golagadia	Samanali Koilisuta	P.R.F.	43.508
38	Telkoi	Laxmi Narayan	Samanali Koilisuta	P.R.F.	104.770
39	Telkoi	Rekuti	Rekuti	P.R.F.	54.480
40	Telkoi	Kaliapani	Renda	P.R.F.	103.000
41	Telkoi	Rendapat, Pitanali	Renda	P.R.F.	155.823
Total Telkoi PRF					801.01
42	Telkoi	Ahigola	Kalapat	R.F.	50.000
43	Telkoi	Bolbom	Kalapat	R.F.	57.120
44	Telkoi	Aluni	Ranibeda	R.F.	13.000
45	Telkoi	Banda	Kalapat	R.F.	15.500
46	Telkoi	Sinduria Padhanisahi	Kalapat	R.F.	19.200
47	Telkoi	Balijodi (Matihudisahi)	Kalapat	R.F.	35.000
48	Telkoi	Kulanga	Kolapat	R.F.	40.900
49	Telkoi	Arkhamunda	Kalapat	R.F.	53.300
50	Telkoi	Bimala Balisahi	Jharbeda	R.F.	55.200
51	Telkoi	Akul Pradhansahi	Bandhanjhari	R.F.	61.050
52	Telkoi	Bimala Nuasahi	Kodbil	R.F.	63.500
53	Telkoi	Jay Hanuman Raisuan	Ranibeda	R.F.	72.750
54	Telkoi	Krushnapur	Benamunda	R.F.	79.000
55	Telkoi	Padiaposi	Benamunda	R.F.	79.500
56	Telkoi	Khajuria	Bandhanjhari	R.F.	80.000
57	Telkoi	Sridharpur	Mankadchua	R.F.	80.961
58	Telkoi	Ranibeda	Kudbil	R.F.	85.283
59	Telkoi	Kundheihata	Jharbeda	R.F.	92.059
60	Telkoi	Banabiharipur (Baji Rout)	Bandhanjhari	R.F.	95.000
61	Telkoi	Balasore	Bandhanjhari	R.F.	100.000
62	Telkoi	Balabhadrapur	Jharbeda	R.F.	102.685
63	Telkoi	Maa Tarini, Kudabil	Kodbil	R.F.	110.437
64	Telkoi	Tangiri	Ranibeda	R.F.	125.000
65	Telkoi	Kalima	Bandhanjhari	R.F.	130.192
66	Telkoi	Kulanga	Kodbil	R.F.	140.000



67	Telkoi	Gramashree	Bandhanjhari	R.F.	146.120
68	Telkoi	Purusottampur	Bandhanjhari	R.F.	150.000
69	Telkoi	Malanda	Bandhanjhari	R.F.	168.759
70	Telkoi	Bandhanjhari	Bandhanjhari	R.F.	196.310
71	Telkoi	Sankalei	Kalapat	R.F.	200.000
72	Telkoi	Banda	Kalapat	R.F.	200.000
73	Telkoi	Ranibeda	Kodbil	R.F.	200.000
74	Telkoi	Khandbandha	Kalapat	R.F.	50.000
75	Telkoi	Gobagoda	Kalapat	R.F.	17.800
76	Telkoi	Biripal	Kalapat	R.F.	30.200
77	Telkoi	Benamunda Balisahi	Benamunda	R.F.	57.100
78	Telkoi	Keranga	Kalapat	R.F.	74.000
79	Telkoi	Patakilpur Burusahi	Kalapat	R.F.	90.100
80	Telkoi	Balijodi	Kalapat	R.F.	200.000
81	Telkoi	Galada	Kalapat	R.F.	200.000
82	Telkoi	Keranga	Kalapat	R.F.	200.000
83	Telkoi	Padiapasi	Ranibeda	R.F.	200.000
84	Telkoi	Sundaria	Ranibeda	R.F.	200.000
85	Telkoi	Ma laxmi	Kalapat	R.F.	60.140
86	Telkoi	Panga	Kalapat	R.F.	15.100
87	Telkoi	Gurum	Kalapat	R.F.	21.300
88	Telkoi	Talapada	Kalapat	R.F.	50.800
89	Telkoi	Marda Malarbeda	Kalapat	R.F.	56.300
90	Telkoi	Sapalangi	Tamango	R.F.	70.000
91	Telkoi	Haladipani	Tamango	R.F.	70.000
92	Telkoi	Birida	Tamango	R.F.	78.900
93	Telkoi	Telkoi, (Balisahi)	Somakoi	R.F.	80.000
94	Telkoi	Purunapani	Dhanurjoypur	R.F.	85.27
95	Telkoi	Sankarpur	Tamango	R.F.	158.200
96	Telkoi	Badkumunda	Kalapat	R.F.	10.100
97	Telkoi	Jaganath	Bandhanjhari	R.F.	50.280
98	Telkoi	Nuagarh	Samakoi	R.F.	51.000
99	Telkoi	Ragada	Mankandachua	R.F.	57.100
100	Telkoi	Trinath	Samakoi	R.F.	63.600
101	Telkoi	Hingula sahi (Telkoi)	Somakoi	R.F.	64.000
102	Telkoi	Laxmi Narayan	Samakoi	R.F.	65.280
103	Telkoi	Kuladera	Bandhanjhari	R.F.	70.000
104	Telkoi	Santhebhanja	Mankadchua	R.F.	73.500
105	Telkoi	Golabandh	Chhamunda Golabandha	R.F.	41.5
106	Telkoi	Ahigola	Kalapat	R.F.	80.751

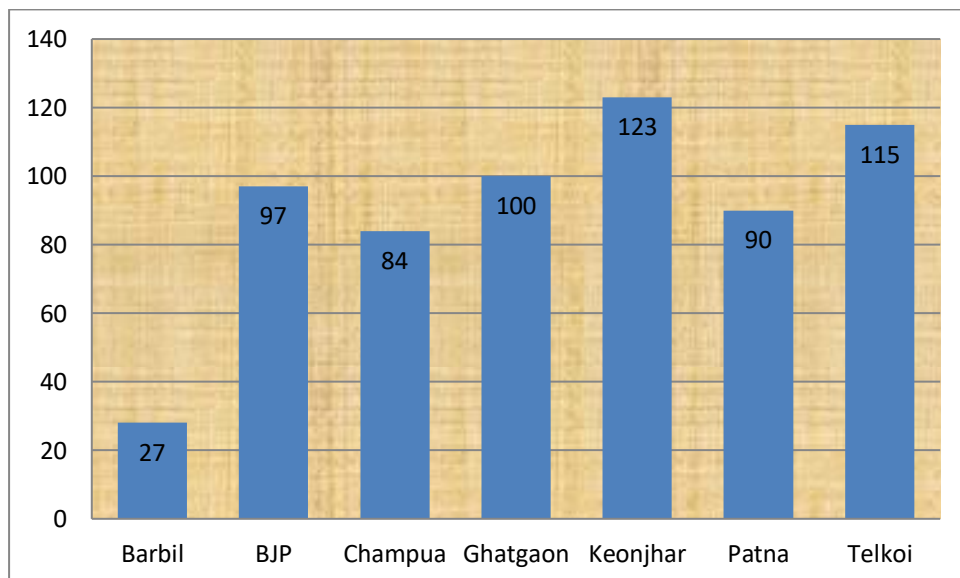


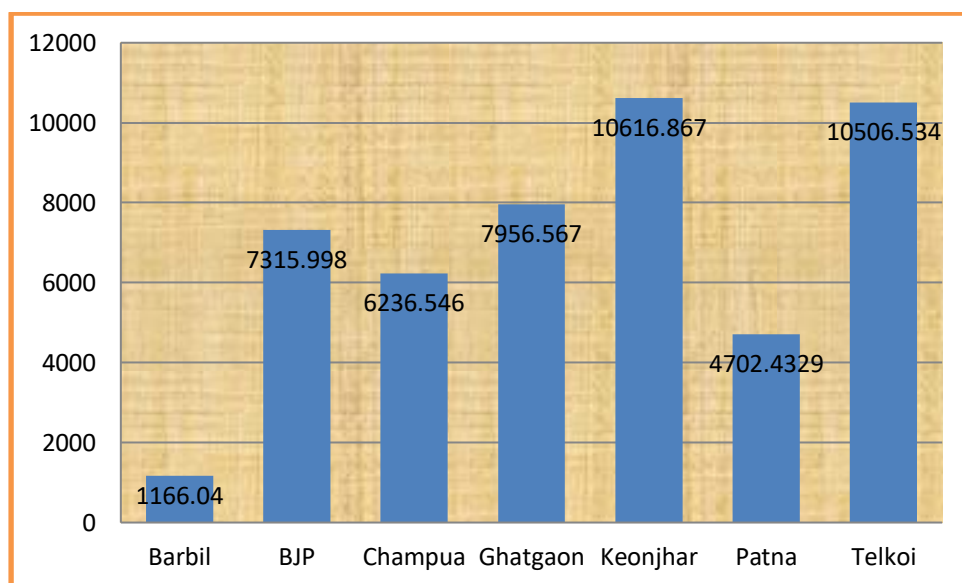
107	Telkoi	Gundurijoda	Somakoi R.F.	R.F.	163.478
108	Telkoi	Ma Tarini	Kalapat	R.F.	112.980
109	Telkoi	Brahmeswar, Khuntapada	Somakoi	R.F.	155.590
110	Telkoi	Madhyapur	Samakoi	R.F.	52.422
111	Telkoi	Bata Kholi	Kalapat	R.F.	200.000
112	Telkoi	S.N. Pur Goda	Kalapat	R.F.	200.000
113	Telkoi	Bangurupal	Kalapat	R.F.	200.000
114	Telkoi	Kardangi	Mankadchua	R.F.	225.000
115	Telkoi	Budha amba	Kalapat	R.F.	84.380
Total Telkoi RF					7183.997

Table No 8.1(H) Abstract of VSS (Area allotted)

Range	No of VSS	RF	PRF	PF	VF#	DPF	KF	Total
Barbil	27	586.0000	0.0000	0.0000	0.0000	0.0000	580.0400	1166.0400
BJP	97	916.1100	1350.2350	83.0000		2098.4930	2868.1600	7315.9980
Champua	84	3731.1760	298.4000	0.0000	132.0000	50.0000	2024.9700	6236.5460
Ghatgaon	100	6707.4170	0.0000	0.0000	0.0000		1249.1500	7956.5670
Keonjhar	123	7609.9970	535.3300	0.0000	0.0000	0.0000	2471.5400	10616.8670
Patna	90	3225.2020	31.0200	0.0000	222.0000	129.0139	1095.1970	4702.4329
Telkoi	115	7183.9970	801.0100	0.0000	0.0000	398.6800	2122.8470	10506.5340
TOTAL	636	29959.8990	3015.9950	83.0000	354.0000	2676.1869	12411.9040	48500.9849

(NB: # The VF indicated is as per Revenue Records and different from VF Declared U/s 30 of OFA,1972)





8.2 Status of Empowerment of JFMCs

The empowerment of JFMC is at a medium to higher level. The Villagers are taking interest in Protection & Management of Forest assigned to them. Under National Afforestation Program, the involvement of VSS is of Participation level-V i.e.

- They resolve what operation to be taken up along with work program.
- They prepare the Micro plan and work accordingly.
- Funds directly transferred from MoEF&CC to FDA at Division Level. There after it is transferred to VSS account.
- They withdraw and furnish account directly to the Secretary of FDA i.e. Divisional Forest Officer.
- The account is audited by Chartered Accountant & passed by the General Body of the VSS.
- Training camps being organized to disseminate knowledge to VSS on forest management and allow them to become technically sound to manage plantations / Forest/ wildlife etc

The status of people's participation in the forest management in the assigned area and benefit sharing with them is provided in the **Table No.8.2.**



Table No.8.2: Status of people's participation in management and benefit-sharing

Reporting Year	JFMC Meetings		Attendance in the GBM		No. of EC Meeting		Grading of the JFMCs			Saving (Funds) with the JFMCs
	No./ periodicity	Agenda	% of attendance	Minutes approved	% of attendance	Minutes approved	A	B	C	
2016-17	Monthly	Awareness on JFM, Forest Protection, Capacity Building, Income Generation through SHGs	89%	190	90%	915	75	15	5	
2017-18	Monthly	Awareness on JFM, Forest Protection, Capacity Building, Income Generation through SHGs	85%	230	92%	1380	83	28	4	
2018-19	Monthly	Awareness on JFM, Forest Protection, Capacity Building, Income Generation through SHGs	91%	270	94%	1620	95	30	10	
2019-20	Monthly	Awareness on JFM, Forest Protection, Capacity Building, Income Generation through SHGs	82%	215	95%	1550	107	34	14	



8.3 Labour Welfare

For uplift of labours, occasional health camps, Skill up-gradation training camps are being conducted by the department. Now LPG connection, Gas Stove, LED bulb and water filter are being distributed in various villages of the division.

8.3.1 Socio Economic Study:

No Socio Economic study has been conducted by the Forest department to ascertain economic status of villages and effect of Forest on improvement of Socio Economic status. The Economic study conducted in the State during 2014-15 by Planning & Coordination Department is at **Annexure-XI**.

8.4 Use of indigenous knowledge:

The people in Odisha were more traditional in nature believing the faith and practices of their local communities. They happened to manage their livelihood through agriculture and maintained an indigenous life with their own knowledge system. They used to maintain the long-standing traditions from their ancestors and spread the knowledge in different spheres of livelihood. Such socially generated knowledge is popularly called as local knowledge. The on-going practice of using such knowledge for indigenous communities established the belief that such knowledge used in traditional manner was fruitful for the people. In course of time such personalized knowledge took the shape of Indigenous Knowledge (IK) which was confined to a particular community and locality and specific knowledge seekers find the effective use of such traditional knowledge for indigenous people and are interested to preserve the knowledge for the communities. It is an established fact that India has long and strong racial, cultural and ethnic groups that generate a traditional knowledge system for its people.

The ethnic minorities, rural and tribal populations, women and other disadvantaged communities in India who are deprived of economic, political and social benefits are more dependable upon such knowledge system for their livelihood. With the modernization of the present society, the needs of those disadvantaged populations were brought to the limelight and their knowledge system was given the importance. Similar phenomenon is gaining ground in other countries in the world where the local knowledge of the communities are treated as the real knowledge for survival. The concept of indigenous knowledge gained its worldwide recognition through the United Nations Conference on Environment and Education in 1992, World Conservation Strategy of International Union and Conservation of Natural Resources in 1980, Brundtland Commission, and World Commission on Environment and Development, 1987. These events recognized the existence of indigenous knowledge in every country, society, culture. Since India has a long history and much enriched culture there is

abundant reservoir of indigenous knowledge in every part of the country. Similarly Odisha is a historical land having enriched cultural heritage which has varied communities and immense resources. Its flora and fauna are vast and varied in nature. The State has a large number of tribal communities who appear to live on their own knowledge system.

8.4.1 Concept and Definitions of Indigenous Knowledge:

The term indigenous knowledge has different connotations such as, traditional knowledge, local knowledge, community knowledge, rural people's knowledge, farmer's knowledge. Although the concept has different forms the meaning appears to be synonymous. Indigenous knowledge is the traditional knowledge of the local community existing within and developed around the specific conditions of women and men indigenous to a particular geographical area. The concept and expansion of its scope in that the term indigenous knowledge is not confined to tribal groups or the original inhabitants of an area. It is not confined to the rural people rather any community possessing indigenous knowledge- rural or urban, settled or nomadic, original inhabitants and migrants. Indigenous knowledge is referred to not only to the knowledge of indigenous people but also the intellectual property of other communities. There are many facets involved in the indigenous knowledge such as, information of the communities, beliefs on religious faiths, tools of using in agriculture, materials in house construction work, experimentation in farming and healthcare, natural resources in flora and fauna, human resources and expertise in skilled artisans, education and learning and communication of information.

Indigenous knowledge is found in people's memories and activities and is expressed in the form of stories, songs, folklores, proverbs, dance myths, cultural values, beliefs, rituals, community laws, local language and taxonomy, agricultural practices, equipments, materials, plant species, and animal breeds. Significance of Indigenous Knowledge Indigenous knowledge is primarily inherited from the ancestors through generations of the community. Such knowledge stands as the main source of utilization and management of resources. It is not only a self centered knowledge but a collecting knowledge, the collection of phenomena and experiences which the older people also. Such knowledge is confined to few people who shared influenced others in a restricted manner. In a particular tribal society Jani is the master of all religious ideas and practices. Other people are imparted to know the religious ideas and practices by Jani which is ultimately used for individual welfare of the common people. The knowledge with personal perseverance of Jani is self centred. On the other hand that common knowledge is about the general livelihood pattern of that community which is more or less to all in the society. Those are very practical knowledge which is primarily earned



his livelihood. The making of household artifacts, knowledge about cultivation, health care etc. are major arena of the indigenous knowledge development. Indigenous Knowledge is primarily referred to the long standing traditions, belief and practices of certain regional, local and indigenous communities. The people in older times were more spiritual, religious, God- fearing and believing in virtuous livelihood. They believed that their living will be happy and prosperous if they work in a systematic manner with certain beliefs and practices. Such beliefs of a locality bear fruits for their existence. Indigenous Traditional Knowledge is developed and adopted continuously to a changing environment and passed on from generation to generation. The livelihood of rural population mainly depends on certain experience based knowledge which is essential for their survival. Such knowledge system has embraced many areas of the people activities such as health, education, agriculture, animal husbandry, handicrafts, religion, culture and tradition of a local community. The people in those days used to practice such knowledge for sustainable development. The knowledge is basically used to cure diseases of human as well as animal and to develop nutrition, to bring out better agricultural systems in farming, to improve the arts and craft, and to maintain the religious practices and astrological beliefs. Indigenous knowledge is embedded in community practices, institutions, relationships and rituals. It provides the basis for problem solving strategies for the communities.

8.4.2 Sources of Indigenous Traditional Knowledge:

The sources of the traditional knowledge mainly derived from the human experiences, beliefs and practices which are collected from several sources. There are also semi-recorded information such as manuscripts, photographs, and folk literature and grey literature. Ancient people had developed the Vedas, Puranas, religious books, grey literature, ethno-botanical texts and archaeological deposits which were the sources of knowledge for those people. Those sources give detail account of the life of the ancient people and the method of living in a prosperous way. Again those sources also give information about biotechniques, medicinal knowledge, breeding techniques, agricultural farming systems, healthcare techniques, religious and astrological guidelines and cultural artifacts. Some of the indigenous traditional knowledge is available in written form in primary, secondary and tertiary sources of information. But most of the indigenous traditional knowledge are undocumented and are available orally or in memory of the group of the community of a region or area. Indigenous Traditional Knowledge in this region is widely scatted and fragile and there is a need to integrate those distributed sources of information in concrete form. Although religious books which give a lot of information about indigenous traditional knowledge are least used in present time. There is greater need to accumulate and acquire to collect information



and make documentation of such knowledge. While tribal communities frequently use such knowledge which is essential to trace the sources of information of indigenous traditional knowledge among tribal communities.

8.4.3 Documenting the Indigenous Knowledge:

The origin of indigenous knowledge can be traced back to the ancient period. People used such knowledge from generation to generation for their livelihood in an unaccounted manner. There are no such written documents for recording and dissemination of such knowledge. Such knowledge system is essential for development. It must be gathered and documented for a particular community. Collection and storage of indigenous knowledge should be supplemented with adequate dissemination and exchange among interested parties.

8.5 Extent of Cultural / Sacred groves:

Nature worship is a common practice around the world, and India is no exception. Stories abound with examples of ancient reverence for trees and an intrinsic understanding of their crucial role in the ecosystem. One king of a coastal region planted mangrove trees to serve as bio-shields around his lands, keeping them safe from hurricanes. Another grew rain-attracting trees around the rivers, so the deities, the trees themselves, can act as rain gods and keeps the river flowing. The Buddha attained enlightenment in different stages under five different trees. In modern times, this tradition of worship is upheld in many forests all over India, known as sacred groves. Some sacred groves are over 5,000-year-old virgin forests that exist because a culture believed in deities that protect the forest. If the deity is pleased, the forest thrives, and tribal community prospers. If the deity is disturbed, by meddling with the forest, some punishment will occur. Thus, the sacred groves are governed not by laws but by cultural taboos. The list of sacred groves adjoining to fringe villages in Keonjhar Division is furnished below.



Table No 8.3 List of Sacred Groves

Sl No	Name of Section	Name of Beat	Name of the revenue village	Name of the site	Area in Ha	GPS reading of sacred groves	Name of the worshipping God/ Goddess/Others
Barbil Range							
1	Guali	Roida	Kundurpani	KundurupanThakurani Sal	0.3212	N- 21-58'-44.6", E- 85-21'-51.6"	Gramasree Thakurani
2	Guali	Roida	Bhyuan Roida	Bhyuan Roida Thakurani Sal	0.0931	N- 22-00'-45.1" E- 85-22'-25.6"	Gramasree Thakurani
3	Guali	Roida	Kolha Roida	Kolha Roida Thakurani Sal	0.0931	N- 22-01'-19.3" E- 85-22'-52.5"	Gramasree Thakurani
4	Guali	Bhadrasahi	Bhusugaon	Bhusugaon Thakurani Sal	0.1457	N- 22-03'-45.8" E- 85-23'-13.3"	Gramasree Thakurani
5	Guali	Rugudi	Katasahi	Katasahi Thakurani Sal	0.1943	N- 22-03'-45.8" E- 85-19'-54.7"	Gramasree Thakurani
6	Nalda	Uliburu	Uliburu	Uliburu Thakurani Sal	0.0002	N- 22-08'-40.2" E- 85-23'-05.2"	Gramasree Thakurani
7	Nalda	Thakurani	Sayabali	Sayabali Thakurani Sal	0.0468	N- 22-04'-43.5" E- 85-24'-59.5"	Gramasree Thakurani
8	Barbil	Harmatha	Hara Matha	Hara Matha Thakurani Sal	0.1435	N- 22-03'-10.2" E- 85-17'-17.6"	Basuli Sala Medha
9	Bileipada	Balita	Silijoda	Sialijoda Thakurani Sal	0.4048	N- 22-03'-57.3" E- 85-28'-47.3"	Gramadevati
10	Bileipada	Balita	Balita	Balita Thakurani Sal	0.1336	N- 22-04'-16.6" E- 85-27'-0.08"	Paudi Devi
11	Bileipada	Balita	Kandara	Kandra Thakurani Sal	0.18	N- 22-03'-05.0" E- 85-30'-0.02"	Gramasree Medha



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12	Bileipada	Balita	Lahanda	Lahanda Thakurani Sal	0.389	N- 22-02'-55.3" E- 85-27'-09.8"	Gramasree Thakurani
13	Bileipada	Balita	Putugaon	Putugaon Thakurani Sal	0.2712	N- 22-03'-48.7" E- 85-32'-46.8"	Gramasree Thakurani
14	Bileipada	Balita	Bhagalpur	Bhagalpur Thakurani Sal	0.19	N- 22-03'-59.8" E- 85-27'-56.6"	Kainsri Medha
15	Bileipada	Balita	Gobardhanpur	Gobardhanpur Thakurani Sal	0.6275	N- 22-04'-41.5" E- 85-27'-49.3"	Gramasree Thakurani
16	Guali	Rugudi	Kendudihi	Kendudihi Thakurani Sal	0.17	N- 21-59'-38.7" E- 85-16'-21.1"	Gramasree Thakurani
17	Guali	Rugudi	Chor Malda	Chor Malda Thakurani Sal	0.251	N- 21-57'-03.4" E- 85-21'-08.3"	Gramasree Thakurani
18	Nalda	Karo	Kara Kolha	Kara Kolha Thakurani Sal	0.0909	N- 21-07'-38.3" E- 85-24'-25.9"	Gramasree Thakurani
19	Guali	Rugudi	Panduliposi	Panduliposi Thakurani Sal	0.1457	N- 21-59'-34.6" E- 85-16'-55.8"	Gramasree Thakurani
Telkoi Range							
20	Bimala	Kardangi	Sridharapur	Sridharapur Pidha Thakurani Sal	0.2427	N- 21-18'-275" E- 85-21'-387"	Gramasree Thakurani
21	Telkoi	Dobalapal	Kadapada	Kadapada Tomkia Pidha Thakurani Sal	0.2023	N- 21-19'-071" E- 85-20'-652"	Gramasree Thakurani
22	Telkoi	Dobalapal	Deuldiha	Deuldiha Thakurani Sal	0.2023	N- 21-20'-539" E- 85-20'-939"	Gramasree Thakurani
23	Telkoi	Telkoi	Kamalanga	Kamalanga Thakurani Sal	0.2023	N- 21-22'-086" E- 85-25'-456"	Gramasree Thakurani
24	Talapada	SNPurgoda	Sankarpur	Sankarpur Thakurani Sal	0.6069	N- 21-22'-523" E- 85-27'-905"	Gramasree Thakurani



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25	Talapada	Oriya	Bhaliadal	Bhaliadal Thakurani Sal	0.4046	N- 21-22'-662" E- 85-27'-151"	Gramasree Thakurani
26	Talapada	Oriya	Dandunmunda	Dandunmunda	0.0971	N- 21-22'-397" E- 85-25'-395"	Gramasree Thakurani
27	Talapada	Oriya	Ramachandrapur	Ramachandrapur	0.3641	N- 21-22'-546" E- 85-25'-632"	Gramasree Thakurani
28	Telkoi	Dobalapa	Madhyapur	Madhyapur	0.1618	N- 21-20'-753" E- 85-21'-859"	Dhubulibudhi Thakurani
29	Bimala	Bimala	Kudheihata	Kudheihata	0.6069	N- 21-13'-5.89" E- 85-24'-1.15"	Gramasree Thakurani
30	Bimala	Podanga	Banabiharipur	Banabiharipur	0.4046	N- 21-17'-8.31" E- 85-25'-3.20"	Mahapat Thakurani
31	Bimala	Bimala	Bimala	Bimala	0.8092	N- 21-10'-96.0" E- 85-23'-6.7"	Petra Ghati Thakurani
32	Bimala	Podanga	Khajuria	Khajuria	0.4046	N- 21-17'-439" E- 85-25'-955"	Gramasree Thakurani
33	Telkoi	Telkoi	Kuladera	Kuladera	0.4046	N- 21-18'-742" E- 85-25'-573"	Maa Somanati Thakurani
34	Telkoi	Telkoi	Khuntapara	Khuntapara	0.4046	N- 21-20'-101" E- 85-23'-926"	Gramasree Thakurani
35	Bimala	Patkhali	Sinduria	Sinduria	0.2427	N- 21-11'-815" E- 85-29'-754"	Hingulai Thakurani
36	Kaliahata	Rekuti	Rekuti	Rekuti	0.4046	N- 21-10'-926" E- 85-36'-504"	Maa Charchita Thakurani
37	Kaliahata	Kaliahata	Kaliahata	Kaliahata	0.4046	N- 21-12'-278" E- 85-35'-811"	Gramasree Thakurani
38	Kaliahata	Kaliahata	Nuagaon	Nuagaon	0.08	N- 21-12'-586" E- 85-35'-612"	Patakhanda Thakurani



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39	Kaliahata	Rekuti	Gobagoda	Gobagoda	0.06	N- 21-11'-511" E- 85-36'-622"	Mahapat Thakurani
40	Bimala	Patkhali	Patkhali	Patkhali	0.08	N- 21-11'-405" E- 85-31'-894"	Mahapat Thakurani
41	Bimala	Patkhali	Padiaposi	Padiaposi	0.245	N- 21-11'-625" E- 85-30'-591"	Maa Charchika Thakurani
42	Talapada	Talapada	Gurum	Gurum	0.163	N- 21-18'-835" E- 85-32'-236"	Gramasree Thakurani
43	Talapada	Talapada	Similipal	Similipal	0.12	N- 21-20'-137" E- 85-30'-930"	Gramasree Thakurani
44	Talapada	Talapada	Talapada	Talapada	0.405	N- 21-19'-966" E- 85-32'-616"	Gramasree Thakurani
45	Bimala	Bimala	Mardha	Mardha	1.214	N- 21-08'-845" E- 85-30'-441"	Hingulai Thakurani
46	Bimala	Raisuan	Samakud	Samakud	1.618	N- 21-07'-313" E- 85-29'-222"	Hingulai Mahapat Thakurani
47	Bimala	Raisuan	Raisuan	Raisuan	2.023	N- 21-10'-212" E- 85-30'-324"	Mahapat Thakurani
48	Bimala	Bimala	Ballabhadrapur	Ballabhadrapur	0.809	N- 21-09'-698" E- 85-25'-763"	Mahapat Kanabira Thakurani
49	Telkoi	Ahigola	Bena	Bena	3.237	N- 21-19'-905" E- 85-26'-774"	Kalapat Thakurani
50	Talapada	Oriya	Haldipani	Haldipani	0.08	N- 21-25'-319" E- 85-27'-790"	Kalapat Thakurani
51	Talapada	Oriya	Dhanurjaypur	Dhanurjaypur	0.06	N- 21-23'-402" E- 85-24'-442"	Gramasree Thakurani



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52	Talapada	Oriya	Pitanali	Pitanali	0.08	N- 21-24'-765" E- 85-26'-634"	Gramasharee Rendapat Thakurani
53	Telkoi	Barhadevta	Damadarguani	Damadarguani	0.607	N- 21-25'-704" E- 85-24'-048"	Gramasree Thakurani
54	Telkoi	Dobalapal	Dimiria	Dimiria	0.06	N- 21-24'-606" E- 85-23'-731"	Gramasree Thakurani
55	Telkoi	Golabandha	Chhamunda	Chhamunda	0.405	N- 21-23'-287" E- 85-20'-273"	Pitabali Thakurani
56	Telkoi	Dobalapal	Saleikana	Saleikana	0.405	N- 21-24'-929" E- 85-23'-029"	Maa Tarini Mahapat & Kalapat Thakurani
57	Talapada	Oriya	Halpodi	Halpodi	0.324	N- 21-22'-438" E- 85-22'-826"	Gramshree Thakurani
58	Talapada	Oriya	Jata	Jata	0.08	N- 21-23'-188" E- 85-23'-402"	Gramshree Thakurani
59	Telkoi	Golabandha	Siriabhal	Siriabhal	0.162	N- 21-24'-755" E- 85-20'-869"	Gramshree Thakurani
60	Talapada	Oriya	Katrapali	Katrapali	0.04	N- 21-22'-5.79" E- 85-24'-5.47"	Pitabali Thakurani
61	Talapada	SNPurgoda	Betkholi	Betkholi	0.405	N- 21-21'-129" E- 85-28'-842"	Gramshree Mahapat Thakurani
62	Talapada	Oriya	Halpodi	Halpodi	0.809	N- 21-22'-325" E- 85-23'-042"	Maa Nagapat Thakurani
63	Kaliahata	Purujoda	Purujoda	Purujoda	0.405	N- 21-12'-760" E- 85-33'-099"	Narendra Mahapat Thakurani



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64	Bimala	Bimala	Bimala	Bimala	1.214	N- 21-11'-495" E- 85-24'-062"	Gramshree Mahapat Thakurani
BJP Range							
65	Kanjipani	Gandijoda	Mundula	Mundula	0.2023	N- 21-31'-13.4" E- 85-30'-51.6"	Gramshree
66	Kanjipani	Gandijoda	Sikulapada	Sikulapada	0.5048	N- 21-30'-13.9" E- 85-31'-11.7"	Gramshree
67	Kanjipani	Gonasika	Guptaganga	Guptaganga	0.097	N- 21-30'-5.9" E- 85-32'-58.4"	Gramshree
68	Suakati	Suakati	Sarukudar	Sarukudar	1.33	N- 21-33'-24.0" E- 85-34'-22.0"	Rangapat
69	Suakati	Suakati	Radhuan	Radhuan	0.0894	N- 21-34'-00.0" E- 85-34'-6.3"	Rangapat
70	Suakati	Suakati	Uper Sumatha	Uper Sumatha	0.2429	N- 21-33'-29.6" E- 85-33'-36.0"	Gramshree
71	Suakati	Anjar	Medinipur (Bhejidihi)	Medinipur (Bhejidihi)	0.3513	N- 21-36'-59.5" E- 85-33'-23.9"	Gramshree
72	Suakati	Anjar	Medinipur	Medinipur	0.1836	N- 21-36'-30.3" E- 85-33'-40.2"	Gramshree
73	Suakati	Suakati	Sandha Balidiha	Sandha Balidiha	0.2025	N- 21-34'-52.7" E- 85-35'-10.4"	Ranki Patsalo
74	Suakati	Suakati	Kasada	Kasada	0.438	N- 21-35'-1.9" E- 85-27'-19.2"	Rushipat
75	Suakati	Suakati	Thakurdihi	Thakurdihi	0.171	N- 21-35'-53.7" E- 85-32'-39"	Nitei Dhobani Patrasouruni
76	Suakati	Suakati	Talachampe	Talachampe	0.063	N- 21-34'-36" E- 85-32'-49.4"	Jatiapat, Kolapat, Sarupat



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77	Suakati	Suakati	Siriskhunta	Siriskhunta	0.2834	N- 21-34'-54.4" E- 85-34'-52.8"	Gramshree
78	Suakati	Suakati	Rugudi	Rugudi	0.1912	N- 21-35'-8.3" E- 85-32'-58.7"	Rangapat
79	Suakati	Suakati	Khuntakata	Khuntakata	0.9448	N- 21-35'-16.1" E- 85-26'-45.2"	Badampat
80	Suakati	Suakati	Suakati	Suakathi	0.4809	N- 21-36'-59.9" E- 85-31'-4.2"	Gramshree
81	Suakati	Suakati	Danla	Danla	0.0757	N- 21-36'-22.5" E- 85-29'-3.3"	Gramshree
82	Suakati	Suakati	Padakasada	Padakasada	0.5568	N- 21-34'-57.3" E- 85-25'-37.9"	Gramshree
83	Suakati	Suakati	Taramakanta	Taramakanta	0.6785	N- 21-37'-59.9" E- 85-17'-00.1"	Kandheibera
84	Suakati	Suakati	Khajurimundi	Khajurimundi	0.4407	N- 21-37'-2.2" E- 85-26'-21.7"	Gramshree
85	Suakati	Bansapal	Saharpur	Saharpur	0.1974	N- 21-35'-53.3" E- 85-25'-2.6"	Gramshree
86	Suakati	Suakati	Bhaliadal	Bhaliadal	0.2465	N- 21-35'-29.5" E- 85-33'-58.9"	Gramshree
87	Suakati	Kusakala	Kalanda (Kha)	Kalanda (Kha)	0.2585	N- 21-42'-16.4" E- 85-18'-56.0"	Gramshree
88	Suakati	Kumundi	Kumundi	Kumundi	0.8097	N- 21-38'-27.5" E- 85-26'-6.3"	Gramshree
89	Suakati	Kusakala	Badbil	Badbil	0.8303	N- 21-43'-1.6" E- 85-18'-56.9"	Gramshree
90	Suakati	Kusakala	Bahgatpur	Bahgatpur	1.2248	N- 21-43'-24.4" E- 85-18'-15.7"	Gramshree



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91	Suakati	Taramakanta	Bargada	Bargada	0.8079	N- 21-35'-45.0" E- 85-19'-35.7"	Gramshree
92	Suakati	Suakati	Gopinathpur	Gopinathpur	0.2748	N- 21-35'-34.4" E- 85-32'-44.9"	Badamsalo
93	Suakati	Suakati	Tentuli	Tentuli	0.1867	N- 21-35'-47.6" E- 85-31'-35.8"	Gramshree
94	Suakati	Suakati	Talakaipur	Talakaipur	0.1862	N- 21-35'-19.5" E- 85-30'-39.9"	Gramshree
95	Suakati	Suakati	Lunaghar	Lunaghar	0.4024	N- 21-35'-27.4" E- 85-30'-5.0"	Gramshree
96	Kanjipani	Gandijoda	Bayakumutia	Bayakumutia	1.9	N- 21-32'-17.6" E- 85-29'-53.4"	Gramshree
Keonjhar Range							
97	Palasponga	Palasponga	Kasira Patna	Kasira Patna	0.0416	N- 21-45'-15.6" E- 85-31'-18.3"	Doleipat
98	Palasponga	Palasponga	Tiadiposi	Tiadiposi	0.001	N- 21-46'-54.0" E- 85-35'-52.2"	Gramyashree Thakurani
99	Naranpur	Naranpur	Gopalpur	Gopalpur	0.076	N- 21-33'-889" E- 85-42'-275"	Maa Rangapat
100	Palasponga	Kampodihi	Banajodi	Banajodi	0.0049	N- 21-42'-59.8" E- 85-34'-45.6"	Kanchena Thakurani
101	Palasponga	Kampodihi	Silisuan	Silisuan	0.0025	N- 21-42'-11.8" E- 85-35'-04.3"	Jayar Marang Gurugal
102	Janghira	Janghira	Masinabila	Masinabila	0.0168	N- 21-26'-25.4" E- 85-38'-11.9"	Maa Rangapat
103	Naranpur	Naranpur	Jodichatar	Jodichatar	0.0596	N- 21-44'-751" E- 85-34'-762"	Maa Gramashree



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104	Naranpur	Naranpur	Jamunalia	Jamunalia	0.0375	N- 21-35'-729" E- 85-39'-846"	Maa Rangapat, Maa Andhari Pat, Maa Bamadevi
105	Naranpur	Gopalpur	Badaposi	Badaposi	0.1443	N- 21-34'-217" E- 85-41'-259"	Maa Rangapat, Maa Andhari Pat, Maa Sarupatiani
106	Keonjhar	Belda	Shankarpur	Shankarpur	0.2128	N- 21-39'-836" E- 85-38'-865"	Swargasundari, Rangapat, Naranpat, Maa pat Bolanath
107	Naranpur	Naranpur	Badamonaharpur	Badamonaharpur	0.0849	N- 21-38'-343" E- 85-41'-559"	Maa Sunaripat, Maa Andhari, Maa Rangapat
108	Palasponga	Dhanurjarpur	Kandaraposi	Kandaraposi Maragburu	0.0059	280.3 Rmt.	Marangburu, Jaherahi
109	Palasponga	Dhanurjarpur	Dhanurjaypur	Dhanurjaypur	5	1230 Rmt.	Maa Mangalapat
110	Palasponga	Palasponga	Bhagabandha	Bhagabandha	1.3902	N- 21-48'-03.6" E- 85-36'-51.4"	Maa Ranjaeisuni
111	Palasponga	Palasponga	Raikala	Raikala	0.7656	N- 21-48'-56.5" E- 85-36'-34.2"	Maa Ranjaeisuni
112	Naranpur	Naranpur	Hundula	Hundula	0.0805	N- 21-45'-52.3" E- 85-33'-39.8"	Maa Ranjaeisuni
113	Janghira	Janghira	Nalapanga	Nalapanga	0.0092	N- 21-25'-18.8" E- 85-38'-56.1"	Maa Tarini
114	Naranpur	Naranpur	Guhchalchatua	Guhchalchatua	0.2485	N- 21-37'-013" E- 85-40'-965"	Rangapat
115	Naranpur	Naranpur	Dimirimunda	Dimirimunda	0.0054	N- 21-37'-828" E- 85-41'-151"	Sindurgouri



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116	Naranpur	Naranpur	Podadiha	Podadiha	0.2124	N- 21-38'-993" E- 85-42'-450"	Tarini Thakurani
117	Naranpur	Naranpur	Basudevpur	Basudevpur	0.6293	N- 21-39'-131" E- 85-42'-207"	Rangapat
118	Janghira	Balabhadrapur	Salabeda	Salabeda	0.0018	N- 21-27'-36.3" E- 85-41'-14.5"	Rangapat
119	Janghira	Janghira	Khutabandh	Khutabandh	0.0126	N- 21-27'-52.0" E- 85-35'-27.1"	Sarupat
120	Naranpur	Naranpur	Ukuchabeda	Ukuchabeda	0.0051	N- 21-33'-438" E- 85-39'-763"	Andhari Sal, Asadhisal
121	Janghira	Janghira	Khudaposi	Khudaposi	0.023	N- 21-42'-42.5" E- 85-37'-45.4"	Rangapat
Patna Range							
122	Saharpada	Saharpada	Bila	Bila	0.3642	N- 21-44'-698" E- 85-53'-448"	Tarini
123	Khireitangiri	Jamunaposi	Padampur	Padampur	0.279	N- 21-42'-687" E- 85-46'-658"	Bisoipata
124	Saharpada	Gorandijodi	Araharpada	Araharpada	0.202	N- 21-42'-762" E- 85-57'-565"	Rangapat
125	Saharpada	Gorandijodi	Sana Dhanurjaypur	Sana Dhanurjaypur	0.0687	N- 21-42'-476" E- 85-56'-591"	Bisoipata
126	Saharpada	Gorandijodi	Tando	Tando	0.255	N- 21-44'-978" E- 85-56'-555"	Narayanpat
127	Saharpada	Gorandijodi	Bhaliadiha	Bhaliadiha	0.5625	N- 21-42'-980" E- 85-58'-777"	Jaheraya, Lit, Manika, Bisam
128	Khireitangiri	Tribindha	Sarasposi	Sarasposi	0.198	N- 21-47'-012" E- 85-46'-718"	Maa Sinduragouri



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129	Khireitangiri	Tribindha	Chemana	Chemana	0.3925	N- 21-46'-430" E- 85-46'-185"	Maa Sinduragouri
130	Saharpada	Gorandijodi	Pingupatna	Pingupatna	0.518	N- 21-42'-383" E- 85-58'-770"	Jaheraya, Manangapur
131	Saharpada	Gorandijodi	Pradhanpada	Pradhanpada	0.247	N- 21-43'-086" E- 86-00'-444"	Naktipata
132	Saharpada	Gorandijodi	Saharpada	Saharpada	0.073	N- 21-43'-637" E- 85-57'-478"	Droupadi
133	Patna	Khireitangiri	Dasarathipur	Dasarathipur	0.583	N- 21-45'-769" E- 85-44'-353"	Sindugouri
134	Khireitangiri	Khireitangiri	Dalanga	Dalanga	0.129	N- 21-42'-098" E- 85-43'-311"	Mahabirapat
135	Khireitangiri	Tribindha	Baliaposi	Baliaposi	0.405	N- 21-46'-171" E- 85-45'-114"	Sindugouri
136	Khireitangiri	Khireitangiri	Godipokhari	Godipokhari	0.182	N- 21-43'-292" E- 85-44'-136"	Mahabirapat
137	Saharpada	Gorandijodi	Haladibata	Haladibata	0.146	N- 21-42'-742" E- 85-56'-884"	Bisoipata
138	Khireitangiri	Jamunaposi	Purunia	Purunia	0.494	N- 21-40'-709" E- 85-46'-008"	Bisoipata
139	Saharpada	Gorandijodi	Dubeipentha	Dubeipentha	0.259	N- 21-44'-279" E- 85-56'-487"	Ranipat, Narangpat
140	Saharpada	Gorandijodi	Chadheibhol	Chadheibhol	0.566	N- 21-41'-799" E- 85-59'-686"	Jaheraya, Manangapur
141	Khireitangiri	Khireitangiri	Bhanrapur	Bhanrapur	0.036	N- 21-44'-725" E- 85-41'-988"	Maa Sinduragouri
142	Patna	Khireitangiri	Nischintapur	Nischintapur	0.113	N- 21-44'-725" E- 85-41'-988"	Maa Sinduragouri



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143	Khireitangiri	Khireitangiri	Bhulda	Bhulda	0.085	N- 21-43'-994" E- 85-40'-786"	Maa Dindopat
144	Khireitangiri	Jamunaposi	Jamunaposi	Jamunaposi	0.0324	N- 21-43'-083" E- 85-45'-145"	Bisoipata
145	Khireitangiri	Rajnagar	Nuakhaman	Nuakhaman	0.376	N- 21-44'-745" E- 85-47'-504"	Bisoipat, Rangapat
146	Khireitangiri	Khireitangiri	Kantiapada	Kantiapada	0.097	N- 21-41'-994" E- 85-45'-000"	Naranapat
147	Khireitangiri	Khireitangiri	Khireitangiri	Khireitangiri	0.012	N- 21-42'-487" E- 85-42'-006"	Maa Rangapat
148	Khireitangiri	Rajnagar	Nuagaon	Nuagaon	0.0324	N- 21-45'-830" E- 85-47'-494"	Biseipata
149	Khireitangiri	Rajnagar	Raikala	Raikala	0.08	N- 21-45'-003" E- 85-48'-767"	Gramashree
150	Khireitangiri	Tribindha	Kainda	Kainda	0.077	N- 21-46'-788" E- 85-49'-075"	Biseswari
151	Khireitangiri	Tribindha	Hatibari	Hatibari	0.279	N- 21-46'-549" E- 85-47'-940"	Aurangapat, Biseipat, Rangeisuni, sarapa
152	Khireitangiri	Tribindha	Childa	Childa	0.0445	N- 21-45'-137" E- 85-46'-396"	Biseipata
153	Khireitangiri	Tribindha	Belaposi	Belaposi	1.06	N- 21-48'-688" E- 85-46'-278"	Ranjeisuni
154	Khireitangiri	Rajnagar	Deogaon	Deogaon	0.0445	N- 21-45'-991" E- 85-49'-005"	Biseipata Maa Thaithanpat
155	Khireitangiri	Khireitangiri	Baunsuli	Baunsuli	0.085	N- 21-43'-335" E- 85-42'-931"	Akhandabrahma



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156	Khireitangiri	Rajnagar	Rajnagar	Rajnagar	0.053	N- 21-45'-776" E- 85-48'-757"	Maa Andhari
157	Khireitangiri	Jamunaposi	Barudiposi	Barudiposi	0.085	N- 21-44'-791" E- 85-46'-685"	Maa Bisopata
Ghatgaon Range							
158	Deobandh	Deobandh	Binida	Binida	0.1722	N- 21-24'-925" E- 85-41'-402"	Maa Rangapat
159	Dhenkikote	Dhenkikote	Khajurijuani	Khajurijuani	0.0306	N- 21-31'-10.6" E- 85-48'-24.7"	Maa Rangapat
160	Dhenkikote	Balipokhari	Gopinathpur	Gopinathpur	0.119	N- 21-22'-02.3" E- 85-48'-18.9"	Maa Rangapat
161	Ghatgaon	Mellan	Melan	Melan	0.0625	N- 21-21'-43.1" E- 85-28'-25.8"	Maa Sankata Tarini
162	Ghatgaon	Mellan	Balijodi	Balijodi	0.024	N- 21-22'-37.2" E- 85-56'-25.6"	Maa Sankata Tarini
163	Ghatgaon	Ghatgaon	Tara	Tara	0.0625	N- 21-25'-01.9" E- 85-51'-13.5"	Maa Tarini Sala
164	Dhenkikote	Balipokhari	Pauchia	Pauchia	0.04	N- 21-21'-47.4" E- 85-48'-43.3"	Maa Rangapat
165	Dhenkikote	Balipokhari	Balipokhari	Balipokhari	0.0306	N- 21-23'-45.8" E- 85-48'-32.8"	Maa Mohabira
166	Dhenkikote	Balipokhari	Sagadapata	Sagadapata	4	N- 21-23'-46.2" E- 85-47'-58.4"	Maa Mohabira
167	Dhenkikote	Balipokhari	Hatinuta Tangartali	Hatinuta Tangartali	0.9506	N- 21-23'-36.6" E- 85-49'-47.5"	Maa Tarini
168	Dhenkikote	Dhenkikote	Nusuriposi	Nusuriposi	0.18	N- 21-26'-05.5" E- 85-48'-22.8"	Maa Rangapat



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169	Deobandh	Deobandh	Rangamatia	Rangamatia	0.0517	N- 21-24'-06.0" E- 85-43'-06.1"	Maa Rangapat
170	Deobandh	Deobandh	Patilo	Patilo	0.025	N- 21-25'-030" E- 85-42'-515"	Maa Rangapat
171	Deobandh	Deobandh	Jamuposi	Jamuposi	0.0225	N- 21-26'-55.6" E- 85-43'-08.9"	Maa Khuntianayakani
172	Deobandh	Deobandh	Badjiuli	Badjiuli	0.141	N- 21-26'-54.8" E- 85-42'-52.7"	Maa Rangapat
173	Deobandh	Deobandh	Patabari	Patabari	0.0625	N- 21-27'-03.2" E- 85-43'-58.2"	Maa Rangapat
174	Deobandh	Deobandh	Asanbhali	Asanbhali	0.0915	N- 21-27'-54.3" E- 85-45'-03.6"	Maa Rangapat
175	Deobandh	Manpur	Manpur	Manpur	0.0625	N- 21-22'-08.7" E- 85-42'-44.3"	Maa Tarnini Rangapat
176	Deobandh	Manpur	Palasbani	Palasbani	0.0225	N- 21-20'-50.6" E- 85-46'-16.2"	Maa Nuchapat
177	Deobandh	Manpur	Chakradharpur	Chakradharpur	0.0855	N- 21-22'-45.7" E- 85-46'-43.8"	Maa Mahabira Maa Rangapat
178	Dhenkikote	Balipokhari	Dudhinali	Dudhinali	0.1056	N- 21-23'-49.5" E- 85-46'-34.9"	Maa Mahabira
179	Dhenkikote	Balipokhari	Kalimati	Kalimati	0.0306	N- 21-24'-15.0" E- 85-45'-58.2"	Maa Mahabira
180	Ghatgaon	Ghatgaon	Murgapahadi	Murgapahadi	0.141	N- 21-26'-07.4" E- 85-53'-55.8"	Maa Hanapati
181	Dhenkikote	Dhenkikote	Barhatipura	Barhatipura	0.0306	N- 21-25'-30.3" E- 85-49'-13.4"	Maa Stanadhipati
182	Ghatgaon	Baiganpal	Badajamposi	Badajamposi	0.141	N- 21-28'-08.2" E- 85-54'-25.5"	Maa Mahapat Tarini



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183	Ghatgaon	Baiganpal	Nalbilla	Nalbilla	0.0625	N- 21-28'-26.3" E- 85-54'-40.5"	Maa Balamukulani
184	Ghatgaon	Baiganpal	Kundapitha	Kundapitha	0.0506	N- 21-29'-42.5" E- 85-54'-10.3"	Maa Balamukulani
185	Deobandh	Deobandh	Sanjiuli	Sanjiuli	0.1056	N- 21-26'-29.2" E- 85-42'-56.8"	Maa Rangapat
186	Ghatgaon	Baiganpal	Dehuryposi	Dehuryposi	0.0156	N- 21-27'-00.6" E- 85-54'-01.0"	Maa Nalibadi Thakurani
187	Ghatgaon	Baiganpal	Baiganpal	Baiganpal	0.0306	N- 21-28'-54.6" E- 85-56'-20.7"	Maa Balamukulani
188	Dhenkikote	Pipilia	Danguaposi	Danguaposi	0.0156	N- 21-31'-44.0" E- 85-46'-15.3"	Maa Basisopata
189	Dhenkikote	Pipilia	Asanbani	Asanbani	0.0225	N- 21-32'-28.3" E- 85-45'-32.4"	Maa Rangapat
190	Dhenkikote	Pipilia	Pipila	Pipila	0.16	N- 21-33'-54.8" E- 85-46'-16.5"	Maa Rangapat
Champua Range							
191	Balibandha	Balibandha	Kasipal	Kasipal	0.04	N- 21-53'-31.7" E- 85-33'-16.2"	Sindurai Thakurani
192	Balibandha	Chipinda	Kankadajodi	Kankadajodi	0.4	N- 21-53'-04.4" E- 85-30'-47.3"	Gramadebati
193	Balibandha	Chipinda	Jaypur	Jaypur	0.03	N- 21-52'-52.2" E- 85-29'-18.4"	Kundalei Thakurani
194	Balibandha	Chipinda	Champadihi	Champadihi	0.4	N- 21-52'-34.7" E- 85-28'-53.5"	Gramadebati
195	Balibandha	Chipinda	Kutugaon	Kutugaon	0.02	N- 21-51'-51.6" E- 85-29'-04.7"	Gramadebati



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196	Balibandha	Chipinda	Ramachandrapur	Ramachandrapur	0.16	N- 21-53'-14.9" E- 85-31'-50.8"	Andharikhaman Thakurani
197	Balibandha	Balibandha	Chingudiposi	Chingudiposi	0.1	N- 21-53'-22.6" E- 85-34'-03.5"	Gramshree
198	Balibandha	Balibandha	Katalposi	Katalposi	0.81	N- 21-53'-03.3" E- 85-34'-20.0"	Mangalapat
199	Champua	Balibandha	Balabhadrapur	Balabhadrapur	0.04	N- 21-52'-08.8" E- 85-34'-35.4"	Kundalei Thakurani
200	Champua	Balibandha	Khendra	Khendra	0.03	N- 21-51'-52.4" E- 85-33'-16.1"	Mangalapat
201	Balibandha	Chipinda	Fakirpur	Fakirpur	0.4	N- 21-51'-40.3" E- 85-33'-53.6"	Gramadebati
202	Balibandha	Chipinda	Jansanpur	Jansanpur	0.4	N- 21-52'-14.1" E- 85-32'-38.2"	Gramadebati
203	Balibandha	Chipinda	Nahabeda	Nahabeda	0.08	N- 21-52'-32.3" E- 85-31'-38.1"	Gramadebati
204	Balibandha	Balibandha	Siriabhal	Siriabhal	0.4	N- 21-54'-45.2" E- 85-34'-07.3"	Swarna Mandia
205	Balibandha	Balibandha	Koldihi	Koldihi	0.81	N- 21-54'-43.2" E- 85-34'-42.1"	Marangburu
206	Champua	Balibandha	Murusuan	Murusuan	0.08	N- 21-53'-14.5" E- 85-31'-52.6"	Gramashree
207	Champua	Balibandha	Tolakbhal	Tolakbhal	0.02	N- 21-55'-56.6" E- 85-34'-45.3"	Gramadebati
208	Champua	Balibandha	Rajabasa	Rajabasa	0.02	N- 21-54'-22.9" E- 85-35'-08.3"	Mahadeb
209	Champua	Balibandha	Balibandha	Balibandha	0.32	N- 21-54'-16.2" E- 85-34'-50.2"	Mangapak sal



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210	Balibandha	Laxmiposi	Parbatipur	Parbatipur	0.02	N- 21-54'-01.0" E- 85-36'-12.1"	Kundalei Thakurani
211	Balibandha	Laxmiposi	Mahadeipur	Mahadeipur	0.02	N- 21-53'-29.4" E- 85-36'-34.7"	Gramadebati
212	Balibandha	Gumura	Parsala (Jamunaposi)	Parsala (Jamunaposi)	0.04	N- 21-56'-39.3" E- 85-35'-27.3"	Gramadebati
213	Champua	Champua	Kainta	Kainta	0.02	N- 22-02'-44.0" E- 85-37'-21.7"	Gramashree Ranjita Debi
214	Champua	Champua	Panchpokharia	Panchpokharia	0.16	N- 22-02'-05.1" E- 85-38'-29.5"	Gramashree Thakurani
215	Champua	Kalikaprasad	Indraprastha	Indraprastha	0.24	N- 22-02'-06.0" E- 85-35'-30.5"	Gramashree Thakurani
216	Champua	Kalikaprasad	Hunjuposi	Hunjuposi	0.81	N- 21-59'-33.9" E- 85-35'-52.2"	Belaguru narasinghapata
217	Champua	Champua	Tunguleisahi	Tunguleisahi	0.08	N- 22-02'-57.3" E- 85-38'-26.3"	Gramashree Thakurani
218	Champua	Champua	Odhangapal	Odhangapal	0.08	N- 22-04'-31.6" E- 85-36'-28.6"	Gramashree Thakurani
219	Champua	Kalikaprasad	Sridharapur	Sridharapur	0.12	N- 22-02'-37.9" E- 85-36'-35.5"	Narasinghapat
220	Champua	Kalikaprasad	Patala	Patala	0.12	N- 21-59'-50.0" E- 85-38'-02.7"	Mandalapat
221	Champua	Kalikaprasad	Jamdalak	Jamdalak	0.1	N- 22-03'-08.8" E- 85-35'-36.6"	Gramashree Thakurani
222	Champua	Ukhunda	Sirikuana	Sirikuana	0.3	N- 21-52'-02.1" E- 85-42'-14.1"	Gramadebati
223	Champua	Ukhunda	Kanchhandumuria	Kanchhandumuria	0.05	N- 21-50'-32.1" E- 85-41'-45.0"	Andharikhman Thakurani



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224	Champua	Ukhunda	Birikuana	Birikuana	0.81	N- 21-52'-47.0" E- 85-41'-31.5"	Ranjeisuni
225	Champua	Ukhunda	Chhelianala	Chhelianala	0.4	N- 21-52'-03.2" E- 85-40'-59.0"	Ranjeisuni
226	Champua	Ukhunda	Bichhitrananda pur	Bichhitrananda pur	0.2	N- 21-49'-30.2" E- 85-41'-07.8"	Sinduragouri
227	Champua	Ukhunda	Nischintpur	Nischintpur	0.2	N- 21-51'-04.8" E- 85-43'-08.2"	Gramashree
228	Champua	Ukhunda	Badaposi	Badaposi	0.3	N- 21-52'-28.1" E- 85-41'-08.9"	Gramashree
229	Ukhunda	Banika	Silipunji	Silipunji	0.4	N- 21-55'-40.5" E- 85-39'-29.3"	Gramadebati
230	Champua	Uhunkda	Baria	Baria	0.4	N- 21-51'-09.6" E- 85-40'-52.8"	Andhari Budhi Thakurani
231	Champua	Uhunkda	Gopiballavpur	Gopiballavpur	0.2	N- 21-49'-25.5" E- 85-41'-44.5"	Sindurgouri
232	Champua	Uhunkda	Ukhunda	Ukhunda	0.81	N- 21-49'-21.3" E- 85-41'-27.1"	Basuli
233	Champua	Uhunkda	Kamanda- KA	Kamanda- KA	0.4	N- 21-51'-52.5" E- 85-42'-51.3"	Ranjeisuni, basuni, Andhari Thakurani
234	Champua	Kalikaprasad	Satabhalia	Satabhalia	1.21	N- 22-03'-55.5" E- 85-34'-39.6"	Gramashree
235	Champua	Champua	Tuntuna	Tuntuna	0.24	N- 22-02'-05.4" E- 85-40'-38.4"	Ranjeisuni
236	Balibandha	Laxmiposi	Barakhandia	Barakhandia		N- 21-52'-47.3" E- 85-35'-26.7"	Ranjeisuni
		Div. Total			77.531		





For management of Sacred Groves, Village committee / priest used to take decision on consultation with villagers / Village Committee.

8.6 Ecotourism Areas and Activities

Ecotourism is a form of tourism involving visiting fragile, pristine, and relatively undisturbed natural areas, intended as a low-impact and often small-scale alternative to standard commercial mass tourism. It means responsible travel to natural areas, conserving the environment, and improving the well-being of the local people. Its purpose may be to educate the visitor, to provide funds for ecological conservation, to directly benefit the economic development and political empowerment of local communities, or to foster respect for different cultures and for human rights. Since the 1980s, ecotourism has been considered a critical endeavour by environmentalists, so that future generations may experience destinations relatively untouched by human intervention. Several university programs use this description as the working definition of ecotourism.

Generally, ecotourism deals with interaction with biotic components of the natural environments. Ecotourism focuses on socially responsible travel, personal growth, and environmental sustainability. Ecotourism typically involves travel to destinations where flora, fauna, and cultural heritage are the primary attractions. Ecotourism is intended to offer tourists an insight into the impact of human beings on the environment and to foster a greater appreciation of our natural habitats.

Responsible ecotourism programs include those that minimize the negative aspects of conventional tourism on the environment and enhance the cultural integrity of local people. Therefore, in addition to evaluating environmental and cultural factors, an integral part of ecotourism is the promotion of recycling, energy efficiency, water conservation, and creation of economic opportunities for local communities. For these reasons, ecotourism often appeals to advocates of environmental and social responsibility.

Development of Eco-tourism near the forest area has a great bearing in the conservation of forest and wild life. In the present time people love to visit forests. The Government of Odisha have also given more emphasis for the development Eco-tourism near the forests. Beautiful cottages are being constructed; local youths are being engaged for maintenance of the ecotourism cottages are for providing delicious foods to the tourist. As a result, people are visiting the ecotourism places and loving the forest and wildlife. Employment of rural youth are generated for the eco-tourism. The following Eco-tourism areas are identified in this Division adjoining to the forest area.

**Table No.8.4: Eco-tourism areas are identified in this Division adjoining to the forest area**

Name of the Range	Name of Location having ecotourism potential .	Description of particular site with GPS reading	The natural attributes	Remarks
BJP	Anjar RF / Sana-Ghagara waterfall. Machhkandana river.	Sana Ghagara eco-tourism complex, Anjar is situated adjacent to Sana Ghagara waterfall of Keonjhar District at an approximate distance of 5 KMs from Keonjhar District headquarter. N:21°37'56.54" & E:85°33'3.40"	Sana Ghagara waterfall. The eco-tourism complex flanks the verdant hill on one side with perennial flow of Machhakandana river and the forested landscape on other side marked by presence of NH-49. The landscape of the site is unique and picturesque owing to undulated terrain and uniform Sal growth. Sighting of black bear and porcupine in summer is unique to the site	

Apart from the above more eco-tourism spot can be developed in the division at Sitabinji, Bhimkund, Gonasika, Murga Mahadev, Khandadhar, Gundicha Ghagi, Handibhanga, Kanjipani Valley, Giridibandha, Kanjhari, Kulijhar water fall, Tenteinali water fall, Daragadasila scenic spot and many more. All the spots are adjacent to forest and suitable for eco-tourism site for nature lovers.

The development will be undertaken following the provisions of Forest (Conservation) Act, 1980, if so required.

(a) Bhimkund Waterfall

Bhimakunda Waterfall, Keonjhar has a stunning spectacular natural environment encircled with lush green forest. The majestic Baitarani river provides two most beautiful and scary waterfalls called Sanakunda & Badakunda to the natural lovers. The waterfall has a terrific characteristic of imparting awesome experience to the visitors due to large vertical shaped gorge & speeding current and makes the environment smokey. Further huge roaring sound of waterfall makes the place most interesting among tourists. This water falls is considered as a most sacred place in religious point of view. Local people gather here during annual celebration of Makar Sankranti in large numbers. Mythology is that Pandavas were staying some time here during their religious expedition



(b) Gundichaghagi water fall

Gundichaghagi waterfall is located amidst spectacular natural environment with lush green forest. A cascade of waterfalls on the river Musala falls at a distance of 50 feet below the river surface makes the area virtually smokey & attractive with roaring sound. The waterfall looks like a silver garland. This picnic spot is truly the paradise of natural lovers which gives unforgettable memory to the visitors. This waterfall is just 12 km away from Ghatagaon



(c) Murga Mahadev Temple

Murga Mahadev Temple stands majestically at the foot of Thakurani Hills is an important tourist spot in the district. A picturesque perennial spring of Thakurani Hills with lush green forest has gifted a gorgeous waterfall to the natural lovers which flows nearby the temple area facilitating holy bath to the devotees. Huge crowd gather here during Makara Sankranti and Shivaratri. This spot is just 70 km away from Keonjhar town.



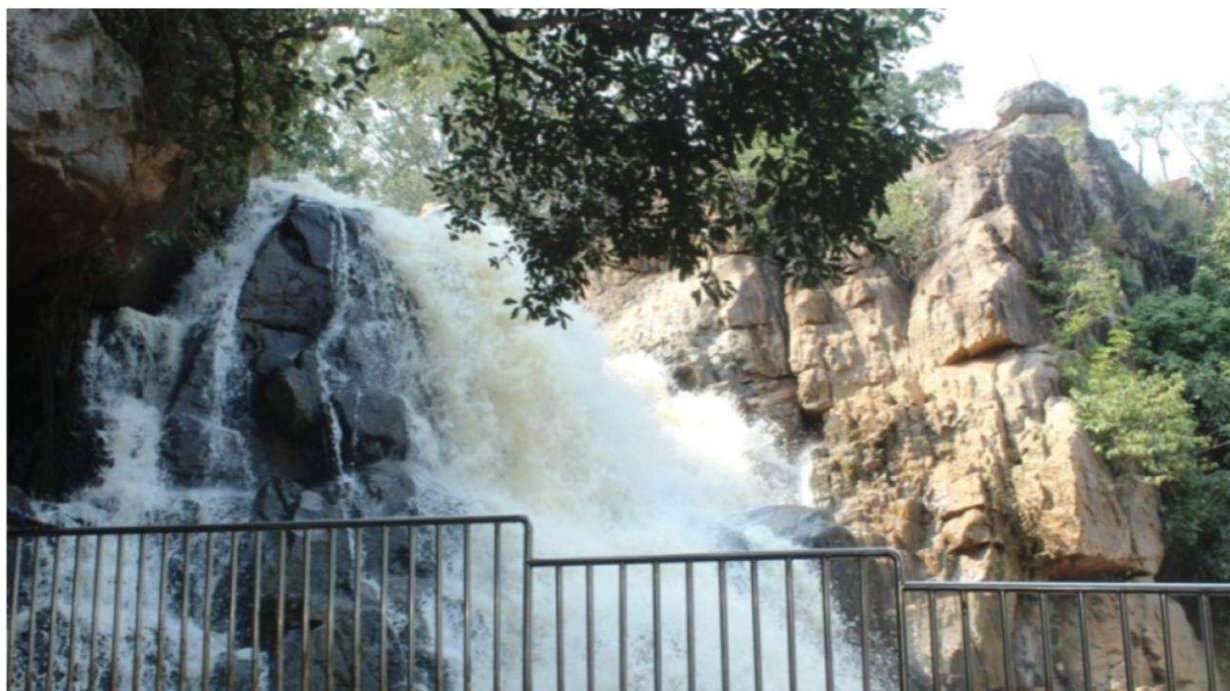
(d) Kanjipani Ghati

Kanjipani Ghati is a picturesque natural panoramic spot with magnificent up rolling mountain ranges. Trail of Kanjipani Ghati spread over 20 km long along NH-49 which offers unique experience to the natural lovers above 610 meter high ghat. The place is the treasure house of rich flora & fauna. The winter temperature goes to -'0' degree Celsius while clouds touches the valley during the rainy season to the delight of tourists. Nature's this area is treasure trove of varied flora and fauna along with huge wildlife reserves. Driving smoothly on a circuitous route while overlooking the plateaus and tribal huts in the valley is uncommon beauty. It is just 30 km away from Keonjhar town.



d) San- ghagara:

Sana Ghagara Water Fall is located in the Keonjhar district at a distance of about 03 K.Ms from Keonjhar town on the National Highway No.- 6 towards Sambalpur. The area is spread over 488 Ha. In a hilly tract with characteristic mixed deciduous and miscellaneous type of forest vegetation. The famous Sana Ghagara waterfall with perennial stream adds to the natural beauty of this forest tract and attracts large number of visitors throughout the year. It is located at an average elevation of 1950 ft. above M.S.L. and experiences a comparative cool summer and cold winter. Average annual rainfall is about 1500 mm and temperature ranges from 14.7 degree C to 41.1 degree C. Relative humidity varies between 41 to 93 % and normally no frosting occurs in this region. The area is an extremely undulating terrain with hills, pediments and a “V” shaped narrow valley. The hills and pediments are very steep and the rock formation is of dolerite origin. The area drains into river Baitarani through Machhakandana Nala.



There is one nature camp at Sana- Ghagara. From the booking history it is revealed that the Nature camp is on high demand in a specific period i.e. November to March. The revenue collected is as follows.

Statement showing Total Booking of Sana Ghagara Nature Camp from November 2017 to February 2022

Date	Total Booking Amount in Rs	Total Deduction	Net Payable
From Nov 17 to Jan 18	97558	22393	75165
From March 18 to Feb 19	590922	139500	451422
March 19 to March 20	918881	188941	729940
During 20-21	598638	105876	492762
April 21 to Dec 22	1699774	345839	1353935
G.Total	3905773	802549	3103224

No specific Study has been conducted by Forest Department / Tourism Department to ascertain carrying capacity of the tourist spots mentioned above. In light of observations made a detail study on Carrying Capacity of important Eco- Tourism Spots, available

infrastructures available, tourist amenities, *safety audit & measures to ensure safety of the tourists, nature education and interpretation component eco-tourism* need to be developed will be taken up in collaboration with Tourism Department authority. What every development will be taken up it will be within the frame work of Forest (Conservation) Act, 1980.

e) Badaghagara:

Badaghagra waterfall adjacent to Keonjhar town is a most spectacular waterfall situated amidst in a lush green forest environment. The waterfall enjoys a unique characteristics of 100 feet height inside the dense forest area to the much delight of tourists, picnics & weekend holidayer alike. Badaghagra reservoir which was raised on Machakandana river during the Kingdom era is the major source of water supplies to the Keonjhar town. The spot is rich in exotic flora & fauna and rare place for study of tribal life. This spot is just 10 km away from Keonjhar town.



8.7 Social Customs

The variety of cultural values and symbolic functions ascribed to the forests are as numerous and diverse as the communities and cultures of the region. Physically and mystically forests have defined the environment of communities in the region throughout time. The distinction that has been made between cultural values and the forest's functions is actually an artificial one. Tangibly and intangibly, forests feature in all aspects of culture, language, history, art, religion, medicine, politics, and even social structure itself. Forest trees may house the spirits of ancestors as well as those of the new born. Forests are viewed in both positive and negative lights as sources of evil as well as power and munificence, as providers for, and hindrances to development. The mystical qualities of specific forest resources often play a crucial role in traditional healing practices. Forests provide the venue for religious, social, and healing ceremonies. Forest products such as tam-tams and forest foods such as palm wine are used in many ceremonies. Assessing the myriad of symbolic and cultural values of forests goes far beyond the scope of this study. However, this does not diminish their importance in terms of the value people place on forests and forest resources. The following discussion can only illustrate some of the ways in which forests are culturally and symbolically valued.

8.7.1 Culture & Heritage

The people of the district observe a number of festivals all the year round. These festivals are broadly divided into two categories viz. domestic festivals and public festivals.

SARHUL

This is a tribal festival of flowers. In the month of March-April sal flowers are brought to the sarna or sacred grove. The priest (pahan) propitiates all gods of the Mundas. The celebration goes on for several days.

SOHRAI

This is celebrated in the month of October-November. The Munda cattle owners fast for the whole day. In the night, lamps are lighted. On the following morning the cattle-shed is washed and sprinkled with rice-beer. The cattle are fed in plenty.

KARMAPUJA

The Karma puja is celebrated mostly by the Adivasis in Keonjhar and Champua Sub-divisions. The festival commences on a Thursday in the month of Margasira (November-December) and is celebrated for eight days. The festival culminates with offerings to the presiding deity, while the preceding seven days are spent in preparation. On the first day, two unmarried young boys collect new pulses like green gram, black gram,



mustard, gingely, horse gram etc., about a handful for each household and keep the collected pulses on the bank of a stream in a bamboo basket. These two young men cook their food themselves and eat it untouched by others till the end of the festival. Every day they sprinkle water on these pulses after taking bath in the stream. On the eight day, they plant two branches of Karama tree in front of the Mandaghar (dormitory). The grains, which have by now germinated, are brought and placed beside the branches of the karama tree. The youngsters of the village then dance around the karma twigs. Next day two fowls are sacrificed there and the baskets containing grains alongwith the branches are carried in a procession to a nearby river or Nala and are immersed there.

BODAM

Bodam is celebrated by all communities in general, and the Advasis in particular, before the eating of new fruits of the season. On a Thursday in the bright fortnight of pousha, some new fruits and flowers are collected. The Dehuri, the village priest, prepares porridge in a new pot and offers the same alongwith curd, milk, new fruits and flowers to the goddess of the village. All the people take part in the festival, but 8 to 10 persons, besides the dehuri, fast for the whole day. Every household contributes for the festival.

CHAITRA PARAB OR UDA PARAB

It falls on the last day of chaitra and continues for 3 to 4 days. The people worship goddess Basuli. The festival is celebrated on a grand scale in Jyotipur, Asanapat and Chamakpur in Champua Sub-Division. On this occasion people perform Chhau dance.

MAKARA SANKRANTI

On the morning of Makara Sankranti people take their holy dip in a river or pond and go to the nearby Siva Temple to have darshan. They worship lord Siva to have their desire fulfilled. On this day Makar Jatra or Mela is held at many places in the district. But it is observed on a grand scale in the villages Barhatipura (Ghatgaon Block), Deogaon (Ghasipura Block), Kasira, Sarei, Balibandha Bhandra, Tangarbantala, Deojhar, Mirigisinga, Govindpur and Chamakpur (Champua Block). Every year 5000 to 30,000 people gather at these places to celebrate the festival. People get an opportunity to enjoy the festival as it takes place at the end of the harvesting season. Keshari Kunda which has two holes on the bed of river Baitarni attract people to get holy dip and people offer their homage to lord Siva on its bank. During Makara Sankranti adventurous people dare to enter into one hole of river bed and come out in another hole in order to prove their righteousness.

NUAKHAI



Nuakhai means ceremonial eating of new grains. It is observed on a Thursday in the month of Bhadrab. In the morning a handful of new paddy is collected from each household. The rice prepared out of this grain is used for preparing porridge which is then offered to the Grama Devati. Goats are also sacrificed before the Deity and a feast is held in the village for which each household contributes . On the following day i.e. Friday, new paddy grains are again collected from each household and the same is kept at the mandaghar. This is distributed to the villagers with pieces of gourd. The sanctified paddy is pounded and mixed with rice to be cooked for the day. In the festival all the communities take part except kolhas. The Kolhas celebrate it in a different manner. They, on this day, cook new rice in a new pot, prepare fowl curry , brew rice beer and offer it all to their Dharam Banga or Sun God on one leaf and to their ancestors on another. This is done by men alone.

RAJA PARAB

Raja is an important agricultural festival. It is observed in the district for three days i.e. from the last day of the month of Jyestha called pahili Raja up to the 2nd day of the month of Asadha, known as Bhuindahan or Bhumidahan . The 1st day of the month of Asadha is called Raja Sankranti. During these days the Mother Earth is supposed to be rajaswalla or under menstruation and all the agricultural operations are hence suspended during the period. For this festival various kinds of dishes, pithas or rice cakes and sweets are prepared. The people pass the time in feasting and merry making. The boys play various kinds of indoor and outdoor games. The girls spend the time by swinging and singing melodious songs on swings fastened to the tree branches. The festival ends on the day following Bhumidahan.

BARUNI JATRA

The Baruni Jatra is observed on the 13th day of the dark fortnight in the month of Chaitra (March-April). On the day of Baruni many people take their holy dip in the sacred rivers and sea. In the district the jatra is held at Gonasika near Brahmeswar Mahadev Temple. Large number of people from different parts of the district as well as from outside come to this place on that day to take bath in the Brahma Kunda, just near the temple of Brahmeswar Mahadev Temple. People regard this as a sacred place as the Baitarani flows from Gonasika through this kunda. There is no easy communication to that place. The local Adivasis mostly come there to sell forest products. The Jatra is held for one day and attracts about 30,000 people.

RATHA JATRA

Like the Puri Rath Jatra, the Gundicha jatra takes place on Asadha Sukla Duitiya i.e. 2nd day of the bright fortnight of the month of Asadha (June-July) . The three deities are



brought from the main temple and placed in the wooden chariot (RATHA). After due ceremony, the chariot is dragged by thousands of devotees to the Sri Gundicha mandira where the deities stay for a week. The return car festival or Bahuda jatra is performed on Asadha Sukla Dasami i.e.the tenth day of the bright fortnight.This festival is celebrated in Keonjhar,Anandapur and Champua. More than 50 thousand people gather in Old town of Keonjhar to witness Ratha Jatra. The height of the Baladev Jew temple is 135 ft or 41.15 meters and the height of the Ratha is 60 feet.

SIVARATRI

Sivaratri festival is observed in all the Siva temples on the 14th day of the dark fortnight in the month of Phalguna (Feb-March). The devotees remain awake throughout the night and worship Lord Siva. At night a lamp called “Mahadipa” is taken to the top of the temple and is kept burning throughout the night. The devotees break their fast after seeing the “Mahadipa”.This festival is observed with great pomp and Splendour in the Siva-Temple at Kusaleswar, Gonasika, Bodapalasa, Champua and Deojhar.

OTHER FESTIVALS

The other festivals performed in households and by the public are Ram Navami, Dasahara, Dola Jatra, Rahas Purnima, Bada Osha and Chandan Jatra etc.

8.7.2 Folk Dances of Keonjhar

One cannot imagine tribal life without dance and music. On festive occasions dancing is indispensable. Most tribal villages have akharas where men and women assemble together to dance to the tune of indigenous music.

CHANGU DANCE

The Changu dance derives its name from a kind of drum called Changu, which invariably accompanies the dance. This dance is common to almost all the tribes but is more popular among the Bhuyans. The peculiar feature of the dance is that the men confront the girls with music and song and then recede backwards when the girls confront them. The girls dance standing in a row generally holding each other's hand.

CHHAU DANCE

It is generally performed during the Chaitra Parab festival in the month of Chaitra. It is a dance with a strong folk character; almost like a dance drama. This dance originated in Mayurbhanj district of Orissa and Sareikela district of Bihar. In this dance footwork and body movement of the dancers are most artistic and virile. Facial expressions are generally absent.

JUANG DANCE



The Juang dance is performed to the accompaniment of tambourines. Earlier they used to dance dressed in primitive leaf which is no more in practice. Men sing as the girls dance being accompanied by deep sounding tambourines. In one form the girls move around in a single file keeping the right hand on the right shoulder of the girl in front. The Juangs also have what are called the bear dance and the pigeon dance.

HO DANCE

The Hos are a purely agricultural tribe. They have dances during Magh festival which is held in the month of January when the granaries are full. The chief beverage taken during the celebrations is a kind of home brewed rice beer called Illi. During Ho celebrations all restrictions are set aside.

8.8 Status of Compliance of Forest Right Act (FRA):

On implementation of Forest Right Act 2006, the eligible scheduled Tribe and other traditional forest dwellers under Scheduled Tribes and Other Traditional ForestDwellers (Recognition of Forest Rights) Act, 2006 have been issued title rights on forest lands over an area to the extent of **16788.032ha** in Keonjhar forest Division. The block wise allotment of forest land under this act is summarised in **Table No. 8.5**.

Table No.8.5: The block wise allotment of forest land under FRA.			
Name of the C.D. Block	Name of the Range	No. of Beneficiaries	Area settled in Acre
Keonjhar	Keonjhar	2821	1652.41
Banspal	BJP	9182	15630.55
Jhumpura	Keonjhar/Champua	2158	1544.58
Champua	Champua	1340	411.90
Joda	Barbil	1424	836.74
Saharpada	Patna	1719	749.22
Patna	Patna	3490	1873.34
Harichandanpur	Keonjhar/Ghatagaon	8793	8267.97
Ghatagaon	Ghatagaon	7451	3569.33
Telkoi	Telkoi	10751	6948.09
Total		49129	41484.13Ac or 16788.032Ha

Out of 16788.032 ha of forest land provided under FRA,2006 under individual rights, 63.00 ha of VF declared under section 30 of OFA,1972 and has been given. 184.5972 has been provided from RF, PRF and DPF)

**8.8.1 Forest Area Diverted under Forest Right Act (FRA)**

Area Diverted under provisions of FRA, 2006 u/s 3 for development of critical infrastructure having area less than 1.00 ha and trees less than 75 numbers per ha and under community interest. All total 23.1633 ha of forest land has been diverted. The project wise area diverted under FRA is at Table no 8.6 given below.

Table No 8.6 Area diverted under FRA,2006 for critical infrastructure development. Keonjhar division.

Sl No.	Name of the Project	Area diverted under FRA (in ha)				
		Total	RF	PRF	Rev. Forest	Sabik Forest
1	Installation of 33 KV V.C.B. to avoid electric accident of wild elephant at Anjar	0.0121	0	0	0.0121	0
2	Construction of Model School at Gourandijodi, Saharpad Block,	0.995	0	0	0.995	0
3	Construction of new tank at R&R Colony, Basudevpur	0.45	0	0	0.45	0
4	Construction of Cement concret approach road to cluster vill-Paramasahi at Basudevpur of Kanpur Irrigation Project	0.18	0	0	0.18	0
5	Laying of overhead power supply from Thakurani village to Karakhendra in Thakurani RF	0.4573	0.4573	0	0	0
6	Construction of Community Centre in Ghatagaon RF	0.9635	0.9635	0	0	0
7	Construction of ITC Training Centre at Jagamohanpur, Telkoi	0.9995	0	0	0.9995	0
8	Construction of R.D. Road to Bajunitangar under PMGSY Package	0.6	0.6	0	0	0
9	Construction of Community Hall	0.372	0	0	0.372	0
10	Construction of Ashram School and Hostel Building with Boundary wall at Sankarpur R&R Colony of village-dhabakuchududa	0.995	0	0	0.995	0
11	Laying of water pipeline from Kanjhari Dam to Keonjhar Town	0.624	0.62	0	0.004	0
12	Improvement of road from Adakata to Sunariposi over 0.626 ha Barabanka RF	0.626	0.626	0	0	0
13	Laying of Water Pipeline from Kanjhari Dam to Keonjhar town	0.308	0.109	0	0.199	0



14	Construction of Padanga High School (community Project)	0.9712	0	0	0.9712	0
15	Skill up-gradation centre of Nilachal High School, Guali	0.96	0	0	0.96	0
16	Renovation an restoring M.I. canal of Talakabahala MIP	0.6	0.6	0	0	0
17	construction of new road from vill-Siriskhunta to village-Champe	0.5909	0.5909	0	0	0
18	Construction of ayurvedic Hospital at vill-Podang under Telkoi Tahasil	0.129	0	0	0.129	0
19	Road connectivity (in two bailey bridges in compartment -30 of Atei RF on Baiganpal-Kadabahali Forest Road and one bailey bridge in Cokpartment -31 of Atei RF on existing extraction path near village Durgudasila)	0.755	0.755	0	0	0
20	Road connectivity (one bailey bridge) over Musal Nallah at Gundichaghagi under Ghatagaon Range	0.268	0	0	0.268	0
21	Electrification in village Rugudikhasada under Banspal Block in DDUGJY Scheme under BJP Range	0.62	0.62	0	0	0
22	Electrification in village-Deri under Banspal Block in DDUGJY Scheme	0.98	0	0	0.98	0
23	Electrification in village-Dargodisila under Anandapur Block in DDUGJY Scheme	0.99	0.99	0	0	0
24	Electrification in village-Kadabahali under Anandapur Block in DDUGJY Scheme	0.67	0.21	0	0.46	0
25	Electrification in village-Lolhapanduli under Joda Block in DDUGJY Scheme	0.51	0.37	0	0.19	0
26	Electrification in village-Pedipokhari under Joda Block in DDUGJY Scheme	0.92	0.92	0	0	0
27	Electrification in village Gayalmunda of Purumunda GP under Ghatagaon Block in DDUGJY Scheme under Ghatagaon Range in Keonjhar district	0.51	0.44	0	0.07	0
28	Kanjipani community Centre under BJP Range	1	1	0	0	0



29	construction of over head Tank in vill- Gobindpur, GP-Badadumuria, Jhumpura Block in Mega Rural Piped Water Supply project	0.06	0	0	0	0.06
30	construction of Water Treatment Plant at village-Kodagadia GP-Kadagadia under Mega Rural Piped Water Supply Project	0.98	0	0	0	0.98
31	Construction of overhead Tank including approach road to the overhead tank in vill-kshireitangiri, GP-Kshireitangiri under Patna Block for supply of driking water	0.42	0	0	0.42	0
32	Construction of overhead Tank in vill-Gopinathpur, GP-Raisuan in MegaWater Rural piped Water Supply project	0.32	0	0	0	0.32
33	construction of overhead Tank in vill-Jamuposi, GP-Palaspanga under Keonjhar for Mega Rural Piped Water Supply Project	0.36	0	0	0	0.36
34	Construction of Water harvesting structure at Sagadia Nala in vill-sagadia in Masinabila RF	0.034	0.034	0	0	0
35	Electrification in village Ramal under Champua Block under Champua Range	0.263	0	0	0	0.263
36	Establishment of Kendriya Vidyalaya at Ramla, Champua	0.97	0	0	0	0.97
37	Establishment of Gopaljew Higher Secondary School, Benamunda, Telkoi	0.99	0	0	0.99	0
38	Improvement of Kanjipani-Kuntala Road (1/700 km to 5/150 km)	0.8625	0.8625	0	0	0
39	Establishment of Ranjeisuni High School Building at Gundunia in Jhumpura Block	0.98	0	0	0	0.98
40	Construction of road from Bhandaridihi to Tinidharia Munda Sahi	0.482	0	0	0.482	0
41	Construction of road Potal to Biswanathpur in Belda RF	0.96	0.96	0	0	0
42	Construction of Intake well	0.96	0	0	0	0.96
43	Construction of Skill up-gradation Centre	0.196	0	0	0	0.196
44	Construction of Water Treatment	0.98	0	0	0	0.98



	Plant					
45	Construction of Community centre in vill- champua	0.8	0	0	0	0.8
46	Improvement of Road of Bileipada-Nuamundi-Jharkhand Boarder road via Murgamahadev	0.9975	0.9975	0	0	0
47	Construction of PMGSY road T2 to Bholbeda	0.818	0.716	0	0	0.102
48	Construction of community Centre	0.2023	0	0	0.2023	0
49	Construction of Rain Water harvesting Structure	0.205	0	0	0.205	0
50	Improvement road from Murga-Nuamundi PWD Roads to Thakurani village	0.828	0.828	0	0	0
51	New Minor Water Body across Jirang Nallah at vill-Jirang	0.03	0	0	0.03	0
52	Construction of Nunjharan to Raghunathpur Road under MMSy Scheme	0.64	0.64	0	0	0
53	Construction of HL Bridge over Janhei Nallah on Baunsuli-Patna Road	0.2124	0.2124	0	0	0
54	Construction of Community Centre at Gopabandhu Market, Joda	0.093	0	0	0.093	0
55	Construction of Overhead Reservoir for drinking water supply By the Executive Engineer, RWS&S Division, Keonjhar	0.1618	0	0	0.1618	0
56	Construction of Intermediate Boosting Station for rural water supply by the Executive Engineer, RWS&S Division, Keonjhar	0.486	0	0	0	0.486
57	Construction of Overhead Reservoir for drinking water supply by the Executive Engineer, RWS&S Division, Keonjhar	0.0809	0	0	0	0.0809
58	Construction of Overhead Reservoir for drinking water supply by the Executive Engineer, RWS&S Division, Keonjhar	0.0809	0	0	0	0.0809
59	Construction of Intermediate Boosting Power Station for drinking water supply by the Executive Engineer, RWS&S Division, Keonjhar	0.0809	0	0	0.0809	0



60	Construction of Overhead Reservoir for drinking water supply by the Executive Engineer, RWS&S Division, Keonjhar	0.0809	0	0	0.0809	0
61	Construction of Ground level Reservoir for drinking water supply by the Executive Engineer, RWS&S Division, Keonjhar	0.0809	0	0	0	0.0809
62	Construction of Overhead Reservoir for drinking water supply under Mega Piped Water supply Scheme by the Executive Engineer, RWS&S Division, Keonjhar	0.0809	0	0	0	0.0809
63	Construction of Intermediate Boosting Station for drinking water supply By the Executive Engineer, RWS&S Division, Keonjhar	0.1618	0	0	0	0.1618
64	Construction of Overhead Reservoir for drinking water supply under Mega Piped Water supply Scheme by the Executive Engineer, RWS&S Division, Keonjhar	0.0809	0	0	0.0809	0
65	Construction of Overhead Reservoir for drinking water supply By the Executive Engineer, RWS&S Division, Keonjhar	0.0809	0	0	0.0809	0
66	Construction of Overhead Reservoir for drinking water supply By the Executive Engineer, RWS&S Division, Keonjhar	0.0809	0	0	0	0.0809
67	Construction of Overhead Reservoir for drinking water supply By the Executive Engineer, RWS&S Division, Keonjhar	0.0809	0	0	0	0.0809
68	Construction of Overhead Reservoir for drinking water supply By the Executive Engineer, RWS&S Division, Keonjhar	0.0809	0	0	0	0.0809
69	Construction of Overhead Reservoir for drinking water supply By the Executive Engineer, RWS&S Division, Keonjhar	0.0809	0	0	0	0.0809
70	Construction of Overhead Reservoir for drinking water supply By the Executive Engineer, RWS&S Division, Keonjhar	0.0809	0	0	0	0.0809



71	construction of Road from Banasahi to R.D. road through Durgabeda	0.486	0	0	0.486	0
72	Construction of Master Boosting Pumping Station	0.43	0	0	0.43	0
73	construction of H.L. bridge over river Kanjhari at 58/900 km on Baunsuli-Patna portion of Satakutunia-Patna Road (ODR) Plot No.144 of Khata No.39(AAA) in Village- Bhimapada by the	0.2	0	0	0.2	0
74	Widening and strengthening of Chandposi-Deobandh-Binida-Janghira Forest Land for widening and strengthening of Chandposi-Deobandh-Binida-Janghira existing road from 09/200 Km to 28/200Km	0.998	0.36	0	0.192	0.446
75	Construction of HL Bridge over River Baitarani on Patuakudar-Basantpur Road over Plot No.2083, Khata No.236 of village-Basantpur, GP-Basantpur by the Executive Engineer, RW Division-II, Keonjhar.	0.365	0	0.365	0	0
76	Construction of overhead Reservoir for drinking water supply in Plot No.261, Khata No.41 of village-Guruda under Barbil Tahasil by the Executive Engineer, RWS&S Division, Keonjhar.	0.06	0	0	0	0.06
77	Construction Non-Conventional Energy- Cum-FSSM over Plot No.1195, Khata No.133 in Mauza-Panchapokharia, Champua NAC	0.8498	0	0	0	0.8498
78	Construction Bio Gas Plant –cum-MCC & MRF over Plot No.1197, 1198, 1199, Khata No.133 in Mauza-Panchapokharia, Champua NAC under Champua Tahasil by the Executive Officer, Champua NAC.	0.8093	0	0	0	0.8093
79	Construction Non-Conventional Energy- Cum-Construction & Demolition of Wastage (C&D) over Plot No.294, Khata No.261 in Mauza- Ramla NAC under Champua Tahasil by the Executive Officer, Champua NAC	0.4046	0	0	0	0.4046



80	construction of "Ground Level Storage Reservoir, Master Boosting Pumping Station & Elevated Storage Reservoir for drinking water supply" in Gundurijoda village of Khuntapada G.P. under Telkoi Tahasil	0.592	0	0	0.592	0
81	construction of Overhead Reservoir for drinking water supply in Plot No.649, Khata No.49 of village-Sana Aamuni, GP-Handibhanga under Sadar Tahasil	0.0809	0	0	0	0.0809
82	Construction of overhead Reservoir for drinking water supply in Plot No.28, Khata No.46 of village-Basudevpur, GP-Maidankle under Sadar Tahasil	0.0404	0	0	0.0404	0
83	construction infrastructure such as 11 KV electric lines and transformers and low tension electric lines to Village-Nelung (Jadikhunta Sahi), GP-Nelung under DDUGJY Scheme in Nelung RF	0.548	0.272	0	0.276	0
84	construction of Overhead Reservoir for drinking water supply over 0.0404 ha Gramya Jungle land in Plot No.239, Khata No.131 in village- Potala, GP- Sankiri of Sadar Tahasil under Keonjhar Forest Range	0.0404	0	0	0.0404	0
85	Construction of Intermediate Booster Pumping Station for drinking water supply in village-Sirispal, GP- Sirispal of Sadar Tahasil under Keonjhar Forest Range	0.1618	0	0	0.1618	0
86	Construction of Overhead Reservoir for drinking water supply village-Manoharpur, GP- Bauripada of Sadar Tahasil under Keonjhar Forest Range	0.0404	0	0	0.0404	0
87	Improvement of Road from MRL 04-Saplanji to Kantalei Via-Udayagiri under PMGSY-II (Package No.or-17-572) at Saplanji Village under Kardangi G.P.	0.977	0.502	0	0.475	0



88	Laying of DI/HDPE pipelines for drinking water supply within Jhumpura Block	0.5029	0.3029	0	0.16	0.04
89	Laying of DI/HDPE pipelines for drinking water supply within Jhumpura Block	0.5052	0.5052	0	0	0
90	Construction of Overhead Reservoir for drinking water supply under Mega Piped Water Supply Scheme in village- Padmapur, GP- Padmapur of Sadar Tahasil under Keonjhar Forest Range	0.0404	0	0	0.0404	0
91	Improvement of Road from Bonda to Aluni under PMGSY Package No.OR-17-447(B) under Telkoi Block at Bonda Village under Karmangi G.P. over 0.964 ha (Reserved Forest 0.859 ha + 0.105 ha Revenue Forest) of Telkoi Tahasil under Telkoi Forest Range	0.964	0.859	0	0.105	0
92	Construction of Canal work at Nekada Hudi Adibandha near village Khaparkhai by the Block Development Officer, Keonjhar	0.0765	0.0765	0	0	0
93	For laying of DI/HDPE pipeline for drinking water supply by the Executive Engineer, RWS&S Division Keonjhar	0.929	0.87	0	0.025	0.034
94	Construction of HL Bridge over River Baitarani at 17th km on Mangalpur-Bhimkund Road to Buring Road	0.1317	0	0	0.1317	0
95	Construction of Elevated Storage Reservoir for drinking water supply	0.121	0	0	0	0.121
96	Construction of Elevated Storage Reservoir for drinking water supply	0.121	0	0	0	0.121
97	Construction of Higher Secondary School Building	0.9	0	0	0.9	0
98	Construction of Elevated Storage Reservoir for drinking water supply	0.08	0	0	0.08	0
99	Construction of Elevated Storage Reservoir for drinking water supply	0.12	0	0	0.12	0
100	Construction of Elevated Storage Reservoir for drinking water supply	0.04	0	0	0.04	0
101	Construction of Elevated Storage Reservoir for drinking water supply	0.04	0	0	0.04	0



102	Construction of Elevated Storage Reservoir for drinking water supply	0.04	0	0	0.04	0
103	Construction of Elevated Storage Reservoir for drinking water supply	0.04	0	0	0.04	0
104	Construction of Elevated Storage Reservoir for drinking water supply	0.04	0	0	0.04	0
105	Construction of Elevated Storage Reservoir for drinking water supply	0.04	0	0	0.04	0
106	Construction of Elevated Storage Reservoir for drinking water supply	0.04	0	0	0.04	0
107	Construction of Elevated Storage Reservoir for drinking water supply	0.12	0	0	0.12	0
108	Construction of Elevated Storage Reservoir for drinking water supply	0.12	0	0	0.12	0
109	Construction of Elevated Storage Reservoir for drinking water supply	0.12	0	0	0.12	0
110	Construction of Elevated Storage Reservoir for drinking water supply	0.0482	0	0	0.0482	0
111	Construction of Elevated Storage Reservoir for drinking water supply	0.121	0	0	0	0.121
112	Construction of Intermediate Boosting Pumping Station	0.243	0	0	0	0.243
113	Construction of Elevated Storage Reservoir for drinking water supply	0.121	0	0	0	0.121
114	construction of infrastructure such as LT line and low tension electric lines to vill-Gobindpur under RGGVY Scheme	0.43	0.43	0	0	0
115	improvement such as widening and strengthening from SL to IL to Baunsuli-Patna Road Road from 57/350 Km to 67/00Km over 0.740 ha Gramya Jungle land	0.74	0	0	0.74	0
116	Improvement such as widening and strengthening from SL to IL to Khireitangiri-Bhrungarajposi-Chemana PWD Road	0.804	0.68	0	0.124	0
117	construction a new line from Tikira Grid to Musakhori 33/11 Kv S/S over 0.1980 ha Gramya Jungle land of village-Badadhanurjayapur in Plot No. 86, 609 & 1336 of Khata No. 123, Tahasil-Patna under Patna Forest Range	0.198	0	0	0.198	0



118	Improvement of Road from Bamebari to Ranasal Ghati via-Joda from 4/800 to 17/800 Km of Joda – Bamebari Expressway over 0.933 ha Forest Land in Baitarani 'A' RF under Champua Forest Range	0.933	0.933	0	0	0
119	Construction of Elevated Storage Reservoir for drinking water supply	0.089	0	0	0	0.089
120	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.091	0	0	0	0.091
121	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.091	0	0	0	0.091
122	construction of Overhead Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0.09	0
123	construction of Overhead Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0	0.09
124	construction of Overhead Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.04	0	0	0.04	0
125	construction of Overhead Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0.09	0
126	construction of Overhead Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0.09	0
127	construction of Ground Level Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0	0.09
128	construction of Ground Level Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.04	0.04	0	0	0



129	construction of Ground Level Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.12	0	0	0.12	0
130	construction of Ground Level Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.04	0.04	0	0	0
131	construction of Ground Level Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.11	0	0	0.11	0
132	construction of Over Head Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0	0.09
133	construction of Ground Level Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.11	0	0	0.11	0
134	construction of Over Head Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0.09	0
135	construction of Ground Level Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0.09	0
136	construction of Ground Level Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.12	0	0	0.12	0
137	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.12	0.12	0	0	0
138	construction of Joda Flyover from Km 0.000 to Km 4.875 (Tata DAV School to Banspani)	0.02	0	0	0.02	0
139	construction of Joda Flyover from Km 0.000 to Km 4.875 (Tata DAV School to Banspani)	0.965	0	0	0.965	0
140	Laying of DI/HDPE pipelines for drinking water supply within Keonjhar Block	0.638	0.564	0	0.024	0.05



141	Laying of DI/HDPE pipelines for drinking water supply within talapada GP, Telkoi	0.9	0.77	0	0.13	0
142	Laying of DI/HDPE pipelines in the roW of R&B village & NH Roads for drinking water supply within Banspal Block	0.94	0	0.1916	0.5377	0.2107
143	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.04	0	0	0.04	0
144	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.04	0	0	0.04	0
145	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0.09	0
146	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.04	0.04	0	0	0
147	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0.09	0
148	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0.09	0
149	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0	0.09
150	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0	0.09
151	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0.09	0
152	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply	0.04	0	0	0	0.04



	Scheme					
153	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0	0.09
154	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.04	0.04	0	0	0
155	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.04	0.04	0	0	0
156	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0	0.09
157	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0.09	0
158	Intermediate Boosting Pumping Station for drinking water supply under Mega Piped Water supply Scheme	0.2	0	0	0	0.2
159	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.04	0	0	0	0.04
160	construction of Ground level Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.04	0	0	0	0.04
161	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.29	0.04	0	0.25	0
162	construction of Ground level Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.04	0	0	0	0.04
163	construction of Elevated Storage Reservoir for drinking water supply under Mega Piped Water supply Scheme	0.09	0	0	0	0.09



	Total	57.3190	22.6067	0.5566	21.4655	12.6902

(Area under Management- 23.1633 ha, Balance 34.1557 ha under Revenue forest outside management perview)

8.8.2 Abstract of land diverted under FRA,2006

Table No 8.7 Abstract of Forest area allotted under FRA				
Description / Category	Total no of projects / individuals	Total area in Ha	Area under Management (in ha)	Area outside the Management (In ha)
Individual Rights	49129	16788.032	247.5972	16540.4348
Critical infrastructure development (Area <1.00 ha)	163	57.3190	23.1633	34.1557
Total	49292	16845.35	270.7605	16574.59

8.8.3 Forest Area Diverted under Forest (Conservation) Act (FCA);

Forest lands have been diverted under provisions of Forest (Conservation) Act, 1980 for various projects for non forest use. The project wise details is furnished at Table No 8.8



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Table No 8.8 Area diverted u/s 2 of the Forest Conservation act,1980

Sl. No.	Name of the Lease/ Lessee	Total Project area	Area (in Ha.)	Forest Area Diverted (Ha.)							Approval No. & date
				RF	PRF	Rev.	DLC	Sabik	Deemed Forest	Total	
1	M/s. Adhunik Metaliks Ltd.- Kulum Iron Mines	33.879	19.370	0	0	19.37	0	0	0	19.37	5-ORC077/2007-FCE dt.23.11.2009
2	M/s. B.D. Patnaik- Kalaparat Iron Mines	25.632	18.02	18.02	0	0	0	0	0	18.02	8-225/FCE dt.03.09.1998
3	M/s. BPME Ltd.- Kolha Roida Iron & Mn. Mines	254.952	119.001	49.2850	0	69.7160	0	0	0	119.001	8-92/97-FC dt.10.06.1998
4	M/s. BPME Ltd.- Thakurani Iron & Mn. Mines	778.762	382.504	297.8940	0	84.6100	0	0	0	382.504	8-91/96-FC dt.26.02.1998
5	M/s. BPME Ltd.- Dalki Manganese Mines	266.77	167.815	130.5410	0	37.2740	0	0	0	167.815	8-93/96-FC dt.03.08.1998
6	M/s. D.C. Jain- Dalpahar Iron & Mn. Mines	101.171	16.464	16.4640	0	0	0	0	0	16.464	8-103/2000-FC dt.14.11.2005
7	Dr. Sarojini Pradhan- Balita Iron Mines	34.75	18.347	10.854	0	7.493	0	0	0	18.347	8-278/FCE dt.28.02.1999
											8-278/FCE dt.03.01.2006
8	Dr. Sarojini Pradhan- Inganijharan Iron & Mn. Mines	18.7	15.316	15.3160	0	0	0	0	0	15.316	8-248/FCE dt.20.06.2006
9	Dr. Sarojini Pradhan- Kalaparat Iron Mines	152.927	52.002	52.0020	0	0	0	0	0	52.002	8-177/1997-FC dt.15.01.2007
10	Dr. Sarojini Pradhan- Sidhamath Iron Mines	94.259	85.55	85.5500	0	0	0	0	0	85.5500	8-100/2006-FC dt.26.09.2007



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11	Dr. Sarojini Pradhan- Baitarani Iron Mines	61.534	61.534	61.5340	0	0	0	0	0	61.5340	8-58/2008-FC
12	M/s. Essel Mining & Industries Ltd.- Jilling-Langalota Iron & Mn. Mines	456.1	75.489			75.489			0	75.489	8-49/98-FC dt.17.11.2000
			342.602	87.5100	0	20.0930	234.9990		0.0000	342.602	8-49/98-FC (pt) dt.08.10.2014
13	M/s. Essel Mining & Industries Ltd.- Kasia Iron & Dolomite Mines	194.196	113.88	71.632		42.248			0	113.88	8-95/96-FC dt.22.01.1998
											8-95/96-FC dt.27.05.2004
											8-95/96-FC(pt) dt.18.11.2011
14	M/s. Gandhamardan Sponge Ltd.- Putulupani Iron Mines	100.1632	19.5197			66.2661			0	66.2661	8-55/97-FC dt.29.06.2001
			46.7464						0		8-55/97-FC dt.14.06.2011
15	M/s. IDC- Roida-C Iron & Mn. Mines {Granted over 184.00 ha (Surveyed Area 192.810 ha)}	192.81	96.783	96.783					0	96.783	8-121/97-FC dt.29.10.1998
									0		8-121/97-FC dt.14.01.2008
16	Prospecting (over 4.62 ha)			4.62	0	0	0	0	0	4.62	8-49/2017-FC dtd.05.02.19
17	Smt. Indrani Patnaik- Unchabali Iron Mines	106.1127	35.275	0	0	0	35.275		0	35.275	8(21)40/2004-FCE dt.03.05.2007
			68.157	0	0	0	68.157		0	68.157	8-67/2014-FC dt. 11.09.2015
18	M/s. K.C. Pradhan- Chamakpur Iron Mines	31.693	31.313			31.313			0	31.313	8-90/98-FC dt.15.02.2000
19	M/s. K.C. Pradhan- Nayagarh Iron Mines	23.809	20.310				20.310		0.000	20.310	5-ORC059/2007-FCE dt.06.06.2011
	M/s. K.N. Ram & Co.- Roida-II Iron Mines	74.867	63.429	56.278		7.151			0	63.429	8-112/96-FC dt.09.09.1999



Revised Working Plan of Keonjhar Division for the period 2022-23 to 2031-32

20									0		8-112/96-FC dt.08.11.2010
21	M/s. KMC (73.228 ha.)- Jurudi & Jalahuri Iron & Mn. Mines	73.228	47.214			22.063	25.151		0	47.214	8-99/05-FC dt.19.03.2008
22	M/s. KMC (54.754 ha.)- Jurudi Iron & Mn. Mines	54.754	6.008			6.008			0	6.008	8-255/FCE dt.02.05.2005
23	M/s. Kaypee Enterprises- Thakurani Iron Mines	228.04	42.843	146.726		42.843			0	189.569	8-154/97-FC. dt.02.11.1998
			146.726						0		8-154/97-FC Vol.-II dt.21.07.2005
24	Prospecting (over 0.948 ha)	228.04	71.407	0.948	0	70.459	0	0	0	71.407	5-ORB378/2019-BHU dtd.28.03.2019
25	M/s. KJS. Ahluwalia- Nuagaon Iron Mines	767.284	371.192	0	0	371.192	0	0	0	371.192	8-17/2001-FC. dt.22.04.2004
	Prospecting (over 2.964 ha)		268.361	0	0	268.361	0	0	0	268.361	5-ORB377/2019-BHU dtd.28.03.2019
26	M/s. Mala Ray & others- Jalahuri Iron & Mn. Mines	182.109	111.58	103.393		8.187			0	111.580	8-97/96-FC dt.21.01.1999
											8-97/96-FC dt.26.06.2006
27	M/s. M.L. Rungta- Silijoda- Kalimati Iron & Mn. Mines	715.639	139.736			139.736	311.396		0	451.132	8-104/96-FC dt.16.01.1998
			311.396						0		8-104/96-FC. dt.12.11.2010
28	M/s. Mideast Integrated Steel Ltd.- Roida-I- Sidhamath Iron Mines	104.68	51.99	51.99					0	51.99	8-106/05-FC dt.19.02.2008
29	M/s. OMC Ltd.- Gandhamardan Iron Mines Block-B	1590.8673	232.4380		124.6427	93.9208	13.8745		0.0000	232.438	8-81/05-FC. dt.17.08.2007
			1177.211	0.00	903.0668	188.1161	86.0281		0.0000	1177.211	8-81/05-FC. dt.09.10.2018



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30	M/s. OMDC Ltd.- Bagiaburu Iron & Mn. Mines	21.52	17.083	17.0830					0.0000	17.083	8-236/FCE dt.26.02.1998
31	-do- (including earlier diverted 17.083 ha)			4.4370	0.0000	0.0000	0.0000	0.0000	0.0000	4.437	No.5-ORC164/2013-BHU dtd. 17.09.2021
32	M/s. OMDC Ltd.- Belkundi Iron & Mn. Mines	1276.79	384.54	171.8080		212.7320			0	384.540	8-88/96-FC dt.26.02.1998
33	M/s. OMDC Ltd.- Bhadrasahi Iron & Mn. Mines	998.7	702.053	48.6590		653.3940			0	702.053	8-118/96-FC dt.26.02.1998
34	M/s. Patnaik Minerals (P) Ltd.- Jaribahal Iron Mines	106.533	99.099			3.893	95.206			99.099	8-261/FCE dt.24.08.1998
											8-261/1997-FC(pt.) dt. 19.02.2015
35	Sri R.B.Das.- Dalpahar Iron & Mn. Mines	4.84	3.630	3.6300					0	3.630	8(21)3/2001-FCE dt.15.10.2007
36	M/s R.P.Sao- Guali Iron Mines	365.026	42.417			137.417			0	137.417	8-96/96-FC dt.14.01.2005
			95.00						0		8-96/96-FC(pt) dt.06.09.2011
	Prospecting (over 2.054 ha)	365.026	126.70	0.963	0	125.512	0	0.225	0	126.7	5-ORB382/2019-BHU dtd.24.04.2019
37	M/s. Rungta Mines Ltd.- Jajanga Iron & Mn. Mines	666.15	44.70			44.7000			0	44.700	8-88/98-FC dt.21.07.2000
			447.811			67.965			0.000	447.811	8-88/98-FC (vol) dt.28.08.2014
38	M/s. Rungta Sons (P) Ltd.- Katasahi Manganese Mines	196.86	60.616	5.3300		55.2860			0	60.616	8-18/99-FC dt.02.06.2000
39	M/s. SAIL (5.10 Sq. Miles)- Bolani Ore Mines	1321.45	1225.78	1181.66		44.12			0	1225.78	8-17/97-FC dt.19.02.1998
											8-17/97-FC(pt) dt.11.12.2012



Revised Working Plan of Keonjhar Division for the period 2022-23 to 2031-32

40											8-17/2016-FC dated 06.11.2019
41	M/s. SAIL (6.90 Sq. Miles)- Bolani Ore Mines	1586.36	723.312	0	0	598.999	0	124.313	0	723.312	8-87/1996-FC(Vol-I) dtd.07.05.2019
42	M/s. Sarda Mines (P) Ltd- Thakurani Iron Mines	947.046	865.276	862.8480		2.4280			0	865.276	8-55/2000-FC dt.21.06.2001
43	M/s. Serajuddin & Co.- Balda Block Iron Mines	335.594	24.446			24.446			0	24.446	8-119/96-FC dt.11.12.1998
44											8-119/96-FC(pt) dt.23.05.2009
45	Prospecting (over 2.690 ha)	335.594	277.856	0	0	0.113	2.298	0.279	0	2.690	5-ORB381/2019-BHU dtd.28.03.2019
46	Sri Tarini Prasad Mohanty- Naibuga Iron & Mn. Mines	47.219	26.89	15.3080		7.985	3.5970		0.0000	26.890	5-ORC029/06-FCE. dt.19.09.2008
	Sri Kiran Sankar Sahoo- Nitigotha Pyrophyllite Mines	3.92	3.92			3.92			0	3.92	8-178/FCE dt.11.03.1996
47	M/s. Tarini Minerals (P) Ltd.- Deojhar Iron Mines	34.365	34.365	34.365					0	34.365	8-216/ 92-FC. dt.31.03.1993
											8-216/ 92-FC. dt.10.03.2008
48	M/s. Tarini Minerals (P) Ltd.- Jurudi Iron Mines	66.368	15.068			15.0680			0.0000	15.068	8-22/91-FC. Dt.07.02.1992
49	M/s TATA Steel Ltd.- Bamebari, Jaribahal Iron & Mn. Mines	464.000	145.329	54.1490		14.6510	76.5290		0.0000	145.329	8-72/2004-FC. Dt.25.01.2007
50	M/s TATA Steel Ltd.- Joda East Iron & Manmora Mn. Mines	671.093	567.087	512.617			54.47		0	567.087	8-32/93-FC. dt.16.01.1997
											8-32/93-FC. dt.24.09.2007



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51	M/s TATA Steel Ltd.- Joda West Iron & Mn. Mines	1437.719	436.678	188.591		21.678	226.409		0	436.678	8-89/04-FC. dt.10.08.2007
52	M/s TATA Steel Ltd.- Khandabandh Iron & Mn. Mines	978.000	453.150	301.609		43.631	107.910		0.000	453.150	8-98/04-FC. dt.09.08.2006
53	M/s TATA Steel Ltd.- Tiringpahar Manganese Mines	169.000	52.348			2.782	49.566		0	52.348	8-80/2004-FC dt.28.03.2007
55	M/s TATA Steel Ltd.- Katamati Iron Ore Mines	403.3228	360.01	57.552	0	141.62	0	160.838	0	360.01	8-1/2018-FC dated 09.06.2021
56	M/s Sree Metalicks Pvt. Ltd.- Khandabandh Iron & Mn. Mines	35.774	35.774	30.98	0	4.794	0		0	35.774	5-ORC097/2010-BHU dt. 16.12.2016
57	M/s OMC Ltd- Gandhamardan Iron Mines Block-A	618.576	41.2442		33.8527	7.3915			0	41.2442	8-105/2006-FC dt. 24.04.2017
58	D.R. Patnaik- Murgabeda Iron Ore Mines	15.378	13.904	12.513	0	1.391	0	0	0	13.904	5-ORC209/2014-BHU dtd.05.10.2018
59	M/s Prakash Industries Ltdn Sirkagutu Iron Ore Mines.	19.532	3.8332	0	0	3.8332	0	0	0	3.8332	5-ORB217/2014-BHU dtd. 12/13. 02.2019
60	M/s OMC Ltd- Tiringpahar Iron & Manganese Mines	79.300	79.3	79.3	0	0	0	0	0	79.3	F.No.8-54/2010-FC dt.18.04.2019
61	Prospecting over 8.2276 ha in Laserda Pacheri iron ore block by Triveni Earth Movers Pvt. Ltd.	8.228	8.2276	0	0	5.7586		2.469	0	8.2276	F. No.8-62/2017-FC dated 08.10.2019
62	Serenda-Bhadrasi Iron & Mangnaese Mines of M/s OMC Ltd.	1734.570	1304.8438	17.96	0	9.564	0.021	0	1.401	28.946	5-ORB-398/2021-BHU dated 22.02.2021
63	Balda-Palsa-Jajang Iron Ore Mines of M/s OMC Ltd.	4.643	4.643	0	0	0.705	3.938	0	0	4.643	5-ORB-455/2021-BHU dated 31.03.2021
	Total Mining Project	22266.2246	13506.30590	4958.70200	1061.56220	3884.84330	1794.98060	288.12400	1.40100	11956.96710	



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64	Iron Ore fines Beneficiation Plant & Tailing Dam by M/s BRPL	81.336	22.746			22.746			0	22.746	5-ORC137/2011-BHU dt.09.07.2012
65	Laying of Water Pipeline from village Tonto to Kanpur by M/s BRPL	33.7703	8.6621	5.354		3.3041	0.004		0	8.6621	5-ORC140/2011-BHU dt.17.08.2012
66	Laying of slurry pipeline within Nainbuga RF by M/s BRPL Ltd	0.1959	0.1959	0.1959					0	0.1959	5-ORB182/2013-BHU dated 27/28.03.2017.
67	Installation of ESP system with CCP by M/s MSP Sponge Iron Ltd.	0.449	0.449			0.449			0	0.449	5-ORB027/2006-BHU dt.21.12.2006
68	Diversion of 0.488 ha. of forest land for PL by M/s Bhushan Steel Ltd.	0.488	0.488			0.488			0	0.488	5-ORB128/2011-BHU dt.04.04.2012
69	Construction of LILO of 400KV S/C Rengali- Baripada Transmission Line of M/s GRIDCO	2.700	2.098			2.098			0	2.098	8-39/84(Cons)FRY dated 14.05.1984
70	Laying of water pipeline in Naibuga RF of M/s Essar Steel India Ltd.	3.893	0.545	0.189	0	0.229	0.127		0	0.545	5-ORB167/13-BHU dt. 27.11.2013
71	Diversion of 0.827 ha of forest land for slurry pipeline by M/s Essar Steel India Ltd.	78.06	0.827	0.489		0.338			0	0.827	5-ORB190/2014-BHU Dt. 31.03.2014



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72	Police Out Post, at Banspal under Nayakote Police Station area in Left Wing Extremism affected Keonjhar district by Superintendent of Police	1.2117	1.2117			1.2117			0	1.2117	10F(Cons)32/2013-3353/F&E dated 18.02.2013
73	Improvement of Pandapada - Harichandanpur Road- (25/720 to 28/450 Km.) in Keonjhar District of Executive Engineer R&B Division, Keonjhar	4.998	4.998	4.998					0	4.998	10F(Cons)539/2012-2311/F&E dated 04.02.2013
74	Laying of optical fibre cable along the NHAI/NH/PWD roads within the ROW by M/s Relinace Jio Infocomm Ltd	3.261	3.261	1.121	0.12	2.02			0	3.261	10F(Cons)217/2016-10036/F&E dated 15.05.2017
75	M/s. Sarda Mines (P) Ltd-Thakurani Iron Mines-Conveyor Belt		0.9457	0.4407		0.1193	0.3857		0	0.9457	8-55/2000-FC(Vol) dt.25.04.2012
76	Police VHF at Judia (Bhaliadal) by S.P., Keonjhar		0.0752			0.0752			0	0.0752	8-6/15/91- FCE. dt.24.9.1991.
77	Diversion of 0.654 ha forest land for laying of 32" dia Iron Ore Slurry Pipeline system for transportation of 30 MTPA iron Ore Of M/s JSW Steel Ltd.	5.591	0.654	0	0	0.029	0	0.625	0	0.654	No.5-ORB387/2019-BHU dated 12.07.2019 of GoI, MoEF&CC, ERO, BBSR
78	Diversion of 2.428 ha forest land for construction of Water Treatment Plant (WTP) by the Executive Engineer, RWSS Division	2.428	2.428	0	0	2.428	0	0	0	2.428	No.10F(Cons)55/2020-6072/F&E dated 1703.2020



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79	Diversion of 6.00 ha Reserve forest land in Kalapat RF for up-gradation of Kutch road in Telkoi Tahasil	6	6	6	0	0	0	0	0	6	No.10F(Con)76/2020-7758/F&E dated 21.05.2020
	Total Other Project		55.5846	18.7876	0.12	35.5353	0.5167	0.625	0	55.5846	
80	Sapua MIP		10.50	4.00		6.50			0	10.500	8-215/84-FRY(Con) dated 06.08.1984
81	Kanpur MIP		235.269	43.822		191.447			0	235.269	8-261/88-FC dated 04.07.1989
82	Kureijodi MIP		72.26			72.26			0	72.260	8-129/90-FC dated 31.07.1990
83	Kalimati MIP		101.00	101.00					0	101.00	8-128/90-FC dated 31.07.1990
84	Balita MIP		6.81	0.73		6.08			0	6.810	8-163/FCE dated 27.03.2001
85	Jagadala MIP		0.64			0.64			0	0.640	8(22)6/2000/FCE dated 14.08.2001
86	Kakudiamba MIP		17.65			17.65			0	17.650	8-276/FCE dated 31.08.2001
	Total Irrigation Project		444.129	149.552	0.000	294.577	0.000			444.129	
87	Daitari-Bansapani Railway Line		709.4336	33.4277	37.4767	34.6632	0		0	105.5676	8-56/93-FC dated 29.04.1994
				90.65	12.496	172.846	0		0	275.992	8-56/93-FC dated 02.09.1997
				217.89	22.94	87.044	0		0	327.874	8-56/93-FC dated 16.01.1998



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88	Joda-Bamebari Express way undeer SE. Railway		1.30			1.3			0	1.3	8-223/FCE dated 06.05.1998
89	Baxi-Barigaon road of PWD, Ghatgaon		0.9549			0.9549			0	0.9549	8/FCE dated 10.09.1991 & 19.01.1992
90	Re-diversion of 0.982 Ha. by M/s Kaypee Enterprises	0.982	0.982	0.982					0	0.982	5-ORB189/2013-BHU dt. 03.03.2014
91	Widening and strengthening of exisiting two lane of NH-215 from 0 Km to 163.0 Km (Panikoili- Remuli section)	151.94	151.94	48.729	0.514	83.452	0	0	0	132.695	5-ORA187/2013-BHU dated 12.03.2018
92	Diversion of 77.7115 ha in keonjhar 52.7828 ha in Bonai division out of 174.1595 ha forest land for widening of NH_215 (Remuli-Rajamunda Section) by NHAI, Keonjhar	174.1595	77.7115	52.8001		17.3004	0.918	6.693	0	77.7115	5-ORA198/2014-BHU dated 16.04.2019
93	Diversion of 111.407 ha forest land for rehabilitation and up-gradation of Singhra-Binjabahal Section NH-6 from Km310.806 to 414.982 within the jurisdiction of Keonjhar Division(100.071ha) & Karanjia Division (11.336ha)	100.071	100.071	19.455	5.994	51.336	14.848	8.438	0	100.071	5-ORA346/2018-BHU dated 25.06.2020
	Total Road & Railyway Project		1042.393	463.9338	79.4207	468.1415	15.766	15.131	0	1023.148	0
94	400 KV Transmission Line from Rengali to Kolhaghat		165.62			165.62			0	165.620	8-245/86-FC dated 16.02.1988
95	M/s TATA Sponge Ltd.- 220 KV single circuit line Joda to		0.9443			0.9443			0	0.9443	5-ORB035/2006-BHU dated 05.02.2007



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	Bileipada										
96	Construction of LILO of 400KV S/C Rengali- Baripada Transmission Line of M/s GRIDCO	45.12	4.079	0	0	4.079	0		0	4.079	5-ORB174/2013-BHU dated 27.06.2014
	Total Trasmission Line		170.6433	0	0	170.6433	0			170.6433	
97	Establishment of Hydro Power Project of M/s Baitarani Power Project Pvt. Ltd.		20.3619	10.483		9.8789			0	20.3619	5-ORC123/11-BHU dt. 26.11.2014
98	Construction of 132 KV transmission line from 132/33 KV OPTCL Grid at Barbil, Keonjhar to Kamando Steel Plant of M/s Rungta Mines Ltd in vill-Kamando, Dist-Sundargarh (31.806 Keonjhar Divn. + 3.701 ha Bonai Divn)	63.411	31.806	6.144	0	7.839		17.823	0	31.806	5-ORC418/2020-BHU dt. 31.03.2021
	Ttoal Hydro Power Project		52.1679	16.627	0	17.7179		17.823	0	52.1679	0
	Grand Total of Diverted land		15271.2237	5607.6024	1141.1029	4871.4583	1811.2633	321.7030	1.4010	13702.6399	

**8.8.3.1 Abstract of Forest land diverted under FC Act,1980**

Table No 8.9 Abstract of Forest land Diverted Under FC Act,1980				
Project Category	No of cases	Forest area diverted In ha	Are under management in ha	Area outside the Management perview. In ha
Mining	63	13506.3059	6020.2642	7486.0417
Others (Ind)	16	55.5846	18.9076	36.677
Irrigation	7	444.129	149.552	294.577
Road & Railways	7	1042.393	543.3545	499.0385
Transmission Line	3	170.6433	0	170.6433
Hydel Project	2	52.1679	16.627	35.5409
Total		15271.2237	6748.7053	8522.5184
Repetition under mining Projects including Prospecting		(-)1325.7495	(-) 1325.7495	
Total	98	13945.4742	5422.9558	8522.5184

8.9 Other Rights and Concessions:

Besides various rights & concessions given under Joint Forest Management Resolution, Forest Rights Act, 2006 and Reserved Forest Notifications, there is no other rights & concessions allowed in favour of people of this division.

8.10 Dependency of Local People on NTFPs:

The people of fringe villages live on eating the fruits, leaves, flower and roots of different forest trees. In remote villages, they make brooms from broom grass, collect honey & sale to the middle men. They also collect the seeds of cane species and sell to the middle men. The NTFPs like Sal seeds, Kusum seeds, Harida, Aonla, Bahada, roots of *Rauwolfia serpentina*, Mohua flower, Mohua seeds, Honey, Tamarind are collected by the local people and sell them to the middle men at a low price. The collection of NTFP has not been regulated till now. The dependency of local people on NTFPs has been assessed during the socio-economic survey conducted over 108 nos of VSS. Their income from NTFP items is estimated to be 30% of their annual income.





CHAPTER 9

ADEQUACY OF POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

9.1 Existing Policy and Legal Framework and Their Compliance:

For Management of Forests, Regulation of Forest Produce, Protection of Wildlife, for collection & use of NTFP various Acts, Rules and Regulation, policy has been framed by the Central Government and State Government. These are

- i) The Odisha Forest Act, 1972 and rules thereof;
- ii) The Wildlife (Protection) Act, 1972 and Rules thereof;
- iii) The Environment (Protection) Act, 1986 and Rule 1986,
- iv) The Air (Prevention & Control of Pollution) Act, 1981,
- v) The Water (Prevention & Control of Pollution) Act, 1981
- vi) The Forest (Conservation) Act, 1980 & Rules.
- vii) The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 & Rules,
- viii) EIA, Notification, 2006
- ix) NTFP Collection Policy-2000
- x) Orissa Gram Panchayats (Minor Forest Produce Administration) Rules 2002,
- xi) The Orissa Kendu Leaves (Control of Trade) Act, 1961 and Rules.

These rules and regulations are duly being implemented by the Forest Department for better management of Forests.

9.2 Status of Approved Working Plan and Compliance

The Keonjhar Division has been functioning since 1927. For management of forests the following working plan was prepared and partly implemented. The status of various Working Plans is as furnished below (Table No 9.1)

Table No 9.1 Status of various Working Plan: Keonjhar Division			
Sl no	Name of Author of Working Plan	Period	Remark
1	Dr. H.F. Mooney	1930-1960	But implemented up to 1944-45
2	A.B. Lal	1945-46 to 1964-65	
3	MR Prasad	1969—70 to 1988-89	Implemented up to 1983-84
4	B.C. Mohapatra	1984-85 to 1993-94	Ban on Tree felling since 1994- 95
5	N. Samal	2006-07 to 2016-17	Plan provisionally approved for 3 years . There after Working is based



			on Annual Scheme ex
6	Annual Scheme	2017-18 to 2020-21	Annual Scheme by DFO Keonjhar

9.2.1 Present Plan:

The present plan is being prepared basing on National Working Plan Code, 2014 after approval of PWPR for the Division. The PWPR has been approved vide letter no 1145/11F(SFM) -33/2014 dated 17.01.2017 of PCCF, Odisha. On approval this plan will be for the period 1st April,2022 to 31st March, 32.

9.3 Number of Forest Offences.**9.3.1 Forest Offence for Violation of the Odisha Forest Act, 1972 & Rules framed thereof.**

The most of the cases booked in the division are under Odisha Forest Act, 1972 & Rules thereof. The number of cases booked / disposed up and balance cases pending for disposal are as furnished at Table No 9.2

Table No 9.2 Cases booked under OFA,1972: Keonjhar division.							
Year	O.R. Cases Booked				U.D. Cases booked	Total Offence cases	Cases disposed
	Under Section 56	Prosecution cases.	Others	Total			
2007-08	31	95	3334	3460	91	3551	3377
2008-09	48	116	3000	3164	100	3264	3010
2009-10	20	96	2457	2573	102	2675	2460
2010-11	19	145	1925	2089	87	2176	1941
2011-12	22	26	2479	2527	127	2654	2525
2012-13	36	47	2382	2465	245	2710	2627
2013-14	19	43	1924	1986	118	2104	1933
2014-15	27	102	1897	2026	76	2102	1929
2015-16	22	71	1310	1403	69	1472	1310
2016-17	22	22	1284	1328	84	1412	1284
2017-18	25	18	1129	1172	133	1305	1149
2018-19	24	28	707	759	81	840	732
2019-20	30	50	636	716	92	808	646

The number of forest offence cases booked in different years and the revenue accrued thereof is furnished below in **Table No. 9.2.**

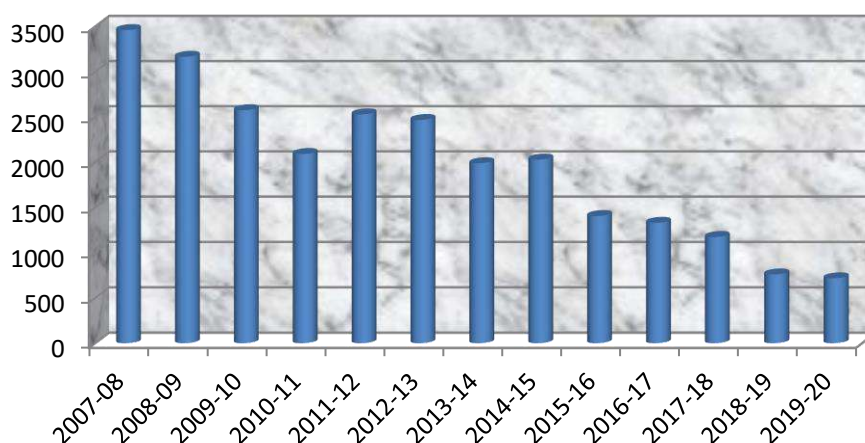
Table No 9.2 No of cases booked under Odisha forest act,1972					
year	Type of offence		Number	Cases send to Court	C. Fees in Lakhs
	Forest	Wildlife			
2007-08	3459	1	3460	33	10.89
2008-09	3159	5	3164	71	11.15
2009-10	2571	2	2573	28	8.80
2010-11	2084	5	2089	44	6.39



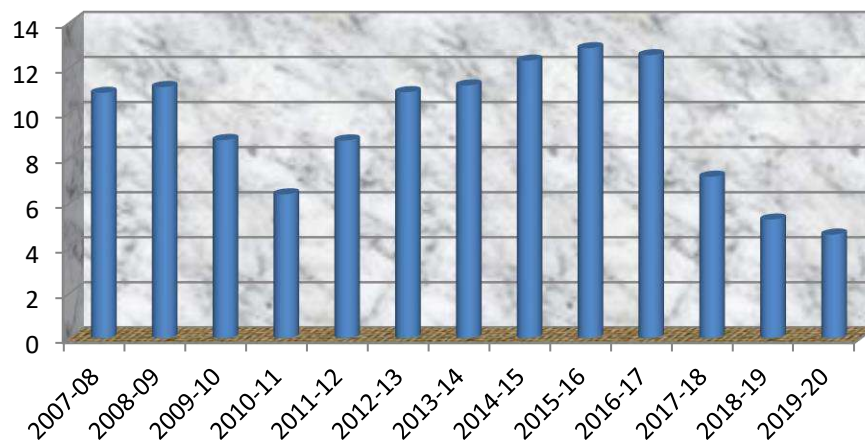
Table No 9.2 No of cases booked under Odisha forest act,1972

year	Type of offence		Number	Cases send to Court	C. Fees in Lakhs
	Forest	Wildlife			
2011-12	2526	1	2527	46	8.78
2012-13	2464	1	2465	56	10.92
2013-14	1983	3	1986	34	11.22
2014-15	2026	-	2026	57	12.32
2015-16	1402	1	1403	36	12.87
2016-17	1327	1	1328	26	12.56
2017-18	1171	1	1172	50	7.17
2018-19	756	3	759	33	5.27
2019-20	715	1	716	26	4.60

No of Cases booked under OFA,1972



Compounding fees in Lakh Rs





From the above trend it is observed that the numbers of forest offence cases are reduced year after year due to involvement of VSS in forest protection & management.

9.4 Status of Research and Development:

Till date no specific Research has been carried out in this division to observe the nature of the forests of this division. For the purpose of assessment of forest stock for proper prescriptions in the current plan, 920 numbers of sample points were allotted to this division by the NRSC sporadically. Out of the same, 92 points have been developed to Permanent Sample Plots. The plots are required to be preserved for Research purposes by the Silviculture wing of this forest Department. But the Divisional Forest Officer, Keonjhar Division should take care for preservation of these plots and keep those out of any biotic interference.

At present there are no research plots / Preservation plots in Keonjhar Division maintained by State Silviculturist.

9.5 Human Resource Capacity Building Efforts:

For Human Resource Capacity Building, circle level training camps have been organized to improve working skill. Training on following subject matter is being conducted under various training program for Foresters, Deputy Range Officer & Range Officers.

- i. On Forest (Conservation) Act, 1980 and various amendments & guidelines issued by MoEF& CC, New Delhi.
- ii. Joint Forest Management Resolution, 2011, 2015, 2019& various stages of Development of Participatory Forest management since 1985.
- iii. Forest Rights Act, 2006 its implecation & procedure involved for settlement of Rights.
- iv. National Working Plan Code 2014, various technics developed for tree enumeration, growing stock estimation, Carbon sequestration, Study of Regeneration Status. REED⁺ etc.

Besides short duration training course, workshops, symposium, the Foresters & Forest Guards are under going training at Forest Training institutes at Angul, Champua and Bhubaneswar.

9.5.1 Labour welfare:

For labour welfare regular health Camp is being conducted in the division and by Minrs Lessee under various schemes. The revision of wage rate is being changed half yearly basing on Consumer Price index as on 1st April and 1st October every year.



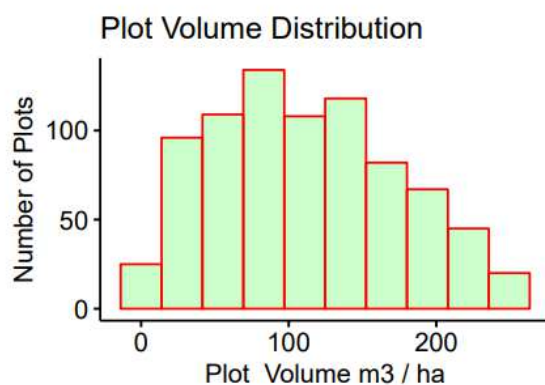
The revised wage rate form different date since 1995 is furnished below (Table No 9.3).

Table No 9.3 Revision of Minimum Wage rate for labours.					
Sl No	Notification Date (Month / Year)	Wage Rate (in Rs.)			
		Unskilled	Semi Skilled	Skilled	High Skilled
1	13.12.1995	30.00	36.00	42.00	48.00
2	29.04.1999	40.00	48.00	56.00	64.00
3	14.02.2002	50.00	60.00	70.00	80.00
4	15.02.2006	75.00	85.00	90.00	100.00
5	14.07.2009	90.00	103.00	116.00	129.00
6	06.10.2012	150.00	170.00	190.00	205.00
7	30.04.2015	200.00	220.00	240.00	260.00
8	04/2017	213.50	233.50	253.50	273.50
9	11/2018	280.00	320.00	370.00	430.00
10	05/2019	286.30	326.30	376.30	436.30
11	11/2019	298.00	338.00	388.00	448.00
12	07/2020	303.40	343.40	393.40	453.40
13	10/2020	308.00	348.00	398.00	458.00
14	05/2021	311.00	351.00	401.00	461.00
15	11/2021	315.00	355.00	405.00	465.00

The latest notification dated 02.11.2021 is enclosed. (**Annexure-XII**)

9.6 Forest Resource Accounting:

The NRSC, Hyderabad has taken up detail accounting of forest resource in the division. The distribution of growing stock in various girth classes has been indicated in chapter-6. The plot volume, Crop strata is furnished below for reference.



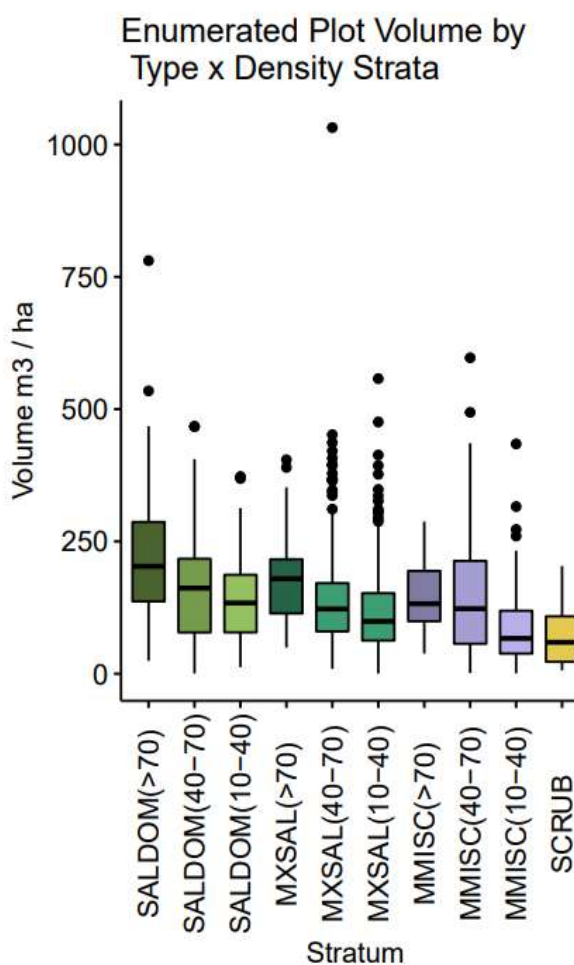


Table No 9.4 Stand volume parameters.

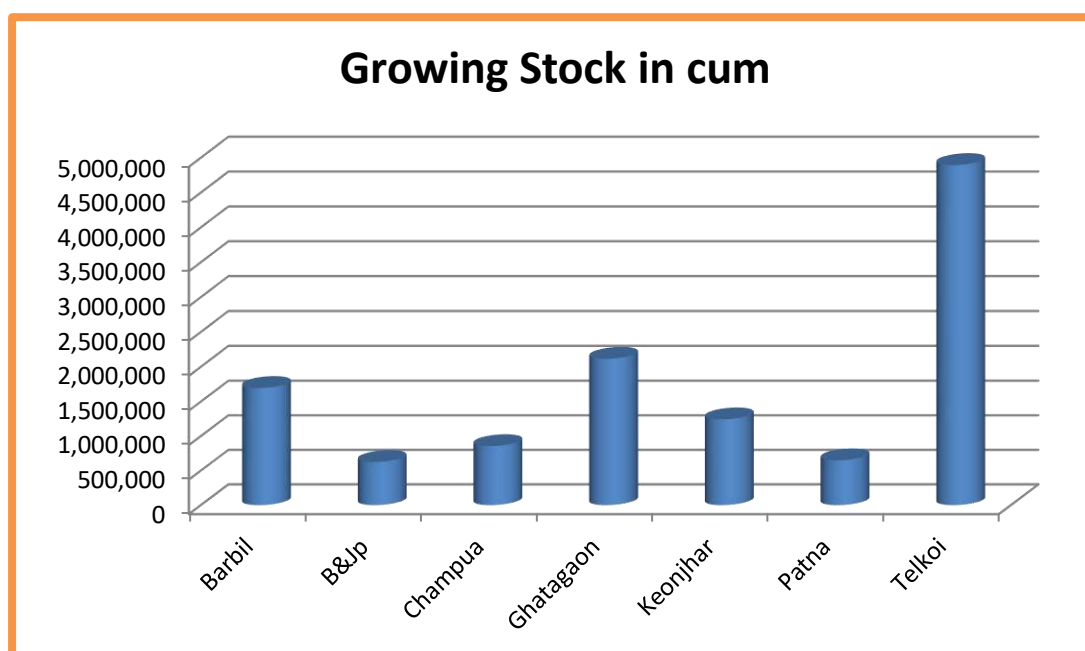
Criteria						
No of trees / ha	Basal Area per ha (M ³)	Volume per Ha (in M ³)	Mean Volume (in M ³)	Standard Error	LB (in M ³)	UB (in M ³)
388.46	14.21	111.32	119.29	0.02	114.56	124.02

The Growing stock of the division considering the established regeneration i.e. above 30cm Girth Class has been computed to to 12.078 Million Cum. The Range wise growing stock is as follows.



Table No. 9.5: Summary of Estimated Volume of Trees in Cum. (SFC)

Range	Major Species	Girth Class (Cm)					Total
		30-60	60-90	90-120	120-150	> 150	
Barbil	All Trees	344,506	399,030	380,307	265,404	306,683	1,695,931
B&Jp	All Trees	145,121	159,691	134,494	87,952	98,268	625,525
Champua	All Trees	205,855	278,221	165,837	87,034	118,834	855,780
Ghatagaon	All Trees	574,015	622,046	426,991	262,918	228,557	2,114,528
Keonjhar	All Trees	410,839	340,961	254,308	120,566	116,691	1,243,364
Patna	All Trees	147,447	190,045	156,871	86,649	68,616	649,628
Telkoi	All Trees	687,716	1,071,236	1,254,423	976,688	904,080	4,894,143
All Range Total		2,515,499	3,061,230	2,773,231	1,887,211	1,841,729	12,078,899
%		20.83	25.34	22.96	15.62	15.25	100.00



In order to quantify the intangible benefits of the forests of Keonjhar, details of biomass for carbon stock assessment have been discussed in para 6.5 of Chapter 6.

9.7 Budgetary allocations to the forestry sector:

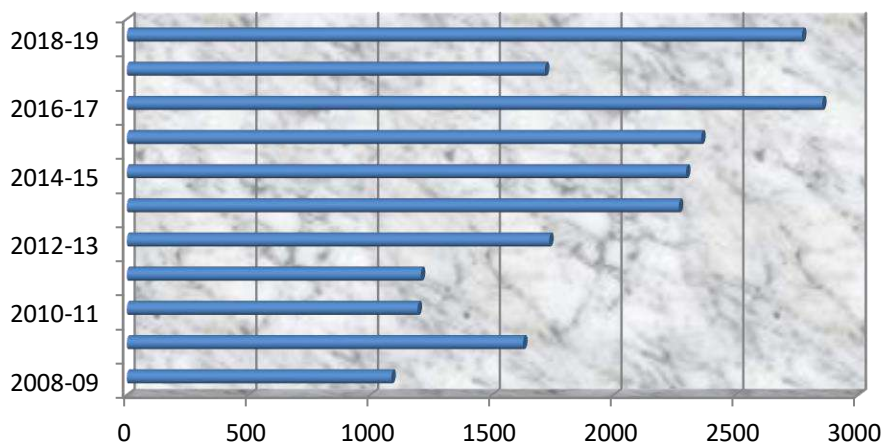
Adequate allotment has been provided every year under different heads to preserve, conserve and to regenerate the forests of Keonjhar division. The details of budgetary allocation under different years have been provided in Table No. 9.6



Table No 9.6 Budgetary allocation : Keonjhar Division.

Year	Allocation / Expenditure (In Lakh Rs)								
	Non-Plan	Plan							
		State Plan	C.O.L.	C.P	C.S. P	OFSDP	FDA	CAMPA	Total
2008-09	430.94	50.91	11.10	0.00	0.00	525.84	61.69	6.58	1087.08
2009-10	420.64	97.57	31.27	8.94	0.00	941.42	13.44	114.91	1628.18
2010-11	365.84	170.18	3.50	7.37	26.47	392.32	2.04	227.33	1195.04
2011-12	272.61	233.06	14.55	2.32	0.13	247.02	5.02	433.54	1208.24
2012-13	283.84	434.86	19.46	10.63	1.00	496.86	16.31	472.69	1735.65
2013-14	470.19	372.25	0.00	0.00	2.62	798.21	11.79	613.13	2268.19
2014-15	484.61	453.57	0.00	0.00	0.00	373.45	34.01	952.13	2297.76
2015-16	600.98	440.62	6.07	0.00	0.00	73.87	17.15	1221.57	2360.25
2016-17	668.34	802.71	0.00	0.00	0.00	3.26	13.78	1366.11	2854.21
2017-18	870.86	381.12	0.00	0.00	0.00	0.00	0.00	465.99	1717.96
2018-19	713.45	259.44	0.00	0.00	35.61	0.00	0.00	1763.35	2771.86

Allocation in Lakh Rs



9.8 Existence of Monitoring, Assessment & Reporting Mechanism:

For monitoring the implementation of various programs and assessment of success rate, standard monitoring mechanism has been developed in the Forest department. Online transmission of progress report, pay bills & payments, payment of wages to labour through Bank accounts are being implemented. All payments pertaining to CAMPA, MGNREGS, and FDA are 100% through bank accounts.

**9.9 Public awareness and education:**

Public awareness on various Forest & Environment matters are regularly being conducted by the division. World Forestry day, Earth Day, World Environment Day, Elephant Day, Vana mahotsava week, Mass tree Planting Program, Wildlife Week are being conducted at Division Level & Range Level. The usual features associated are

- Essay, Drawing, Debate, Paragraph writing Competitions being conducted involving School Children.
- Awareness through Rally, Nature camps etc are being conducted.
- Eco clubs are being promoted and various leaflets distributed among school children.
- Display of hoardings at public places to educate people,
- Conducting Meetings followed by Tree Planting Program,
- VSS members / NGO are motivated against Forest Fire.

9.10 Adequacy manpower in forest division:

The Sanction cadre strength of Keonjhar Division is 236. As on 01.01.2021 the staff in position is as furnished in Table No 9.7

Table No. 9.7 Cadre strength of Keonjhar Division as on 01.01.2021.				
Sl. No.	Name and Rank of posts	Post sanctioned	Employees in position	Vacancy\Excess
1	Divisional Forest	1	1	0
2	A.C.F. (Afforestation)	1	0	1
3	A.C.F. (Enforcement)	1	1	0
4.	Forest Ranger (Affn.)	1	0	1
5	Forest Ranger (Enf.)	1	0	1
6	Forest ranger (Range)	7	6	1
7	Dy. Ranger	8	3	5
8	Forester (Enf.)	1	1	0
9.	Forester (Affn.)	6	6	0
10	Forester (Check gate)	2	1	1
11	Forester (Section)	25	24	1
12	Forest Guard (Beat)	105	73	32
13	Forest Guard (Check	23	2	21
14	Forest Guard	11	0	11
15	Head Clerk	1	1	0
16	Jr. Accountant	8	7	1
17	Jr. Clerk	9	2	7
18	Driver (HV)	1	1	0
19	Driver (LV)	2	0	2
20	Amina	1	0	1
21	Chainman	1	1	0
22	Dak-runner	2	2	0
23	Mali	1	1	0



24	V.F.W. (Merged in	14	8	0
25	F.E.S.	1	1	0
26	Orderly Peon	1	1	0
27	R.I.	1	1	0
		236	144	86

From the above it is observed that about 1/3rd of the post are laying vacant which is affecting the day to day functioning of the Division. Most crucial cutting edge staff i.e. forest Guard post up to 64 out of 139 sanctioned strength are vacant.

In the recent pasts, much emphasis is being given on wireless communication system to combat smuggling, elephant menace etc. in the division. Simultaneously, computers have been introduced in the offices for recording of data and their compilation with accuracy in less time. A G.I.S. cell is operative in Keonjhar Division since 2014. Many advanced software; qualitative big printers have been installed in this division. But this equipment is being operated by temporary staffs. Requisite and skilled staff should be posted for better operation of these instruments to get fruitful results. Similarly, skill development programs should be taken up in the division to empower the IT system.

Keonjhar division has been managed by different efficient Divisional Forest Officers since its inception. A detailed incumbency list is furnished at Annexure-XIII.

Besides the regular staffs, there are protection squads, fire fighting squads, elephant trackers to assist the regular staffs in the field. Considering the workload, various schemes under implementation, it is felt that more ministerial and technical staffs at grass root level (Forest Guards and Foresters) are required to be deployed for better management of forest & wildlife.





CHAPTER- 10

FIVE YEAR PLANS

10. Five Year Plans:

From 1947 to 2017, the Indian economy was premised on the concept of planning. This was carried through the **Five-Year Plans**, developed, executed, and monitored by the Planning Commission (1951-2014) and the NITI Aayog (2015-2017). With the prime minister as the ex-officio chairman, the commission has a nominated deputy chairman, who holds the rank of a cabinet minister. The Twelfth Plan completed its term in March 2017. Prior to the Fourth Plan, the allocation of state resources was based on schematic patterns rather than a transparent and objective mechanism, which led to the adoption of the Gadgil formula in 1969. Revised versions of the formula have been used since then to determine the allocation of central assistance for state plans. The new government elected in 2014, has announced the dissolution of the Planning Commission, and its replacement by a think tank called the NITI Aayog (an acronym for National Institution for Transforming India).

10.1 Forest Management under Five-Year Plans

10.1.1 The First Five-Year Plan (1951-56):

The First Five Year Plan (1951-56) put considerable emphasis on the development of forests. The aim of the Plan was to provide for the expansion and improvement of areas under forests, for meeting the increased demand for timber and forest produce in the immediate future as well as for the planning of long-range development of forest resources. Besides these, revenue derived from forests was also an important consideration for which forests had to be managed. A most significant step in this direction was the enunciation of the New National Forest Policy of India in 1952, revising the old forest policy of 1894 in order to bring it into line with the requirements of the economy. The policy emphasized the protective as well as productive roles of forests and suggested, as a desirable long-term objective, that one third of the land area (around 33%) should be under forests including 60% of the land 86% in hilly regions and 20% in the plains. Programmes of forest development in the States during the First Five-Year Plan were mainly a continuation of programmes which had been initiated under post-war development schemes during the period from 1947-51. These included schemes for afforestation and plantation, improvement of forest communications, preparation of working plans, application of modern systems of intensive forest management, introduction of modern logging techniques, demarcation of newly acquired areas with a view to their rehabilitation, improving the growing stock and



strengthening of forest administration (Review of the First Five Year Plan, 1957). In view of the urgent need for protecting India's rich heritage of wildlife, conservation of wildlife was considered as an integral part of forest management. Owing to this, the Indian Board for Wildlife was constituted in 1952 which has done useful work for the cause of preservation of wildlife in the country (Anon., 1961).

The First Five Year Plan also drew attention to the important role of forests in soil conservation. Consequently, the Central Soil Conservation Board was set up by the Ministry of Food and Agriculture in 1953 with the mandate of carrying out research in soil and water conservation as well as assisting the States in carrying out soil conservation programmes. Besides expenditure on various centrally administered items, the Board sanctioned a total expenditure of Rs 47 lakh for soil conservation.

10.1.2 The Second Five Year Plan (1956-61):

The Second Five Year Plan (1956-61) aimed mainly at enlargement of the processes initiated in the First Plan and provided for the large increase in the pace of forest development. Besides continuing the work initiated during the First Five Year Plan, programmes of the Second Plan included measures for afforestation and improvement of poorer areas in the forests and extension forestry, formation of plantations of species of commercial and industrial value, promotion of methods for increased production and availability of timber and other forest produce in the immediate future, conservation of wildlife, amelioration of the conditions of staff and labour in the forests, increased volume of forest research, increased provision of technical, personnel as well as central coordination and guidance in the implementation of forest development schemes all over the country. A sum of Rs 21.21 crores was provided in the plan (in both Centre and State budgets) for the development of forestry and wildlife (Table No. 10.1). Soil conservation work was also to be undertaken in a concentrated manner and a provision of Rs 20 crores was made in the plan for the same.

10.1.3 The Third Five Year Plan (1961-66):

While intensifying the programmes initiated under the first two Five Year Plans, The Third Plan (1961-66) put special emphasis on measures which would help meet the long term agricultural and industrial requirements of the country and ensure more economic and efficient utilization of the available forest products including inferior timber and wood residues. The immediate objective was to increase the output through better techniques of timber extraction, to develop forest communications and to bring about increased use of preservation and seasoning processes. The plan stated that, "it is essential to develop the forest wealth of the country on a long-term basis not only for providing adequate fuel and timber for the rural areas but also for meeting the



requirements of construction and various industries including paper, rayon, plywood, matches and tanning" Major forest development programmes included in the plan were economic plantations for industrial and commercial purpose, plantations of quick growing species, village and extension forestry. While regarding the conservation of biodiversity as an important aspect of forest development, the plan included programmes for the development and establishment of five zoological parks, five national parks and ten wildlife sanctuaries. The plan provided an outlay of Rs 45.85 crores for various programmes of forest development in States and Union Territories including a sum of Rs 6.7 crores for Centre and centrally sponsored schemes (Table No. 10.1). The plan also initiated various programmes related to soil conservation and an outlay of about Rs 72 crores have been provided for their execution.

10.1.4 The Fourth Five Year Plan (1969-74):

The Fourth Five Year Plan (1969-74) had stated three main objectives in the area of forestry, namely, to increase the productivity of forests, to link up forest development with various forest-based industries and to develop forests as a support to rural economy. In view of the large-scale demand for timber and various forest products for industrial purposes, the plan envisaged efforts at creating large scale plantations of valuable quick-growing species and species of economic and industrial importance. An important objective was to achieve self-sufficiency in forest products especially for major forest-based industries. Accordingly, steps were proposed to bridge the gap between demand and supply by fuller utilization of forest resources other than wood such as bamboos and grasses and by encouraging the use of nonconventional woods and small-sized timber. As far as conservation of wildlife was concerned, the plan recommended special training in ecology and conservation. Special training programmes in wildlife conservation, management and research were accordingly instituted in the Forest Research Institute at Dehradun (The Fourth Five Year Plan, 1969-74). While recognizing that protection and effective management of habitats was crucial for the conservation of the rich wildlife of the country, two new centrally-sponsored schemes- Project Tiger and Development of National Parks and Sanctuaries also came into existence in 1973 (Towards Faster and More Inclusive Growth-An Approach to the Eleventh Five Year Plan, 2006). The total outlay for forestry programmes (including wildlife) in the Fourth Plan was Rs 89.42 crores in the Centre, States and Union Territories (Table No. 10.1) including a sum of Rs 1.39 crores for Centrally Sponsored Schemes.

10.1.5 The Fifth Five Year Plan (1974-79):

During the Fifth Five Year Plan (1974-79), focus shifted from conservation forestry to a dynamic program of production forestry. The primary objective laid down in the Plan



was to initiate measures for increasing production of industrial wood and other forest products by clear felling and creating large scale man-made forests with the help of institutional financing. The second important objective was to develop farm forestry and improvement of degraded forests to increase the fuel and timber supply in the rural areas. The major programmes of forest development included in the Fifth Five Year Plan were large scale commercial plantations, plantations of quick growing species, social forestry, forest consolidation, surveys and statistics, communications and logging. It was also proposed to build up a system of meaningful forest surveys along with a proper information system to assess the present growing stocks, increments and potential increments by forest divisions, natural regions and States. However, the Plan also drew attention towards large scale deforestation in the country and laid emphasis on intensive forest development and ensured that forest areas are not deforested for the extension of crop areas. To compensate for the forest area already lost, efforts were proposed to afforest equivalent areas out of wastelands. As far as conservation of wildlife was concerned, the plan intended to strengthen the wildlife administration on one hand and to carry out regular surveys and enumeration of various wildlife species on the other. Special efforts were proposed to protect the tiger population in nine selected areas where no commercial forestry operation would be carried out (The Fifth Five Year Plan, 1974-1979). A sum of Rs 208.84 crores were tentatively allocated in the Centre and State budgets for forestry and wildlife conservation programmes in the plan.

10.1.6 The Sixth Five Year Plan (1980-85):

The objective of forestry sector programmes laid down in the Sixth Five Year Plan (1980-85) was conservation of existing forests and launching of a country wide afforestation and Social Forestry Programs. During the plan period, various acts were enacted and institutions were set up for the protection of environment and forests (see chapter 6). For instance, the Forest (Conservation) Act was enacted in 1980 with the main objective of checking the diversion of forest land for non- forestry purposes. Similarly, for the efficient implementation of activities in the forestry sector through modern management technologies, the Indian Institute of Forest Management was established in March 1981 at Bhopal. Moreover, Forest Survey of India (FSI) was established in June 1981 (on the recommendations of the National Commission on Agriculture) for carrying out regular surveys of forest resources of the country. While recognizing the vitality of biological organisms, the Sixth Plan laid emphasis on the protection and conservation of natural ecosystems and stated that "the preservation of the country's genetic diversity and conservation of its species and ecosystems for sustainable utilization is of crucial importance for future survival and development of our people". Accordingly, the Wildlife Institute of India was set up during the plan in 1982-83 with the objectives of



building scientific knowledge on wildlife reserves, carrying out research and providing information and advice on scientific wildlife management (The Approach Paper to the Seventh Five Year Plan, 1985). A sum of Rs 692.49 crores were provided in the Plan in both Centre and State budgets for forestry and wildlife conservation programmes.

10.1.7 The Seventh Five Year Plan (1985-90):

It was for the first time during the Seventh Five Year Plan (1985-90) that the role and importance of forestry sector for economic development of the country in terms of protection of the ecosystems and supply of various forest products was understood properly. The task of bringing one-third of the geographical area of the country under tree cover became a vital need and all possible efforts were made to achieve the target. A revised National Forest Policy was formulated during the Plan in December 1988 which stressed on management of forests for conservation and meeting local communities' needs, and made commercial exploitation and revenue generation secondary objectives (Saigal, 2005). The policy also encouraged people's participation in the protection and management of forests. Thus, a decentralized system of forest management was started during the Seventh Plan with the introduction of JFM Programme in 1990. The objectives and strategy laid down in the plan included conservation of ecologically fragile ecosystems and preservation of biological diversity in terms of flora and fauna, increasing substantially the vegetative cover by massive afforestation through Social Forestry, Farm Forestry and other plantation programmes, meeting the basic needs of the people in respect of fuel wood, fodder, minor forest produce and small timber, ensuring close linkages between forestry programmes and welfare of the tribal and other communities traditionally dependent upon forests, special emphasis on forestry research and education and implementation of Wildlife Action Plan for wildlife conservation (The Approach Paper to the Seventh Five Year Plan, 1985). A sum of Rs 1859.1 crores were provided in the Plan in the Centre, States and Union Territories for forestry and wildlife conservation programs (Table No. 10.1). Despite various forest conservation programmes initiated during the Seventh Five Year Plan, the scenario of forests continued to cause concern. Destruction and degradation of forests took a heavy toll of country's soil and water resources. An estimated 6000 million ton of top soil with essential nutrients was flowing into the sea every year. Loss of top soil, vegetative cover, unregulated surface runoff with poor recharge of aquifers seriously affected the society and in particular Tribes.

10.1.8 The Eighth Five Year Plan (1992-97):

In view of these problems, the Eighth Plan also initiated various programmes and schemes regarding the protection and conservation of forests. Under forestry conservation program, the Eighth Plan established the National Afforestation and Eco-



Development Board (NAEB) in 1992. A number of afforestation schemes like Integrated Afforestation and Eco-Development Project Scheme, Fuel wood and Fodder Project Scheme, Non-Timber Forest Produce Scheme, etc were initiated under NAEB for reclaiming degraded forest areas adjoining forests. Besides, the Government of India also set up a new Department of Wastelands Development under the Ministry of Rural Development in July 1992 with the mandate to develop non forest wastelands. The plan also included the program of Development of National Parks and Sanctuaries for Biodiversity Conservation (The Ninth Five Year Plan, 1997-02). An overall provision of Rs 4910 crores was made in the plan for forestry and wildlife conservation programmes in Centre and State budgets.

10.1.9 The Ninth Five Year Plan (1997-2002):

The Ninth Five Year Plan (1997-2002) recognized the importance of forests in maintaining ecological balance, preserving life support system on earth as well as in achieving the goal of sustainable development. However, the shrinking forest area in the country due to the population pressure and various development activities like agriculture, irrigation, power projects, industry, roads, etc was also a matter of serious concern for the country. Thus, while showing concern on the tremendous pressure on forest resources, the Plan stressed on massive afforestation programmes, control over hacking and grazing and provision of cheap fuel through alternative technologies. A National Forestry Action Plan was also launched during the plan in 1999 to address major issues in forestry sector. The plan also laid emphasis on the conservation of biodiversity in the country. The important issues that had emerged in the Convention on Biodiversity were viewed from two perspectives-national requirement and actions and international negotiation needs, commitments and actions. The need for a comprehensive legislation had been fully recognized and the process of drafting the same had commenced. A separate biodiversity cell was also proposed to be set up in the Ministry of Environment and Forests in the Ninth Plan. The important schemes initiated during the plan for biodiversity conservation included fifty-two new research projects related with the biosphere reserves, conservation and management of mangroves and wetlands and eco-development projects in seven tiger reserves (The Ninth Five Year Plan, 1997-02). A provision of Rs 8189.09 crores was made in the Plan in Centre and State budgets for the execution of various programmes under forestry and wildlife.

10.1.10 The Tenth Five Year Plan (2002-07):

The Tenth Five Year Plan (2002-07) further emphasized on the important role of forests in achieving environmental and economic sustainability as well as in maintaining life support systems on earth. However, the plan also showed concern on consistent undervaluation of forests in economic and social terms. It was found that 95 despite



significant resource flows and national concern, the potential of forests to reduce poverty, realize economic growth and their contribution to the local and global environment had not been fully realized. Accordingly, the Plan proposed to give a thrust to integrated forest protection which includes all components of protection and sustainable management of forests. The Approach Paper of Tenth Five Year Plan had stipulated the need to bring 25% of area under forest and tree cover by 2007 and 33% by 2012. The plan emphasized on a coordinated and balanced strategy for forest and wildlife management and rural development while integrating local community's knowledge, skills and practices into conservation strategy, planning and management. More focused interventions were required for maintaining natural forests for ecosystem protection and sustaining the global and local forest values. The programmes related to forest protection initiated in the plan were universalization of joint forest management program, strengthening and enhancing the protected area network, effective management of protected areas, agro-forestry development, conservation and development of medicinal plants, promotion of shelter belt plantations to reduce the adverse impacts of natural calamities, improving the productivity of forest plantations, research and technology development to improve productivity and production of new products, control of poaching and illegal trade of wild animals and plant species, and development of national parks and sanctuaries, etc. A new scheme named as Protection of Wildlife outside Protected Areas (PWOPA) was also proposed for the Tenth Plan. It was also proposed to merge all afforestation programmes of National Afforestation and Eco-development Board (NAEB) into a single scheme called National Afforestation Program (NAP). This 100% Centrally Sponsored Scheme (CSS) was started in 2002-03 for regeneration and eco-development of degraded forests and adjoining areas on watershed protection and 96 conservation of natural resources through active involvement of people and checking land degradation, deforestation and loss of biodiversity (The Tenth Five Year Plan, 2002-07). A sum of Rs 14344 crores were provided in the Plan for the execution of various programmes under forestry and wildlife sectors in the Centre, States and Union Territories.

10.1.11 The Eleventh Five Year Plan (2007-12):

The strategy of the Eleventh Plan for forestry sector development was to create an environment for achieving sustainable forestry and wildlife management with specific focus on the socio-economic targets. Accordingly, the plan initiated various programmes for developing forestry and improving the status of green cover. In order to meet the target of increasing forest cover by 5% of total geographical area, the plan emphasized on the rehabilitation of degraded forests through joint forest management committees by linking forests to livelihood and increasing the participatory process through National



Afforestation Program. An intensive management of existing commercial plantations with scientifically designed inputs was emphasized in the plan for optimum productivity. In order to build sustainable forest management capacity of the states, two programmes of Ministry of Environment and Forests viz. Integrated Forest Protection and Strengthening Forest Divisions were proposed to be reoriented during the Eleventh Plan. The plan has also initiated various programmes for preservation of wildlife and forest biodiversity. These include initiatives for mitigation of wildlife-human conflicts, involving and compensating local communities, management of habitats outside protected areas, rehabilitation of displaced communities and strengthening and protection of indigenous knowledge while improving research and monitoring system (The Eleventh Five Year Plan, 2007-12). A sum of Rs 15583.02 crores was tentatively envisaged in the Plan (in Centre and State budgets) for forestry and wildlife conservation programmes.

10.1.12 Twelveth Five year Plan (2012-2017)

The Twelfth Five-Year Plan of the Government of India has been decided to achieve a growth rate of 8.2% but the National Development Council (NDC) on 27 December 2012 approved a growth rate of 8% for the Twelfth Plan.

With the deteriorating global situation, the Deputy Chairman of the Planning Commission Montek Singh Ahluwalia has said that achieving an average growth rate of 9 percent in the next five years is not possible. The Final growth target has been set at 8% by the endorsement of the plan at the National Development Council meeting held in New Delhi.

The objectives of the Twelfth Five-Year Plan were:

- To create 50 million new work opportunities in the non farm sector.
- To remove gender and social gap in school enrolment.
- To enhance access to higher education.
- To reduce malnutrition among children aged 0–3 years.
- To provide electricity to all villages.
- To ensure that 50% of the rural population have accesses to proper drinking water.
- To increase green cover by 1 million hectare every year.
- To provide access to Binkang services to 90% of households.

10.13 Financial Achievements during Last 12 Years in Forestry Sector:

The Budget provision in Forestry Sector under Plan & Non- Plan head during the last twelve years for the State is summarized below (Table No 10. 1)



Table No 10.1 Budget Provision in last twelve years (For the State)			
Year	Figures (Rs. in lakhs)		
	Non-Plan	Plan	Total
2008-09	35038.2	21001.2	56039.5
2009-10	37817.8	21609.2	59426.9
2010-11	37069.4	24204.3	61273.6
2011-12	38309	28648.5	66957.5
2012-13	27952.8	36873.2	64826.1
2013-14	25791.5	39351	65142.5
2014-15	30722.2	25885.7	56607.9
2015-16	23040.9	20378.8	43419.7
2016-17	24637.8	18093.3	42731.1
2017-18	30600	10057.8	40657.8
2018-19	30599.9	21989.2	52589.1
2019-20	32304.4	83963	116267.0

10.1.14 Expenditure on Forest Research

The programme named as Forest Research with the budget provision under the Programme Expenditure Scheme “Training Programme” envisages to support special research schemes on the following themes:

1. Tree breeding / improvement activities of commercially important trees and important indigenous species including NTFPs,
2. Standardisation of nursery & establishment techniques of medicinal plants and NTFP species.
3. Sustainable harvest techniques for NTFPs and medicinal plants.
4. Propagation of improved varieties of Bamboo and Canes.
5. Application of bio-fertiliser.
6. Development of agro-forestry models in different agro-climatic zones and
7. Development of seed production areas for major species.

Apart from that, during the current year, the budget provision of Rs.30.00 lakh has been made for Silviculture Researches on tree improvement, nursery & plantation techniques and plant ecological studies with up-gradation of research facilities as per the approved Quinquennial Research Programme.



10.2 Activities of Keonjhar Division in Last Plan Periods:

10.2.1 Twelfth Five Year Plan (2013-14 to 2018-19):

Different activities have been taken up in this division during the 12th five-year plan periods depending on the allocation. The following are the thrust areas and strategies for the 12th plan.

- Quantitative and qualitative improvement in Forest Cover and Carbon sequestration.
- Protection of Forests, River Basins and Bio-diversity for Ecological Security of the nation and Ecosystem Services to the people.
- Shelter/Green-belt Development for Disaster Risk Management and Climate Change Adaptation.
- Greening of under-utilized and Problematic land to combat desertification
- Participatory Management.
- Agro-forestry/Farm-forestry to bridge the gap between domestic demand and supply.
- Rehabilitation of Grazing and pasture land including formulation of National Grazing Policy.
- Sustainable Non-Timber Forest Product (NTFP) Management and strengthening Livelihood of forest depended communities.
- Urban and Recreational Forestry in urban and peri-urban areas.
- Productivity of Lands and Management of Invasive Species.
- Habitat Improvement and management of man-animal conflicts in Forests.
- Training and Capacity Building of Multiple Stakeholders.
- Strengthening Science and Technology for Forestry and Climate Change Research, Extension and Networking.
- Strengthening National Information Repository and collaborative Institutional Net-Work for Forestry and Biodiversity.
- Cross-sectoral synergy and convergence of integrated execution of schemes.
- International Cooperation and Commitment for Sustainable Natural Resource Management to achieve Millennium Development Goal.



- Development of Integrated Investment Framework and innovative augmentation of finances to the Sector.
- Streamline and leverage implementation of FRA, PESA and Biodiversity Acts through Amendments of Forestry Working Plan Code.
- Revamp and strengthen the institutional mechanism for effective delivery.
- Scientific and transparent GPS based evaluation and monitoring in GIS format and social auditing.

The details of the work done and the expenditure made for the purposes are given below.

Table No 10.2 :Expenditure under various sub head during 12th Five Year Plan: Keonjhar Division.	
Budget sub - head	Expenditure in Lakh Rs
NON-PLAN	
22-2059- 01-053-2448-21033	
.-Public Works	
N.R. Building	38.000
22-2406- NON PLAN	
003 Education & Training	0.588
070-Communication of Building	
0851-36002-Minor works-	1.200
0851-21033-Maintenance	2.650
0551-21033-Maintenance of building	1.200
1904-21064-Maint. Of Building	29.000
0904-21094-Maint. Of Road	19.000
136-Pay:-	1029.130
156-D.A.:-	860.823
403-H.R.A.	23.332
516-R.C.M.:-	5.999
523-O.A.:-	43.239
855-Arrear Pay	62.116
01004-Consolidated Pay	21.132
06001-T.E.	5.245
07001-L.T.C.	0.314
OFFICE EXPENSES	
074-Electric charge	5.450
154-Telephone charge	0.829
397-Motor vehicle	6.440
506-Other contingency	1.270
Office Expenses	13.989
20003:-O.C. (Clothing)	16.625
09001:-R.R.T.	0.320



78118-Up-gradation of Computer	0.260
78012-Computer Consumable	0.310
33011-Spare & Service	0.280
21019:-Maintenance of Boundary	2.600
78124-Working Plan	1.600
22026-Forest consolidation	0.270
22036-Regeneration	1.080
22035-Protection from Fire	0.790
22041-Sowing & planting	0.410
37109-Other works	4.070
13TH Finance Commission grant	
Plantation Programme Activities (outside WP area)	18.496
Increasing tree cover outside forest	122.934
Inventorisation & sustainable management of NTFP	2.920
Subsidiary Silvicultural Operation in coupe (1650 Ha during 13-14)	24.825
Strengthening of Forest	0.000
a) Building a cadre of community youth	27.014
b) Stall feeding & control of grazing	6.250
c) Incentive for Fire Control	1.000
Management of Forest Fire	36.000
<u>105:-Forest Protection</u>	
0334-20002-Drift & W. wood-other Charges	1.500
0513-20002-H.F.P-Con.& pur- O.C	3.420
<u>111 Deptt. Working</u>	0.000
0922-22020 Deptt. Working of Timber	3.770
<u>800-Other Expenditure</u>	
1012-12003-Legal charges	0.672
1012-17001-Reward for planting & Celebration of Vanamohashaba	5.882
<u>2000000-Other Charges</u>	
<u>Compassionate grant</u>	
Wild life Compassionate Grant	54.816
1) State Sector - 01 -Forestry	
102-Social & Farm Forestry-1004- OFSDP	
136-Pay	150.712
156-D.A.	114.902
403-HRA	4.154
516-RCM	2.000
523-OA	4.624



State Sector - 01 -Forestry 2406-01-101-1012	
22026-Forest Consolidation	0.248
22035-Prote from Fire	0.360
22036-Regeneration	0.180
78124-Working Plan	0.842
13TH Finance Commission grant 78378- protection of working circle (State Plan)	0.000
Plantation Programme Activities (outside WP area)	13.629
Increasing tree cover outside forest	37.520
Inventorisation & sustainable management of NTFP	8.640
Subsidiary Silvicultural Operation in coupe (1655 Ha during 13-14)	24.386
Strengthening of Forest	0.000
a) Building a cadre of community youth	13.514
b) Stall feeding & control of grazing	3.750
c) Incentive for Fire Control	0.300
Management of Forest Fire	13.610
2399-IFM	11.050
2118-Intensive protection Critical Endangered Area	26.134
22-2406-State Plan District Sector	
Tall Sapling Plantation	129.932
2151-OBDA-Bamboo	9.999
Avenue Plantation	3.200
Agro Farm Forestry	17.250
Maintenance of Permanent Nursery	9.900
Sacred Groves	44.100
SSO Timber coupes	391.546
2063-Urban Plantation(13-14 year 20000 nos 12-13 Yr 15000 nos)	104.473
0334-Drift & Waif-wood	1.112
0513- h. Forest Produce	0.464
Avenue Plantation	20.627
Maintenance of Permanent Nursery	24.737
Agro Forestry	16.600
2406-01-111-0922- Depart. working of Timber	
22020-Working of timber	2.043
2406-01-789-Special Component Plan for SC	
0513- h. Forest Produce	0.338



0922-22020-Working of timber	0.500
2406-01-796-Tribal Area Sub-Plan	0.000
0334-20002-Drift & Waifwood	0.148
0513-20002-h. Forest Produce	0.598
0922-22020-Deptl Working of Timber	0.457
22026-Forest Consolidation	0.127
22035-Protection from Fire	0.110
22036-Regeneration	0.055
78124-Working Plan	0.358
1571-Wildlife-Protection & Conservation-W.L. Compensation	93.396
1571-Wildlife-Protection & Conservation-Wild life Week	0.050
Elephant Squad	11.660
Wild Life Compensation	203.212
Accidental Electrocution	0.200
Elephant Tracker	0.324
Intelligence network & informer & Monitoring	0.350
Elephant Census	1.105
Strengthening Communication Network	1.000
Elephant Proof Barrier Trench Fencing	11.000
Elephant Corridor	63.986
Celebration of wildlife week	0.450
2316-Ecotourism	123.000
Wild life Compensation	40.000
Fodder Plantation	8.068
Construction of Pond	11.000
Elephant Barrior/Trench	8.000
Fire Squad	4.040
Eradication of Invasive Weeds	1.650
Survey (Pillar Posting)	7.480
EPA (Livelihood support)	2.000
Old Tank Renovation	1.750
Watch Tower	10.000
Hoarding	1.000
Permanent Camp	7.000
Deep well	1.000
22-4406-COL State Plan Dist. Sector	0.000
Avenue Plantation	4.878
Maintenance of Permanent Nursery	10.080
Minor works	4.500
Purchase of Camp Equipment for fire	2.495



protection Squad	
Tiger Census (STR)	1.123
CENTRAL PLAN	
<u>22-2406-Forestry & W.L Centrally Sponsored Scheme -State Sector-</u>	
Wildlife Compensation	9.980
Elephant Census	0.650
FDA AR Plantation	8.325
FDA ANR Plantation	33.621
Other Activities	13.258
NBM	17.412
OFSDP	1083.142
Total	5520.473

10.3 Suggestion For Future Five-Year Plan:

Keeping in view the changing needs of forest management in the Division, the following issues need emphasis for future,

- Consolidation of forests, survey and demarcation, geo-referencing and digitization of forest boundary.
- Strengthening the forest manpower and infrastructure.
- Rehabilitation of degraded forest areas.
- Mapping of floral and faunal diversity.
- Putting in place a periodical vegetative and wildlife monitoring system.
- Grassland management in wildlife rich areas.





CHAPTER – 11

PAST SYSTEM OF MANAGEMENT

11.1 General History of the Forest:

General History: Prior to 1892, there was no record of systematic forest conservation and management. During 1896, the then Maharaja of Keonjhar introduced certain rules to regulate the disposal of forest produce. This came into force from 1st April 1896 in lower Keonjhar and subsequently implemented in upper Keonjhar. Prior to this the tenants of Keonjhar used to get their requirements free from any part of the ex-state. However, the right of the inhabitants of large villages was limited to a radius of 04 miles and that of smaller hamlets it was 02 miles from their home. For extraction of forest produce, from greater distance permission was required.

Ancestors of Keonjhar: The ancestors of Keonjhar are Bhuyans and Juangs Tribes, who were habituated in *Jhum* i.e. shifting cultivation. They were not restricted on the forest land although some nominal restrictions as to the area within the limit of which they were entitled to do so did exist. They enjoyed every freedom of hunting.

Shifting Cultivation: For the first time the Agency Forest Officer Mr. A.N. Grive realized the evil effects of shifting cultivation and deforestation during 1911. Accordingly, he pleaded for creation of Reserved Forests. As per his advice, Reservation of a number of forest blocks was taken up. But it could not be materialized in Bhuyan and Juang dominated hill tracts because no forest law or rules of the ex-Durbar administration could be enforced. Over the years, all the efforts to change the habits of shifting cultivation of Bhuyans and Juangs and to convince them about its bad effects could not be materialised. Although demarcation of some forest blocks were carried out to bring them to the fold of reservation, but subsequently proved infructuous. These tribes continued the practice of shifting cultivation on the hill slopes even up to interior areas destroying the valuable Sal Forest of the plateau.

Commercial Exploitation: For the first time, commercial exploitation of forest was taken up in Boula. This system was called Ghati system. Under such system, a contractor purchased the right every year to sell forest produce from a certain area. The purchasers from outside used to collect permits from this contractor and then they cut and remove the timber from the forest without any let or hindrance. On introduction of East Coast Railway during 1893, there was a great demand of railway sleepers and its effect was seen on Boula forest. The forest was very badly handled and large quantities of sleepers were extracted.



Early Step in Forest Conservation: In order to conserve forest, the forest conservancy was started during the year 1892 followed by framing of certain rules by 1896. The staffs for its execution were deployed in 1898. The staff position in the beginning was 01 Head Moharir, 02 Moharirs and 08 Peons. It was increased by 01 Moharir and 07 peons in 1901. The forest revenue collected during 1901 was Rs. 23,887/-. For the first time, during 1906 a Dehradun trained Forest Ranger was appointed in the scale of pay of Rs. 100/- per month and attempts were made to place the department on an organized basis. The British Government took over the direct management of the forests in the year 1907. After that, importance was given on reservation of forest blocks with zeal and sincerity. The work was first started in Atei block with a slow pace up to 1911. After appointment of an Agency Forest Officer, the fieldwork gained momentum and it was completed by 1924.

Early Forest Exploitation: At the close of the settlement operation in 1915, the selection and demarcation of forest blocks was taken up and completed soon after. Little work seems to have been done in these forests prior to opening of sleeper operations by Bengal Timber Trading Company. In 1910, B. Barooah primarily took up this lease in 1906 but the lessee does not appear to have done any work and delegated his rights to Bengal Timber Trading Co. No clause relating to the proper management of the forests or economic conversion of timber was there in the condition of the lease. The exploitable girth was 5' but no limit was set regarding the number of trees to be removed in any one year or during the period of contract for 20 years. The revenue felling work went on in full swing regardless to the capacity of the forest. As a result, the Sal rich forests were converted to pole crops in many areas. The deficit of matured trees noticed now is mainly due to Revenue felling during the time of B.T.T. Co.

Systematic Working Plan: The first Systematic Working Plan for the Reserved Forests and Proposed Reserved Forest of Keonjhar Division for the period from 1930 to 1960 were prepared by Dr. H.F Mooney, SC. D.F.L.S. This Plan was implemented up to 1945-46. Mr. A.B Lal's Plan was for the period from 1945-46 to 1964-65. Mr. Prasad's Plan was for the period from 1969-70 to 1988-89, which was approved in the year 1983. Mr. Bhaskar Chandra Mohapatra's Plan was for the period from 1984-85 to 1993-94. There was no forest management for the period from 1965-66 to 1983-84 and for the period from 1994-95 to 2006-07. Mr. Narayan Samal's plan was for the period from 2007-08 to 2016-17.



11.2 Past system of Management and Their Result:

11.2.1 Dr. H.F. Mooney's Plan:

The first systematic working plan for the period 1930 to 1960 was written by Dr. H.F. Mooney. After expiry of the lease period of B.T.T. Co., it was enforced on dt.1.4.1930. Although the protected forests were managed under a system called Coppice with standard since 1915, no systematic management of forest was adopted prior to the first systematic working plan. There were prescriptions for 3 working circles namely:

High Forest Working Circle,

The Coppice Working Circle,

The Miscellaneous Working Circle.

(a) High Forest Working Circle: This Working Circle constituted with forest blocks of Keonjhar Division like Rebana, Kalapat, Siddhamath, Karo, Thakurani and Barabanka. Subsequently, Thakurani block was excluded and kept under Coppice system due to inadequacy of trees of exploitable girth. Rebana and Kalapat blocks were clubbed together to form one felling series. The yield was regulated by area and the felling cycle was 30 years. Exploitable girth was fixed at 4.5 feet in all blocks except Boula where it was 4 feet only. Improvement felling was prescribed after selection felling. No selection felling was taken up in Boula Forest block as the areas of annual coupes were too small having very few exploitable trees. The plan was not based on scientific inventory of growing stock. It resulted in creation of scrub jungles and unproductive areas under this working circle. The annual coupes were invariably laid out in such a way that most of the best forests containing large number of trees were selected separately resulting inflation of the yield. Improvement fellings were carried out and proved to be remunerative except in Rebana and Kalapat blocks where market for small timber was not there. But the whole forest could not be covered up during entire plan period. Due to want of sufficient funds, thinning in the coupes as prescribed by Dr. Mooney could not be carried out. In most of the cases removal of suppressed and dominated trees could not be done properly to nourish the crop. Marking of Selection coupes were entrusted to untrained foresters who did the job regardless of silvicultural considerations. Climber cutting, though prescribed in the plan was not attended to in Rebana, Kalapat and Boula blocks.



(b) Coppice Working Circle: - Parts of Boula, Thakurani, Uliburu and Santoshpur forest blocks were kept under this working circle. These forests could not be worked out in time for want of a local market for small timber and firewood. This system was satisfactorily successful in Boula block due to heavy pressure. As such a new felling series was opened in Boula block during Lal's plan to cater to the demand of local population. Cleaning was prescribed in the second year and thinning in 10th, 20th and 30th year. But cleaning operation was badly neglected due to want of funds. This resulted in retardation of growth rate due to congestion and poor crown formation.

(c) Miscellaneous Working circle: Atei, Nayagarh, Baitarani, Barabanka (P), Bandhanjhari, Benamunda and Ranibeda were kept under this Working Circle. Felling of green trees was closed in Atei, Nayagarh, Baitarani and Barabanka blocks. Removal of dead and dry trees was permitted in these blocks. In rest of the forest blocks, thinning was prescribed which was badly neglected due to want of funds. The main objective of this working circle was to allow sufficient rest for the growing stock either because of its poor quality or due to inaccessibility. By allowing such restriction, it was aimed that the crop would improve in long run and could be worked under different working circles in the next plan.

11.2.2 A.B. Lal's Plan:

Since 1940, excess felling was done in Karo, Siddhamath, Uliburu and Thakurani blocks in order to meet the urgent demands of Defence department. As such, creams of these forests were removed due to their accessibility to Jamda Railway Station. In 1941 Sir S.H.Howard, the then Inspector General of Forests to the Government of India inspected this area for the first time. He made some valuable suggestions for better management of forests in this tract to introduce Conversion to Uniform Working Circle in better quality Sal forest with profuse regeneration and accessibility. He also pleaded against the practice of shifting cultivation.

The Lal's Plan came into force from 1945-46, which constituted following seven Working Circles.

- i. Sal Conversion Working Circle.
- ii. Selection Working Circle,
- iii. Selection Coppice working Circle
- iv. Coppice Working Circle
- v. Protection Working Circle
- vi. Nistar Working Circle
- vii. Plantation Working Circle



- i. **Sal Conversion Working Circle:** This Working Circle included all good quality Sal Forests like Karo, Siddhamath where concentrated regenerations fellings were considered justified due to heavy demand and favourable market conditions. All these blocks were easy to access and operate. The main objectives were to convert the existing irregular forests in to relatively even aged crop with a normal series of age classes. For the Felling Series at Karo, the conversion period of 120 years. There were six periodic blocks in the felling series. Periodic blocks I & II were allotted and the remaining periodic blocks were not allotted and grouped as P.B. Inter. Periodic Block I area consisted of matured and nearly mature crop with adequate regeneration and advance growth. Yield was fixed by area.

Clear felling with the retention of not more than 04 standards per acre (10" to 14" DBH.) was prescribed here. Subsequent silvicultural operations after main felling were also prescribed which included felling of left over materials like shrubs, climber cutting. Artificial regeneration in areas certain areas were prescribed where regeneration of Sal was not adequate. A C/D grade thinning was prescribed to the resultant crop on 10th year following the main felling. In P.B.II area no felling were prescribed but climber cutting was advocated on a 10 years cycle. Burning of moist areas to reduce semi-evergreen undergrowth and induce establishment of Sal regeneration was also prescribed. In P.B. Inter areas the objective was to nurse and improve the younger age classes and to utilize those trees which were not expected to remain sound till they come to P.B.I. Selection cum improvement fellings were prescribed in P.B. Inter area. Subsidiary operations included thinning in congested even aged pole crop, removal of dead, dying and diseased trees and inferior species suppressing the stems of Sal or other valuable species. Prescriptions were made for rigid fire-protection in the whole working circle excepting the places where burning was contemplated. Grazing was prohibited in P.B.I and other areas where Sal regeneration was profuse.

But the prescriptions failed at the hilly tracts of Karo, Siddhamath completely. Practically, there was no follow up action for cleaning to keep down the semi-evergreen species in the forests, which resulted disappearance of Sal at the end of their plan. Even now, any rectification by way of cultural operation will not bring back Sal forests in this area. All the 20 annual coupes of P.B I area of Karo felling series were worked during the plan period. In the following years, it was observed that most of the Sal regenerations could not be established in Karo and Siddhamath blocks, which was perhaps due to heavy human interference and excessive mining operations in the forest. Hence the very purpose of Lal's Plan was defeated. Mr.



Saranghi/ Mr. Prasad reiterated the same mistake by keeping all these blocks under Conversion working Circle resulting further deterioration of vegetation.

- ii. **Selection Working Circle:** This Working Circle constituted three felling series including R.F. like Kalapat and Barabanka. Since the area was inaccessible, concentrated regeneration felling was ruled out. Rather Selection-cum-Improvement felling was prescribed in this working circle. Rotation was fixed at 140 years with a felling cycle was fixed to 20 years. No enumeration was done but Yield was fixed by area with 33 $\frac{1}{3}$ % trees of exploitable girth were allowed to be felled. Remaining 66 $\frac{2}{3}$ % trees were retained for further improvement for another 20 years. Climber cutting was prescribed along with main felling. Restrictions were imposed on felling of miscellaneous trees depending upon market demand. Subsidiary silvicultural operations included cutting back of damaged trees, felling of marked trees left over by the contractor, removal of trees standing over healthy advanced growth, thinning of congested crop and cleaning in moist area to favour Sal regeneration. Fire protection measures were strictly imposed. Grazing was also strictly prohibited. Due to remoteness of the area and scarcity of labourers many difficulties paved the way of extraction of timber from coupes. This situation improved towards the end of plan period when the retention of exploitable girth trees was reduced from 66 $\frac{2}{3}$ % to 33 $\frac{1}{3}$ %. There seems to be no record of retention of reserved trees. No steps were taken to select healthy trees of exploitable diameter for the subsequent felling cycle. Subsidiary silvicultural operations were ignored.
- iii. **Selection Coppice Working Circle:** Atei block felling series was included in this Working Circle. Due to lack of demand for small timber and firewood in this area, pure coppice system was avoided. Due to want of sound trees adoption of high forest selection system was ruled out. Since these forests were susceptible to theft regularly, importance was given on catering to the needs of local people. The silvicultural system prescribed was selection felling with coppice regeneration. Rotation was for 60 years and felling cycle was of 20 years. Yield was regulated by area. The rules of marking included cutting of all Sal trees of exploitable girth with climber cutting. Trees of valuable species were retained in the blanks area where there was no regeneration. Cutting of damaged trees and unhealthy poles were included in Subsidiary Silvicultural Operation. Heavy restrictions were imposed on fire and grazing. In absence of management and stock maps and without doing enumeration the prescriptions of this plan were rather theoretical. None of the prescriptions of the working plan was seriously adhered to. Only annual coupes were marked and allowing indiscriminate felling contributed opening of gap in the vegetation. Because of close proximity to population, repeated fire and overgrazing,



regenerations suffered serious setback. No steps were taken to regenerate the blank patches or encourage coppice regeneration. Because of unsoundness in exploitable girth trees, sound trees below exploitable girth were removed.

- iv. **Coppice Working Circle:** This Working Circle was constituted with felling series of R.F. like Uliburu, Thakurani, Baitarani 'A' & 'B'. The silvicultural system prescribed was coppice with standard with a view to produce small timber, poles & firewood as per local demand for agriculture and mining purposes. The five-felling series of these RFs were of 40 years. 8 to 10 sound trees of 15 to 20 cm diameter were prescribed to be retained as standards per acre. Regeneration cleaning along with sowing and planting were prescribed. Heavy restrictions were imposed on fire and grazing. No tabular statement for felling was given. Laying out of annual coupes was not systematic due to want of management maps showing annual coupes. Due to pressure of population, expansion of railways, mining and increasing industrialization in Barbil and Joda areas, R.F. like Thakurani, Baitarani and Uliburu were over tapped and at places standards were stolen away. No attention was given on prescribed Subsidiary Silvicultural operations such as cleaning, fire protection and control on grazing. This affected coppice regeneration. Many encroachments and hutments came up due to expansion of industries in Baitarani, Thakurani and Uliburu R.Fs. No sowing & planting as per working plan prescriptions were carried out. Due to defective prescription of working plan and want of supervision and implementation of the prescription there of, most of the areas in this tract were degraded at the end of this plan.
- v. **Protection Working Circle:** Reserve Forests which were inaccessible and poor in quality were included in this working circle. These forests were not fit for intensive management. Forests in this category were further classified into two groups (a) Protection Forest, which were meant for indirect benefit like prevention of soil erosion and regulation of stream flow. (b) Other forests situated in remote areas with good advance pole crop of better future. The 1st category comprised whole of Nayagarh Block, parts of Karo. The 2nd category consisted of Benamunda, Bandhanjhari, Ranibeda, Jharbeda, Kodbil, Palaspal, Balbhadrapur, Krushnapur, Sarupat and Kalimati blocks. The prescriptions for the 1st category of forest intended to stop felling of green trees but 50 acres of forest land were allotted annually for plantation of Sabai Grass. The recommendation for 2nd category of forests was thinning with improvement felling on a felling cycle of 20 years. Supplementary operations like fire protection and control on grazing was included. These prescriptions of the working plan were not implemented at all. Since most of the forests of this category falling in Telkoi Range contained good Sal crop, Sri M.C. Das the then A.C.F. Keonjhar Division prepared a brief scheme after stock mapping of



these blocks. He had prescribed for selection felling with yield, which was regulated by area basis. One felling series, namely Charigarh felling series, constituting Benamunda, Bandhanjhari, Ranibeda, Jharbeda, Kodbil & Krushnapur RFs was formed. But this scheme was also not followed.

- vi. **Nistar Working Circle:** -This Working Circle was formed with the main object of opening Praja coupes to meet local demand. 27 felling series were constituted consisting of "B" Class Reserved Forests extending over an area of 27307.1 Ha. Coppice with standard system was prescribed with retention of 8 to 10 standards per acre. Subsidiary Silvicultural operations included fire protection and control over grazing. The coupes were irregularly laid out due to want of management maps. Pilferages of coppice with standards by the local people devastated the forests of Keonjhar & Champua Range. Repeated fire and heavy grazing obstructed the establishment of regenerations. Repeated cutting and uprooting of stumps left the area barren. The condition of the RFs of Ghatagaon Range was somehow better. Inadequate silvicultural operations and failure to adopt sowing and planting rendered this working circle deteriorated. The method of working in this Working Circle was to allot one felling series to a group of villagers. Tenants, paying Nistar Cess were allowed to work out the coupes from October to March every year. Beyond March an extra half of the royalty was charged for extraction from these coupes. Due to want of management maps laying out of annual coupes became unsystematic and coupes could not be opened in highly populated area of Champua and Keonjhar Sub-divisions due to want of materials in many felling series. In felling series of Ghatagaon Range no subsequent silvicultural operation was carried out after annual coupes were worked out. No sowing and planting were done during the entire plan period.
- vii. **Plantation Working Circle:** -This Working Circle was constituted with 02 forest blocks namely Nuniapatna and Hatibandha of Anandapur range comprising of 147.10 ha. But now these blocks are under Keonjhar (WL) Division and therefore not coming under the purview of this plan.

11.2.3 Mr. Sarangi's Plan:

The plan prepared by Mr. A.B. Lal was for the period 1945-46 to 1964-65. During 1964, Mr. G.G.Das and then Mr. P.K.Pani took up the revision of working plan of Keonjhar division. After writing Part I, Mr. Pani proceeded on deputation to United Kingdom and Sri U.N.Sarangi I.F.S. was assigned to complete the plan which was prepared for the period 1969-70 to 1988-89. Mr. Sarangi made some major changes while drafting Part II of the revised plan. The Salient features of Mr. Sarangi's Plan were as follows:



- He suggested three felling series under Sal Conversion Working Circle with an object to manage the best Sal areas capable of producing high-grade large sized timber.
- Six felling series were made in Selection working Circle including whole of Kalapat and part of Rebena with prescriptions for plantations in miscellaneous forest areas.
- Improvement Working Circle was recommended in Telkoi Range to include left over forest areas of Protection Working Circle in Mr. Lal's Plan. The main objective of this working circle was to boost growing stock of the forest and to remove matured trees.
- The Selection Coppice Working Circle was dropped in this plan. All the forests accessible to rail heads and local favourable market places were kept under Coppice working Circle with an object to produce small timber, poles and fire-wood.
- The soil Conservation Working Circle was introduced by Mr. Sarangi to check progressive soil erosion problems in Rebenaforest block. In addition, provisions were made in all working Circles to rehabilitate eroded patches.
- Nistar Working Circle was formed comprising of all 'B' class Reserved Forests to meet the demand of cess paying tenants with provision to improve growing stock by artificial regeneration and enrichment planting.
- A Plantation Working Circle was formed comprising of Hatibandha and Nuniapatna Blocks. Plantation was suggested for Salapada and Jyotipur R.Fs.
- A separate Working Circle namely Mining Working Circle was formed comprising entire mining leasehold areas because of various mining activities going on inside the R.F. areas of Champua Range.
- A separate chapter was included for development of Bhuyan Pirh and Juang Pirh, which were heavily prone to shifting cultivation. Definite suggestions were given for reservation of upper hill slopes, regulated Taungya cultivation and social and cultural upliftment of the aboriginal tribes of Keonjhar.
- A separate chapter on Wild life management and preservation was drafted for improvement of wild life population and preservation of virtually extinct wildlife species.
- A separate chapter on watershed management dealing with requirements of cess paying tenants were included.



11.2.4 Mr. Prasad's Plan:

Mr. Sarangi's plan was not approved for certain reason. Mr. Prasad was then entrusted with re-drafting the plan vide C.C.F's Memo No. 15829 dt.3.8.70. Mr. Prasad on his revision suggested eight Working Circles which are discussed as here under.

i) TheSal Conversion Working Circle:

In Lal's plan 13051 ha was kept under Sal Conversion Working Circle out of which 2,336 ha was in P.B I, 2,487 Ha. in P.B. II and rest in P.B Inter. Mr. Lal had recognized that maturity of crop was not an important consideration especially during the first conversion period. His P.B I allotment was mainly based on availability of mature or near mature crop with adequate seedling regeneration and advance growth. The entire area, allotted to this Working Circle was stock mapped by him and compartments were formed. But the allotment to various periodic blocks was not based on any enumeration.

Mr. Sarangi's Plan also continued the conversion system. Mr. Lal and Mr. Sarangi confirmed that the forests covered under this Working Circle, had a rotation of 90 to 120 years age gradation and preponderance of 60 to 90 years of age class. Regeneration was observed to be profuse by both Mr. Lal and Mr. Sarangi, but they were in whippy and sub-whippy stage due to fire and suppression by over wood. They were mainly guided by the principle that Sal grew best in a more or less even-aged crop. This Working Circle includes 3821.6 ha. of Karo and 5715.5 ha. of Siddhamath R.F.

In Prasad's Plan, this Working Circle consisted of good quality Sal forests of Karo and Siddhamath. The average quality of Sal was fairly Q-III.

The areas worked under P.B. I in Lal's plan was kept in P.B. young. The remaining areas were kept in P.B. Inter. P.B. I, P.B. II and P.B. Young areas were definitely marked in 2" = 1mile management maps. No enumeration had been done for allotment of different areas to P.B.I, P.B. II and P.B. Inter. The nature of felling prescribed in P.B. I was clear felling with retention of 10 to 15 standards of 15 to 30 cm. d.b.h. per acre. All trees, up to 10 cm. d.b.h were restricted from marking. Mining areas and encroachment areas were excluded from the annual coupes. The subsidiary silviculture operation like cleaning and thinning with shrub cutting for successively two to three years after main felling was prescribed. Regeneration survey and stock mapping was made mandatory in the second year after the main felling. The Range Officer was required to furnish a certificate showing the areas, which were completely regenerated, and areas with deficit regeneration. Areas having more than 200 established Sal regeneration per acre were to be considered as fully regenerated. Areas with deficit regeneration were to be restocked by sowing. Report certifying the success of plantation was to be submitted by



the Range Officer after 3rd year of plantation. The regenerated areas were to be thinned at 10th, 25th, and 40th year and thereafter in a 20 years interval. 'C' to 'D' grade thinning in the 10th year was prescribed. Prescriptions like climber cutting, fire protection and grazing control remained as usual.

Due to large-scale violations of the Working Plan, the P.B I areas deteriorated considerably. Retention of advance growth up to 10-cm. d.b.h. adversely affected the site condition due to non-implementation of the prescription. The areas lacking sufficient regeneration and advance growth were covered with miscellaneous growth. The total observation of implementation of Working plan prescriptions in P.B.I areas reveals that though P.B I felling have brought good results, S.S.O have been severely neglected. This has resulted in congestion and suppression of Sal crop by miscellaneous species. Other prescriptions of Mr. Prasad's plan had not been implemented at all.

Mr. Sarangi, in his plan had prescribed the exploitable diameter to be 40 cm. in Karo and Siddhamath without any future safeguard. Lack of correct interpretation of improvement marking prescriptions had resulted in considerable over felling in annual coupes. Mr. Prasad however raised the exploitable diameter from 40 to 45 cm. with 33% safeguard in Karo and Siddhamath R.Fs. Even this system did not improve the situation due to over felling by way of improvement marking in all the coupes. The prescriptions were sound but its implementations were not carried out properly which caused a disappointing result in this circle.

ii. Selection Working Circle:

Mr. Sarangi retained Kalapat under selection system. Atei and Barabank containing defective trees of poor quality were brought under coppice with standard system on a 40 years rotation. Mr. Sarangi took the view that; these areas should be clear felled and restocked by coppice and artificial regeneration in order to get a better crop in future. But in the field, the condition of the trees in Atei was extremely poor. Even the younger crops also get defective by the time they reach 60cm girth. Mr. Prasad realized his defects and withdrew some portion of Atei, from Coppice Working Circle and put them in Selection Working Circle. He expected large scale felling in these areas may invite ecological problem. In Mr. Sanagi's plan, while the area in Selection Working Circle was 40,696.8 ha, it was 91,777 ha in Mr. Prasad's plan. But none of them carried out any enumeration in Selection Working Circle on the ground of variation of growing stock, irregular forest and heavy encroachments and mining activities. The yield had been fixed by area and no attempt had been made to make the coupes productive on reduced area basis. Both of them provided an arbitrary safeguarding factor. The safeguarding factor was 66%, 25% and 33% by Mr. Lal, Mr. Sarangi and Mr. Prasad



respectively. Both the authors had fixed the exploitable diameter of 45-cm. d.b.h. for Sal in Kalapat block. In respect of other species, the exploitable diameter in both the plans was different. In other felling series, like Barabanka and Atei, Mr. Prasad suggested 35-cm. d.b.h. as exploitable diameter. Mr. Sarangi had suggested plantation of valuable species in the miscellaneous patches. Both of them had prescribed thinning along with main felling in congested groups in the annual coupes. In both the plans S.S.O. was provided.

In all felling series other than Kalapat, a lot of dislocations occurred due to change in allotment of Working Circle coupled with late working of coupes. During the Plan period, Mr. Mohapatra observed that a number of arrear coupes were marked and worked out in later years and the late working in the selection forests hampered the regeneration badly and subsequent cultural operations also. In some areas, the S.S.O. was totally neglected. In Mr. Sarangi and Mr. Prasad's plan some percentage of safeguard had been prescribed but proper records of such retention were not maintained as observed by Mr. Mohapatra. Mr. Mohapatra analyzed from the number of trees marked that a large number of trees have been marked in approach class and sub-approach class under improvement marking in the felling series like Barabanka, Baiganapal, Bhimakund, Mushal (N), Mushal (S), Kalapat (W), Kalapat (N) and Kalapat(S) as per Prasad's plan. This adversely affected the future yield. Further he observed that except in Mushal South F.S. in all other felling series, heavy improvement marking had resulted in over-felling. The cultural operations were delayed and neglected.

iii. Improvement Working Circle:

During the course of revision of Mr. Lal's plan by Mr. Pani and Mr. Sarangi, the Working Plan Committee recommended that such blocks instead of being kept under protection could be brought under Management through some conventional silvicultural system. Accordingly, the forest blocks like Bandhanjhari, Jharbeda, Kodbil, Krushnapur, Ranibeda and Benamunda were kept under Improvement Working Circle by Mr. Sarangi. Because of availability of a number of Khesra forests in Telkoi Range, Samakoi block was also brought under Improvement Working Circle, which was kept under Nistar Working Circle in Mr. Lal's plan. At that time, it was recognized that, the quality of Sal in all these blocks was of Q III and in patches Q II. The density was from 0.4 to 0.6. The blocks were mostly situated in plains and low hills. The growing stock was middle aged. Matured trees were sporadic. He had suggested four felling series and prescribed improvement felling of nature of Selection-cum improvement marking combined with thinning. For Sal, the exploitable size was fixed at 40 cm. d.b.h. without any safeguard with a felling cycle of 10 years. Such prescriptions were considered defective as exploitable diameter of 40cm d.b.h. without any safeguard especially in Q III forests could result



inconsiderable over felling in a 10-year cycle. In normal Silvicultural practice, shorter the cycle, higher is the exploitable size. This point was not taken into consideration by Mr. Sarangi. However, this was rectified by Mr. Prasad by increasing the d.b.h. to 45 cm. Mr. Prasad kept all these seven blocks under improvement working circle with 4 F.S. with 10 years cycle and with 33% safeguard. Both Mr. Sarangi and Mr. Prasad reduced the d.b.h. to 20 cm. for felling of dead, hollow and diseased trees including removal of inferior and secondary species interfering with the growth of established principal species.

The implementation of the coupe working was late. Marking rule was not scrupulously followed for which many good stems of semi-matured trees were removed. The aim of improvement felling was neither regenerating the crop nor producing a crop of distinctive characteristic. So, it was silviculturally unsound. This improvement felling aimed at removal of inferior growing stock in the interest of better growth of economically valuable species. But it is seen from the prescriptions of Mr. Sarangi and Mr. Prasad that actually they prescribed selection cum improvement felling. In this improvement felling, only the over matured, unsound and defective stocks should have been removed for better avenue for other principal species and to induce natural regeneration and to allow the established regeneration to put up height and diameter increment through judicious opening of the canopy. But the results revealed that in all felling series; a lot of immature stock has been removed under improvement felling.

Mr. Mohapatra, compared the established regeneration and advance growth of Telkoi forest with that of North Betul (M.P.) Division. In case of North Betul Division the forests were due for conversion was considered to have sufficient if it had more than 1500 stems up to 30-cm. girths at b.h. per ha. Whereas, in Telkoi forest, hardly 100 to 200 stems of this size per ha was available. The past felling figures also showed that the availability of matured stock per unit area was deficient. Hence adoption of uniform or shelter wood compartment system would not be suitable for these forests. From his 5 % strip enumeration done in Bandhanjhari compartment No.1 to 3 also showed that the distribution of girth classes and advance growth was not favourable for conversion system.

iv. Coppice Working Circle:

Mr. Sarangi observed that Atej, Santoshpur, Barabank, Sarupat, Palaspal, Balabhadrapur and Kalimati blocks contained poor quality Sal Forest and majority number of trees were defective, diseased and malformed. Hence, he withdrew the areas worked under Selection-Coppice in Lal's Plan and included these areas under coppice system. He retained Thakurani, Uliburu, Baitarani A and Baitarani B in coppice system as already prescribed by Mr. Lal in his plan. To replace the defective crop, he suggested a clear



felling in these areas. So, he formed 23 Felling series under this working circle with rotation of 40 years. In hilly areas he suggested selection felling in top 1/3rd of the coupe and these areas were excluded from the coppice felling.

Mr. Prasad revised the plan in which 16 felling series were retained under coppice working circle and 7 felling series were diverted to Selection Working Circle, mainly from Atei, Santoshpur and Barabanka blocks. The coppice area was reduced to 22674 ha. 12 to 15 trees of 15 to 20 cm. d.b.h were prescribed to be retained as standard per acre. Selection marking was prescribed in hilly slopes and in lower slopes coppice was prescribed with a rotation of 40 years. Both the authors had prescribed Subsidiary Silvicultural operations i.e. cleaning, fire-protection, and control of grazing and sowing and planting in blanks. Thinning was prescribed during 10th and 25th year.

Mr. Mohapatra observed that the coupes in some areas e.g. Biragovindapur, Nayagarh, Kalimati, Balabhadrapur etc., Felling series were not opened. He expected, it might be due to want of management maps, non-availability of produce or deforestation on account of projects. Out of the balance 9 F.S. Baitarani 'B' was found very much depleted by Mr. Mohapatra, where further coppicing was not done. In general, he observed that, the coppice fellings in this division produced a very poor crop owing to inadequate cultural operations, heavy illicit felling, grazing, fire and indiscriminate mining operation.

v. Nistar Working Circle:

Both Mr. Sarangi and Mr. Prasad continued the Nistar working Circle with 22 F.S. They changed the rotation from 30 years to 40 years. Retention of minimum number of 12 standards per acre and all advance growth up to 10-cm. diameter was prescribed. Sowing and planting was prescribed in open and eroded blanks after main felling. Regeneration cleaning was also prescribed. At 10th and 25th year following main felling, thinnings were prescribed. Grazing control and fire protection measures were also prescribed.

Mr. Mohapatra observed either no working or very irregular working in many Nistar Felling Series. It was because of non-availability of exploitable materials, heavy illicit felling and less public demand. The retention of advanced growth was totally ignored. No proper assessment of the growing stock was made while framing the Felling Series and laying out coupes. At the time of Mohapatra's plan, almost all forest blocks assigned to this working circle were in a much-degraded stage.

vi. Plantation Working Circle:

In Mr. Sarangi/Mr. Prasad's plan, three planting series covering 1444.8 ha were formed. The object was to rehabilitate and afforest the depleted 'B' class R.F. of Salapada and Jyotipur and



to harvest the mature plantations in Nuniapatna and Hatibandha followed by replanting of the forest blocks. But these forest blocks are not under the purview of current plan. Hence, these are excluded from further analysis.

vii. Mining Working Circle:

Both Mr. Sarangi and Mr. Prasad formed this Working circle with the following objectives.

- a) To clear the forest growth in advance of mining operation.
- b) To maintain a vegetative cover over the mining lease areas except the mine faces as measure of soil and water conservation.
- c) To maintain vegetative cover over the idle mine faces and mines-spoils to prevent erosion.
- d) To manage forests to get as much financial return as possible.

This working circle covered an area of 3792.7 ha with three felling series. Coppice system was prescribed with a rotation of 40 years. Out of the three felling series, namely Bolani F.S. TISCO F.S. and O.M.C. F.S. covering a part of Karo, Baitarani and Rebena R.F. respectively, coupes were opened in Bolani and TISCO F.S. while no work was done in O.M.C. F.S. Although the main objective of management was to exploit forest growth before mining operations were started but Mr. Mohapatra observed that, this had not been possible due to lack of co-ordination between Forest department and mine owners.

viii. Soil conservation working Circle:

Mr. Sarangi and Mr. Prasad created this working circle covering a part of Rebena R.F. and extending over an area of 8837.2 ha. This was previously included in Protection Working Circle in Lal's plan. The prescriptions were mainly Improvement fellings, which included both Selection and Improvement marking. Climber cutting, Contour bonding, Contour trenching and Gully plugging. Mr. Mohapatra observed no action on the prescription under this working circle.

11.2.5 Mohapatra's Plan:

Mr. Mohapatra was assigned to prepare the working plan of Keonjhar Division for the period from 1984-85 to 1993-94. As per Mr. Mohapatra, the Prasad's plan was a complete failure and only revenue oriented. So, Sri Mohapatra took up the work, balancing the revenue as well as silviculture and prescribed 05 working circles with the following objectives.



- To conserve and improve forest cover especially on hilly slopes for soil and water conservation, improvement of eco-system, environmental protection and stability.
- To cater the need of the local people for timber, firewood, fodder and other forest products.
- To rehabilitate and enrich the depleted forest to scientific management, to attain normalcy as far as practicable and increase the proportion of more valuable species.
- To preserve and enrich the forest flora and fauna for sustainable utilization.
- Consistent with the above objectives to achieve progressively increased yield of timber, firewood and other forest products and ensure maximum economic return.

Mr. Mohapatra had prescribed 05 numbers of Working Circles. Those are as follows.

- i) Sal Conversion Working Circle.
- ii) Selection Working Circle.
- iii) Coppice Working Circle.
- iv) Plantation Working Circle.
- v) Rehabilitation Working Circle.

a) Sal Conversion Working Circle:

Mr. Mohapatra kept Karo and Siddhamath Forest Blocks under this working circle due to comparatively plain area having good regeneration. He excluded Compartment No.1 to 6 of Karo from this working circle because of the steep hills and mining activities. He observed that trees of 150 cm g.b.h in this area were not available. The regeneration survey indicated that the regenerated crop was mainly from coppice origin. Since Sal grows best in an even aged crop, Mr. Mohapatra prescribed to convert the existing irregular crops to one even aged stand to get optimum yield per ha. To achieve this goal, he constituted 2 Felling series namely Karo and Siddhamath. The gross area allotted to this working circle was 9871.16 ha (3941.19 ha for Karo, 5929.97 ha for Siddhamath). Sri Mohapatra suggested implementation of Indian Irregular Shelter wood system of working in this working circle. Out of six periodic blocks P.B.I, P.B. II, P.B. V and P.B. VI were definitely demarcated. P.B. III and P.B. IV were clubbed together as P.B. Inter. He suggested to retain young poles up to 20 cm. dia. and some healthy and promising stems between 30 to 50 cm d.b.h in P.B I areas. In P.B II areas, no felling was prescribed except removal of uprooted and dead trees for promotion to P.B I.

The system of felling prescribed for P.B. Inter was selection felling with thinning in congested patches. Thinning and climber cutting along with removal of dead, uprooted



and unpromising stems were prescribed in P.B. V areas. The P.B VI area generally consisted of the worked-out area of the last plan. Therefore, thinning and cleaning were prescribed for them. Thinning was prescribed at 10th and 20th year with enrichment planting in blanks and eroded areas. From the yield table it was found that Sal reaches an average crop diameter of 42 centimetres in 120 years. Availability of big size timber gradually reduced for which he fixed the rotation at 120 years. Conversion to uniform system in Sal forests of this division started with Lal's Plan (1945-46) with a rotation of 140 years. Mr. Mohapatra also fixed the rotation period at 120 years taking into account the fact that, it was difficult to get suitable areas for allotment to P.B.I in view of slow pace of regeneration. He observed from yield table that the mean annual increment terminated at 85 years and remained constant up to 95 years at 2.10 m³ per acre. At 120 years the M.A.I falls to 2.01 m³ per acre. The fall in M.A.I was insignificant. Hence fixing of rotation at 120 years was correct. In P.B II area, the object was mainly to create suitable condition of light and aeration on the forest floor for better germination of seeds. Also, prescriptions were made for judicious opening in top storeys to facilitate natural regeneration. Since there was no felling in P.B. II area, there would be no yield. Only prescriptions were made for removal of dead, uprooted and definitely hollow trees.

P.B Inter was allotted to the areas having irregular middle-aged and immature crop. The object of management was to improve the quality of crop, to remove and utilize trees which would not remain sound till the area passed to P.B I and to accelerate regeneration. P.B. Inter embraced both P.B III and P.B IV which were difficult to be distinguished. The area, which had been converted during Mr. Lal's plan were kept under P.B V. Regeneration was adequate, though S.S.O was completely neglected during last plan. No felling was prescribed in this P.B except removal of dead, uprooted and visibly hollow trees. Climber cutting was prescribed all over along with C and D grade thinning in Sal areas. The area worked under P.B I during Mr. Lal's plan was kept under this P.B. Mr. Mohapatra provided detailed area statement. The aim of this P.B was to tend the pure patches of crop and small patches of eroded blanks for better regeneration in future. This P.B was termed as P.B last. The yield was regulated by area. Prescriptions to remove all dead, uprooted and visibly hollow trees were made. C and D grade thinning was also prescribed for young crop. Over wood of 50cm dia. and above was prescribed for removal provided there were at least 4 to 6 poles of 10m height were surrounding it. Ban was imposed on cutting of fruit bearing trees, trees in Nala (river) banks and eroded gullies. Climber cutting and control on fire were prescribed as S.S.O. Mr. Mohapatra emphasized that, a complete stock map of the area should have to be done soon after thinning and cleaning, which would indicate the area to be taken



up for artificial regeneration. He suggested for fire protection definitely for five years after cleaning and thinning. Artificial regeneration was prescribed where Sal regenerations were less than 600 established Sal poles per ha. The area allotted to P.B VI should be rigidly protected against grazing.

Due to such continuous conversion system, larger size trees were removed. At many places permanent gaps in the canopy were created and in some areas there were congestion also. Mr. Mohapatra suggested for strict S.S.O measures and heavy restriction of grazing, fire and biotic interference but those were not followed. The prescriptions of plantation in eroded blanks were not carried out anywhere. Due to periodic block system, the matured trees were removed and lower girth class trees were heavily congested which badly hampered the diameter growth of the trees and thereby required yield could not be attained. Due to removal of bigger size trees the natural regeneration also hampered. Further, due to moratorium imposed by Govt. felling was banned from 1992-93. It was observed that at places like Sidhamatha RF the crop was highly congested in the areas along NH 215. In other areas, there were very inadequate regeneration. Many sound trees were illicitly removed in these areas. Hence, the purpose of converting this area into a regular uniform system failed. Mr. Mohapatra had excluded Compartment No. 1 to 6 of Karo RF as those are steep hills. But he included Comp. No.8, 9, 10,13, 14, 15,16, 21 & 22 of Karo RF and Comp. No.15 to 22 of Sidhamatha RF in this working circle which were also having larger areas in hill slopes with steep to moderate gradient. But these areas were unsuitable to be kept under uniform system.

b) Selection Working Circle:

Mr. Mohapatra continued the areas allotted for this working circle to remain as such. In addition, he kept Atei, Barabanka R.F.s under this circle where the crop was defective and unsound. The plain forests of Telkoi previously worked under Improvement Working circle was brought to Selection system. He emphasized to keep poor quality and defective Sal areas under this circle. Therefore, he included Bandhanjhari, Benamunda, Jharbeda, Ranibeda, Kodbil and Krushnapur under this circle. The main objectives were to protect, maintain and improve forest cover on hill slopes in the interest of soil and water conservation, to improve the composition of principal species through sound silvicultural system, to encourage natural regeneration through proper tending operation and to maintain a balanced uneven aged crop.

Mr. Mohapatra, while constituting this working circle possibly did not consider the crop condition in various Felling Series. The crop condition in Kalapat North, Kalapat South, Kalapat East, Kalapat West, Ranibeda, Bandhanjhari, are comparatively better than the



rest of the areas under this Working circle. Even, the crop conditions in the later areas were mostly defective and unsound. Those should have been kept in Rehabilitation Working Circle. In Kalapat North F.S, out of 11 compartments, 9 compartments were having a very poor crop. Therefore, those should have been retained in Rehabilitation Working Circle. Lower exploitable girth for Sal was fixed at 30 cm d.b.h in some of the forests; which led to heavy exploitation of Sal. The Sal regeneration was badly hampered which ultimately led this area to a miscellaneous crop. Because of fixation of the lower exploitable girth, heavy marking and felling occurred leading to heavy removal of sound and unsound trees. Whatever trees left as mother trees, were of smuggling worth and hence illicitly removed. Further, due to imposition of moratorium, the coupe working was stopped from 1992-93. Therefore, the objectives of Mr. Mohapatra could not be fulfilled.

c) Coppice Working Circle:

In view of the degraded conditions of the Khesra forests and 'B' class R.Fs and in order to meet the day-to-day demand of the public, Mr. Mohapatra created this working circle comprising Uliburu, Part of Thakurani, Baitarani, a part of Atei near Mellan village along with 'B' class R.F.s like Basantapur, Ghatagaon, Balipokhari, Pipilia, Poipani, Sarupat and Kalimati R.F. He abolished the Nistar Working Circle prescribed by Mr. Prasad. Because of poor vegetation, unfavourable condition for working the forest blocks like Baitarani 'B', part of Atei (BiraGovindapur F.S.) part of Thakurani and most of the 'B' class R.F. were excluded from this Working Circle.

Many mining leases, M.I.P.s and other developmental projects started in Thakurani, Baitarani 'A' and Ulliburu. Heavy biotic interference and easy accessibility into the forests were also there in these areas. In spite of this Sri Mohapatra had marked a very good regeneration in these blocks and kept them under Coppice with reserve system, as there was no other alternative. The main objectives of the prescription were to meet the local demand for small timber, poles, firewood and industrial requirements of poles, pit-props, tram line cogging and Charcoal and to gain maximum yield. Mr. Mohapatra did not consider the growth of population. As these forests were having easy accessibility, these forests did not sustain to the demand of the over population. Therefore, slowly and gradually, the small timber and pole crops were illicitly removed and finally converted the tract into a bushy forest. The regenerations as observed by Sri Mohapatra were not actually from seed origin rather those were from coppice origin. The situation was so aggravated that, by the time the working started, some of the coupes like Pipilia, Ghatagaon, Basantapur were treeless. Subsequently due to heavy public demand forests like Thakurani, Baitarani and Mellan became open forest after 1991-92.



d) Plantation Working Circle:

Mr. Mohapatra selected some bushy forest areas having a soil of low moisture retention capacity with a good drainage system under this working circle. Once upon a time, these areas were having a good Sal Forest and subsequently turned into bushy forest with miscellaneous crop due to heavy biotic interference. All of them are situated mostly on planes or gentle slopes and fringes of Atei R.F. The main objective of this working circle was to bring back the value of the forest by replacing the inferior species with plantation of species like Teak, Semul and Bamboo and to restock the open forest with the valuable species. The prescription as well as the choice of species except Semul by Sri Mohapatra was correct. But the objectives could not be achieved in practical due to various retarding factors like inadequate allotment of funds etc. Emphasis should have been given for plantation of bamboo with teak to satisfy both commercial and fodder purpose.

e) Rehabilitation Working Circle:

Mr. Mohapatra included all the degraded forest blocks except Ghatgaon, Balipokhari, Basantapur, Kalimati, Sarupat, Poipani and Pipilia in this working circle and abolished Soil Conservation Working Circle and Mining Working Circle of Mr. Prasad. Though plantations were raised, in most of the blocks in small and scattered patches, its existence was very poor due to want of post planting operations, protection against grazing, fire and other biotic interferences. The main objectives of this working circle were to restock the barren, eroded and depleted areas and to tend the existing growth. Water conservation and soil conservation measures were to be taken up to check erosion and denudation. Steep hill slopes devoid of vegetation were to be rehabilitated. Adequate protection against biotic interferences such as theft, fire, grazing was to be taken up. Mr. Mohapatra suggested retaining and tending of all existing growth except dead and up rooted trees. The species, he suggested for plantations were Khair, Chakunda, Gohira, Karada, Siddha, Babool, Rohini, Mahula, Bamboo, Sisoo and Sabai grass. He also suggested for mixed plantation of fruits, oil seed and fodder bearing trees in the proximity of villages. In this category he suggested Subabool, Agasti, Mango, Tamarind and Jackfruit species for plantation. The prescriptions were very sound from the socio-economic angle. But it could not be implemented due to paucity of funds.

11.2.6 Narayan Samal' Plan:

Mr. Narayan Samal, AIFC, OFS-1 has revised the Working Plan of Keonjhar Division for the period from 2007-08 to 2016-17 which was provisionally approved for three years i.e. for the year 2011-12, 2012-13 and 2013-14 and was not approved in toto. The following Working Circles / Regulation were prescribed in the Working Plan.



- i) Selection Working Circle.
- ii) Improvement Working Circle.
- iii) Plantation Working Circle.
- iv) Rehabilitation Working Circle.
- v) Village Forest Working Circle.
- vi) JFM Working Circle
- vii) Wildlife (Overlapping) Working Circle.
- viii) NTFP (Overlapping) Working Circle

- The Principal Objectives of Management Outlined in the Samal's Plan are:
- Maintenance of environmental stability through preservation and where ever necessary, restoration of ecological balances that has been adversely disturbed by depletion of forest cover. As such, regulated felling of trees shall be confined to removal of dead, dying, up rooted and Silviculturally available trees.
- To increase forests and vegetal cover to help checking of soil erosion in hill slopes and denudation of catchments and riverbanks, water bodies and reservoirs by maintenance of permanent closed cover.
- To maintain the hydrological cycle and to regulate water yields.
- To conserve the natural heritage by preserving vast variety of flora and fauna, maintain biodiversity and genetic resources of the division.
- To improve the condition, composition and productivity of the forests through appropriate scientific management and increased investment.
- To meet the requirement of fuel wood, fodder, MFP and small timber of the rural and tribal population without putting additional pressure on the forest.
- To supplement sustainability and the livelihood security of the people, living in and around it.
- To create massive awareness amongst the people with the involvement of women for achieving these objectives and minimizing pressure on forest.
- To provide employment opportunity to the rural people, particularly weaker sections of the society through above-mentioned conservation-oriented activities.
- Not to look upon forest as a source of revenue.
- To bring the non-forest areas having forest growth to the management fold of the Department and to increase the forest cover.



a) Selection Working Circle:

The area, where the crop density is more than 0.4 has been allotted to this working circle. This area is found suitable in 05 Reserve Forest and 01 Proposed Reserved Forest having good growth with mature tree and re-generation. The total area allotted to this Working Circle is 26174.5302 ha which constitutes 20.35% of the total Working Plan area. The area allotted to this Working Circle is mainly Sal dominated. The quality of the Sal varies from All India site quality III to IV.

The Special objective of Management of Selection Working Circle:

- (a) To improve the growing stock and stand structure by appropriate silvicultural operations.
- (b) To improve the floristic-diversity of the forests.
- (c) To remove mature and silviculturally available trees before they become unsound.
- (d) To help natural regeneration and establishment of indigenous species endemic to the area.
- (e) To cater to the needs of the people to the extent possible.
- (f) To protect the hillside from soil erosion and to increase the moisture regime to regulate and augment the flow of water in the river system by following the principle of water shed management.

Silvicultural System Adopted: The Silvicultural system adopted is Selection-Cum-Improvement felling. The tending and cultural operation is also prescribed to improve the growing stock and induce sustainable re-generation. A felling cycle of 10 years had been prescribed. The exploitable girth of all species is 150 cm and above. The Yield has been calculated by Smythie's Safeguard formula.

Implementation of SWC area: In SWC area 03 felling series and 30 coupes have been constituted. The implementation of the prescription in the SWC annual coupe is given in Table No. 11.1.



Table No 11.1 Area allotted to coupe working & Result.					
Year	Felling Series	Coupe No.	Total Area	Coupe Worked Out	Out Turn in No./ Cum
2007-08	Kaliahata	I	645.9304	0	0
	Padanga	I	1218.7399	0	0
	Talapada	I	1464.5924	0	0
2008-09	Kaliahata	II	592.0706	0	0
	Padanga	II	881.7597	0	0
	Talapada	II	339.3512	0	0
2009-10	Kaliahata	III	1086.3518	0	0
	Padanga	III	1223.6473	0	0
	Talapada	III	557.5538	0	0
2010-11	Kaliahata	IV	1172.5678	0	0
	Padanga	IV	989.6605	0	0
	Talapada	IV	661.7435	0	0
2011-12	Kaliahata	V	960.3145	960.3145	183.1752
	Padanga	V	909.2003	909.2003	145.2211
	Talapada	V	553.2168	553.2168	164.9499
2012-13	Kaliahata	VI	655.3063	655.3063	55.5624
	Padanga	VI	2484.2314	2484.2314	103.5068
	Talapada	VI	628.0097	628.0097	148.4544
2013-14	Kaliahata	VII	469.4347	469.435	38.7156
	Padanga	VII	408.3542	408.354	84.2582
	Talapada	VII	782.8060	782.806	265.138
2014-15	Kaliahata	VIII	509.8227	509.8227	33.7008
	Padanga	VIII	345.2093	345.2093	178.4071
	Talapada	VIII	795.3593	795.3593	187.1103
2015-16	Kaliahata	IX	927.3484	927.3484	119.9055
	Padanga	IX	515.8886	515.8886	25.7785
	Talapada	IX	750.7947	750.7947	58.2410
2016-17	Kaliahata	X	1437.3115	1437.3115	128.0261
	Padanga	X	1229.8612	1229.8612	146.6489
	Talapada	X	978.0917	978.0917	83.7531
Total			26174.53	15340.56	2150.553

As the plan was not approved the working in other working circles not followed as per prescription, hence not discussed.

The annual Schemes were prepared & followed on adhoc basis.



11.2.7 Management under Annual working Schemes:

For preparation of next plan PWPR has been approved vide Memo No 1145/11F (SFM)-33/2014 dated 17.01.2017. As the plan preparation has been delayed, the forest working has been regulated under annual schemes from 2017-18 to 2021-22. The approved target and achievement is furnished at Table No 11.2.

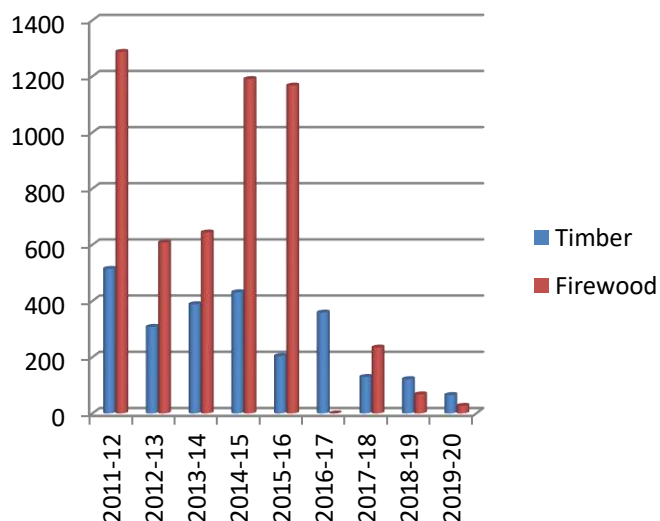
11.2 Target & Achievement as per working Schemes. Keonjhar Division								
Working Circle	Year 2017-18		Year 2018-19		Year 2019-20		Year 2020-21	
	Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement
Selection WC	10840.96	2204.02	1223.6473	1223.6473	2823.9718	989.6605	0	0
IWC	0	0	0	0	0	0	7590.3464	0
RWC / Eco Restoration	1325.9470	0	14414.3563	700	10327.6405	2642.9035	3497.3810	1526.1986
PI WC	414.322	0	3419.594	0	3419.594	0	3419.594	88.3455

11.4 Past Yield, Revenue and Expenditure:

11.4.1 Past Yield:

The past yield has been discussed under chapter 7. The timber & firewood obtained during last 10 years is furnished below.

Table No 11.3 Past Yield (Timber / Firewood)		
Year	Timber Produce d in cum	Firewood in ton
2011-12	513.755	1287
2012-13	307.524	607.5
2013-14	388.112	643.5
2014-15	430.606	1190.25
2015-16	203.922	1167
2016-17	358.428	0
2017-18	129.555	234
2018-19	121.721	67.5
2019-20	65.1951	27





11.4.2 Revenue and Expenditure:

The revenue received & expenditure incurred during plan period in this division is as given at Table No 11.4

Table No.11.4 Revenue & Expenditure			
Year	Revenue in lakh	Expenditure in Lakh	Ratio Rev: Exp
2007-08	190.01731	378.39177	13:88
2008-09	116.64050	492.96016	19:81
2009-10	209.95164	558.41206	27:73
2010-11	83.90068	573.35620	13:87
2011-12	69.82092	522.66663	12:88
2012-13	124.86187	749.79026	14:86
2013-14	102.16734	845.05189	11:89
2014-15	101.55727	938.17325	10:90
2015-16	107.73131	1040.16085	9:91
2016-17	580.80669	1302.11844	30:70
2017-18	132.07799	1251.97252	10:90
2018-19	83.45676	990.54563	8:92
2019-20	139.4654	1071.46043	12:88
2020-21	125.91515	928.07855	12:88

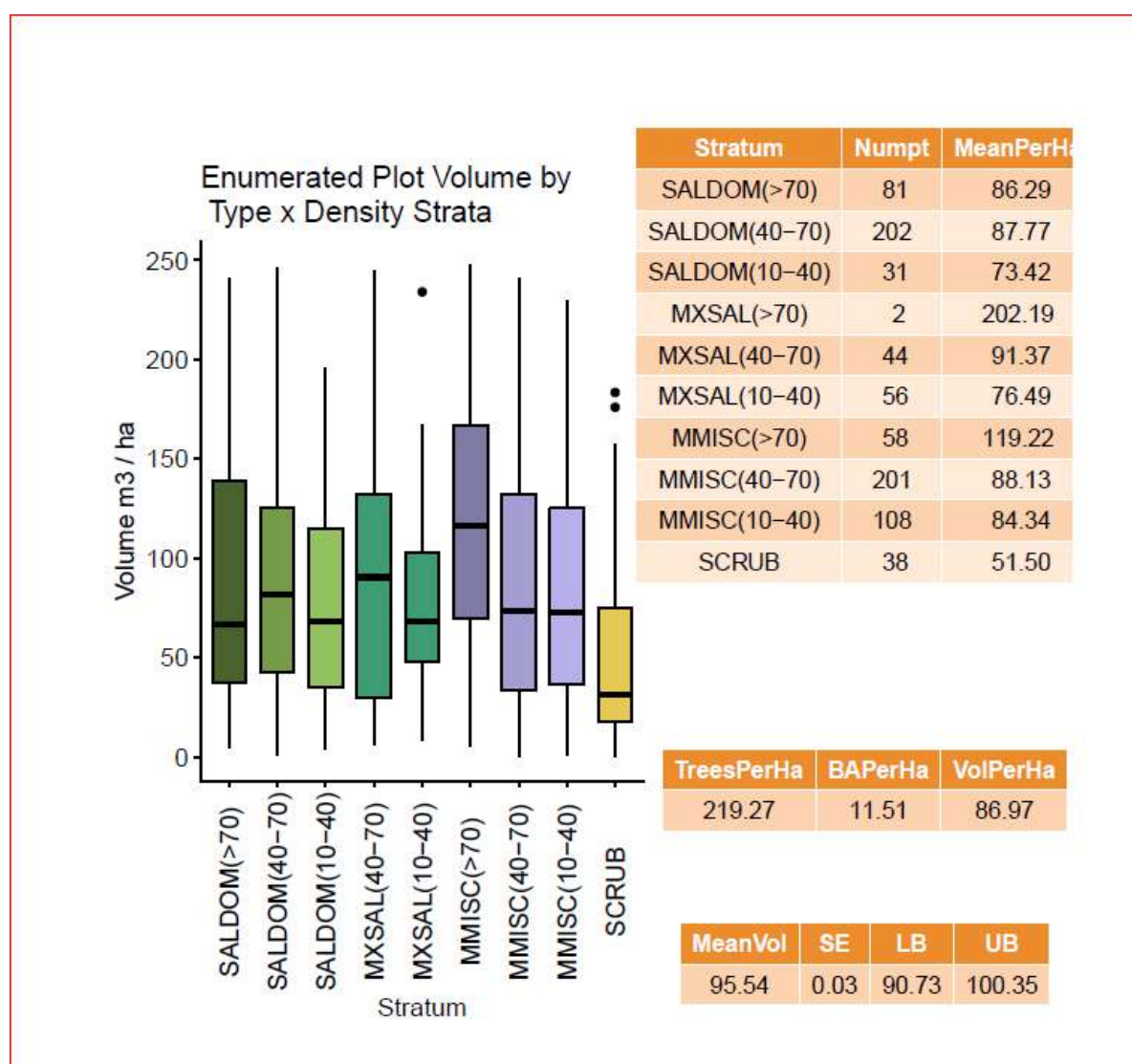


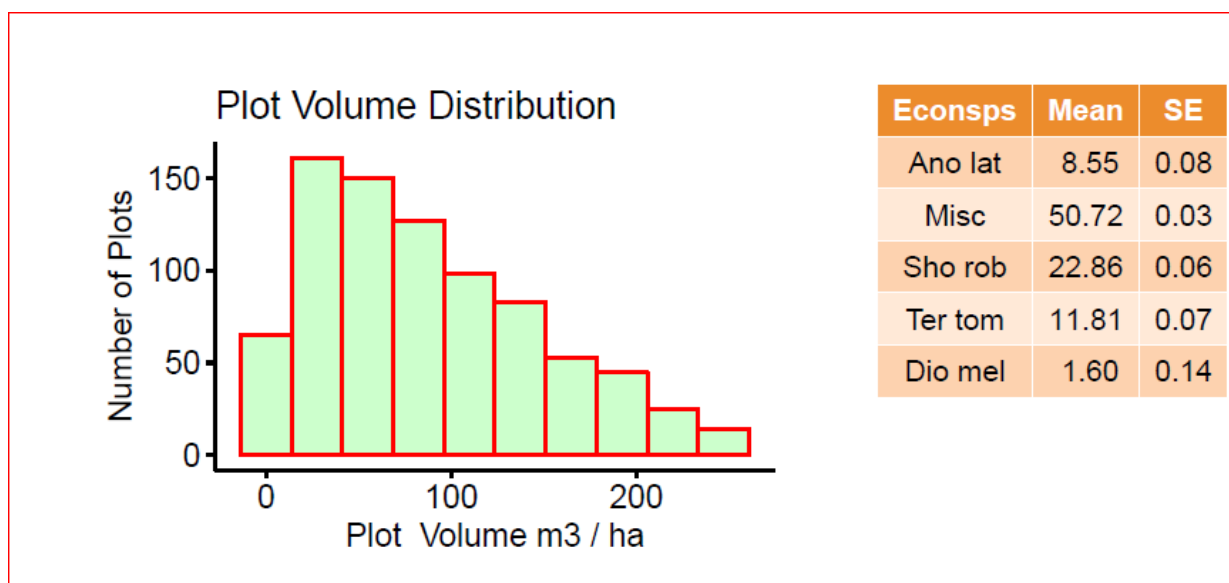
CHAPTER – 12

STATISTICS OF GROWTH AND YIELD

12.1 Statistics of Forest Carbon Stock:

Keonjhar Forest Division is one of the good moist forests of the State. It is a combination of Plane Forests, Hill Forests, Valley Forests and Riperian Forests. To assess the Growing stock Sample enumeration has been taken up over 920 points. Analysis by NRSC has been carried out over 854 Sample points through various modeling by NRSC, Hyderabad. The growing stock has been assessed. The relevant portion is furnished below to indicate the growing stock position in Keonjhar Division.





The overall crop density and other parameters have been assessed and furnished at Table No 12.1

Table No 12.1 Stand volume parameters – Keonjhar Division						
Criteria						
No of trees / ha	Basal Area per ha (M ³)	Volume per Ha (in M ³)	Mean Volume (in M ³)	Standard Error	LB (in M ³)	UB (in M ³)
388.46	14.21	111.32	119.29	0.02	114.56	124.02

The Overall crop density and area under each density class has been furnished by ORSAC. The details are as given below (Table No 12.2).

Table No 12.2 Forest Area under Different density Class (Sal & Non sal)					
Category	Area under different Density class (in Ha)				Total
	>70%	40-70%	10-40%	<10%	
Sal Forest (SFC)	6875.65	7956.08	8894.65	1391.70	25118.08
No of Plots in SFC	84	89	86	6	265.00
Non Sal Forest (Non- SFC)	4397.95	32684.09	67078.43	17093	121253.47
No of Plots in Non SFC	17	311	232	29	589.00
Div. Total					
Area (All)	11273.60	40640.17	75973.07	18484.71	146371.55
Sample plots	11	400	318	35	854.00
%	7.70	27.77	51.90	12.63	100.00



12.2 Annual Increment:

Field exercise has been conducted to find out the increment of important timber species like Sal, Bija, Asan, Arjun, and Teak. The Age has been ascertained, it's Girth at Breast Height and Top height measured.

The GBH and height have been taken from field observation and calculating the average of number of data. The volume has been calculated from Quarter Girth Formula with 70% of the tree height. The average Annual increment of few important species has been predicted below.

Table No: 6.7 Average Annual increment of few important species

Name of Species	Growth in in cum					Annual increment predicted in Cum
	10-20 Yr	20-30 Yr	30-40Yr	40-50 Yr	50-60Yr	
Sal	0.02655	0.346908	0.28793	0.618398	0.995039	0.045497
Bija	0.068848	0.12334	0.27832	0.396387	0.648105	0.0303
Asan	0.15082	0.367031	0.577969	0.69	1.0425	0.056566
Arjun	0.145079	0.446425	0.712149	0.657187	1.058907	0.060395
Dhaura	0.158614	0.483691	0.614414	0.295781	0.457969	0.040209
Teak	0.066225	0.184287	0.665738	1.06395	1.296007	0.065524

**12.2.1 Forest Block Wise Carbon Stock:****Table 12.4(a) (RF) Carbon stock of each Forest Block**

Sl No	Name of RF	Area in Ha(Notified)	Growing Stock Cum/ ha	Density T/ Cum	Total G. Stock in 10 ³ Tons	Carbon Equivalent in 10 ³ T	CO ₂ equivalent 10 ³ T
1	Kandra A	6.6300	114.56	0.7	0.532	0.207	0.760
2	Kandra B	136.3800	114.56	0.7	10.937	4.265	15.639
3	Kandra C	81.3400	114.56	0.7	6.523	2.544	9.328
4	Karo (C1-C22)	5107.7100	119.29	0.7	426.509	166.339	609.908
5	Sidhamatha (C1-C29)	5970.9400	119.29	0.7	498.591	194.451	712.986
6	Thakurani	4679.9500	119.29	0.7	390.790	152.408	558.830
7	Uliburu	1499.8100	119.29	0.7	125.239	48.843	179.091
8	Anjar	196.4941	119.29	0.7	16.408	6.399	23.463
9	Gadgadei	218.0103	114.56	0.7	17.483	6.818	25.000
10	Jagar	155.9472	119.29	0.7	13.022	5.079	18.622
11	Kanjipani	726.9460	114.56	0.7	58.295	22.735	83.362
12	Khajurimundi	180.6000	114.56	0.7	14.483	5.648	20.710
13	Mundala	432.0270	114.56	0.7	34.645	13.512	49.543
14	Saharpur	834.3484	114.56	0.7	66.908	26.094	95.679
15	Baitarani-A	2358.9900	114.56	0.7	189.172	73.777	270.516
16	Baitarani - B	1278.4400	114.56	0.7	102.521	39.983	146.605
17	Balibandha	920.6900	114.56	0.7	73.832	28.794	105.580
18	Bardhana	944.5600	114.56	0.7	75.746	29.541	108.317
19	Jyotipur	882.2400	114.56	0.7	70.749	27.592	101.170
20	Kalikaprasad	1416.4500	114.56	0.7	113.588	44.299	162.431
21	Lakshmiposi	866.8600	119.29	0.7	72.385	28.230	103.511
22	Mooney	89.0300	119.29	0.7	7.434	2.899	10.631
23	Naibuga	309.8300	119.29	0.7	25.872	10.090	36.997
24	Pedipokhari	1487.2700	119.29	0.7	124.192	48.435	177.594
25	Ukhunda	946.5900	119.29	0.7	79.043	30.827	113.032
26	Atei (P) C-11 -C49)	16658.8800	119.29	0.7	1391.066	542.516	1989.225
27	Badmasinabila	66.2200	119.29	0.7	5.530	2.157	7.907
28	Balipokhari	1011.7500	119.29	0.7	84.484	32.949	120.812
29	Barabanka(P) C4-C14	5694.6800	119.29	0.7	475.523	185.454	679.998
30	Ghatagaon	810.8100	119.29	0.7	67.705	26.405	96.818
31	Kalimati	914.6200	119.29	0.7	76.374	29.786	109.214
32	Masinabila	473.4900	119.29	0.7	39.538	15.420	56.539
33	Nalapanga(p)	352.8800	114.56	0.7	28.298	11.036	40.466
34	Pipilia	796.0404	119.29	0.7	66.472	25.924	95.055



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35	Balabhadrapur	746.6700	119.29	0.7	62.349	24.316	89.159
	Barabanka(B) C1-C3 & C15- C17)	2308.6600	119.29	0.7	192.780	75.184	275.675
36	Basantapur	1187.7900	119.29	0.7	99.184	38.682	141.833
37	Belda	1059.9000	119.29	0.7	88.505	34.517	126.562
38	Jadipada	1329.8400	119.29	0.7	111.046	43.308	158.795
39	Maidankel	872.5300	119.29	0.7	72.859	28.415	104.188
40	Narayanpur	1702.9750	119.29	0.7	142.204	55.459	203.351
41	Nayagarh	2842.6100	114.56	0.7	227.955	88.902	325.975
42	Nelung	624.0400	119.29	0.7	52.109	20.323	74.516
	Nalapanga(B) (C2)	834.1000	119.29	0.7	69.650	27.163	99.599
43	Raghunathpur	1273.1808	119.29	0.7	106.314	41.463	152.030
44	Raikala	690.0100	119.29	0.7	57.618	22.471	82.394
45	Sarupat	317.6800	119.29	0.7	26.527	10.346	37.934
46	Tangarani	594.8971	119.29	0.7	49.676	19.374	71.036
47	Barbil	17.8600	124.02	0.7	1.550	0.605	2.217
	Atei(B)(C1-10)	3967.5500	119.29	0.7	331.302	129.208	473.762
48	Lakshmiposi (P)	30.2900	119.29	0.7	2.529	0.986	3.617
49	Baunsuli	629.3000	119.29	0.7	52.548	20.494	75.144
50	Belapasi	46.1000	124.02	0.7	4.002	1.561	5.723
51	Billa-A	43.0800	119.29	0.7	3.597	1.403	5.144
52	Budhikapudi 'II'	21.7100	124.02	0.7	1.885	0.735	2.695
53	Chadheibhol	48.8800	119.29	0.7	4.082	1.592	5.837
54	Chemena-A	26.8900	124.02	0.7	2.334	0.910	3.338
55	Ninua	60.5800	119.29	0.7	5.059	1.973	7.234
56	Padmapur	795.6400	119.29	0.7	66.438	25.911	95.007
57	Palaspada	14.7200	119.29	0.7	1.229	0.479	1.758
58	Patna	1193.8600	119.29	0.7	99.691	38.879	142.558
59	Poipani	533.7900	119.29	0.7	44.573	17.383	63.739
60	Pradhanpada	21.0600	119.29	0.7	1.759	0.686	2.515
61	Purunapani	180.5200	119.29	0.7	15.074	5.879	21.556
62	Rasapada	9.9500	119.29	0.7	0.831	0.324	1.188
63	Sarasposi	13.4800	119.29	0.7	1.126	0.439	1.610
64	Tando	15.5400	119.29	0.7	1.298	0.506	1.856
65	Bandhanjhari C 1-C5)	2666.5600	124.02	0.7	231.495	90.283	331.037
66	Benamunda (C1-C5)	2783.9300	124.02	0.7	241.684	94.257	345.608
67	Dhanurjaypur	85.2700	119.29	0.7	7.120	2.777	10.182



68	Chhamunda-Golabandha	41.5000	119.29	0.7	3.465	1.351	4.955
69	Jharbeda	1274.8000	119.29	0.7	106.450	41.515	152.223
70	Kalapat (C1-C39)	21488.3500	124.02	0.7	1865.490	727.541	2667.650
71	Kodbil (C1-C3)	1558.0900	119.29	0.7	130.105	50.741	186.050
72	Krushnapur (C1-C2)	620.0000	124.02	0.7	53.825	20.992	76.969
73	Mankadchua (C1-3)	682.3200	119.29	0.7	56.976	22.221	81.475
74	Ranibeda (C1-C4)	2868.9100	124.02	0.7	249.062	97.134	356.158
75	Salaikena Siriabahal-Kalapokhari	89.4599	124.02	0.7	7.766	3.029	11.106
76	Samakoi	679.8924	124.02	0.7	59.024	23.019	84.405
77	Tamango	1362.6424	124.02	0.7	118.296	46.136	169.164
Divn. Total		118764.8610	9524.28	0.7	9980.327	3892.328	14271.868

Table No 12.(b) (PRF) Carbon Stock

Sl No	Name of PRF	Area in Ha. (Notified)	Growing Stock Cum/ ha	Density T/ Cum	Total G. Stock in 10 ³ Tons	Carbon Equivalent in 10 ³ T	CO2 equivalent 10 ³ T
1	Amuni	50.5990	114.56	0.7	4.058	1.582	5.802
2	Bayakumutia	118.0000	114.56	0.7	9.463	3.690	13.532
3	Champey	363.8700	114.56	0.7	29.179	11.380	41.727
4	Danla	170.7000	114.56	0.7	13.689	5.339	19.575
5	Digachampey	170.0100	114.56	0.7	13.633	5.317	19.496
6	Dumuridiha	501.9600	114.56	0.7	40.253	15.699	57.562
7	Gandhamardan	2296.0000	114.56	0.7	184.121	71.807	263.293
8	Gonasika	334.3900	114.56	0.7	26.815	10.458	38.346
9	Gouda champey	447.3700	119.29	0.7	37.357	14.569	53.420
10	Lunaghar-I	131.6800	114.56	0.7	10.560	4.118	15.100
11	Lunaghar-II	360.9400	114.56	0.7	28.945	11.288	41.391
12	Raiguda	489.3800	114.56	0.7	39.244	15.305	56.119
13	Suakati-I	475.3900	114.56	0.7	38.122	14.868	54.515
14	Suakati-II	134.9700	114.56	0.7	10.824	4.221	15.478
15	Baitarani East 'A'	154.1400	119.29	0.7	12.871	5.020	18.406
16	Baitarani East 'B'	309.2000	119.29	0.7	25.819	10.069	36.921
17	Khajuribani	3575.4000	119.29	0.7	298.557	116.437	426.936
18	Budhikapudi 'I'	31.0200	119.29	0.7	2.590	1.010	3.704



19	Dublupal	88.2300	119.29	0.7	7.367	2.873	10.535
20	Godhihudi	78.8700	119.29	0.7	6.586	2.568	9.418
21	Rekuti	275.3000	119.29	0.7	22.988	8.965	32.873
22	Renda	1282.4000	119.29	0.7	107.084	41.763	153.130
23	Sikheswari	3105.5000	124.02	0.7	269.601	105.144	385.529
24	Syamanali Koilisuta	341.4900	119.29	0.7	28.515	11.121	40.777
	Total PRF	15286.8090			1268.242	494.614	1813.586

Table No 12.(c) (DPF) Carbon Stock

Sl No	Name of PRF	Area in Ha. (Notified)	Growing Stock Cum/ ha	Density T/ Cum	Total G. Stock in 10 ³ Tons	Carbon Equivalent in 10 ³ T	CO ₂ equivalent 10 ³ T
1	Murgabeda	518.2300	114.56	0.7	41.558	16.208	59.428
2	Jamirta	313.6505	114.56	0.7	25.152	9.809	35.968
3	Kankana	170.2168	114.56	0.7	13.650	5.324	19.520
4	Rugudi	368.5764	114.56	0.7	29.557	11.527	42.266
5	Mahaparbat	343.9900	114.56	0.7	27.585	10.758	39.447
6	Nandijhari	1950.6500	114.56	0.7	156.427	61.006	223.690
7	Barach	1211.8200	114.56	0.7	97.178	37.900	138.965
8	Kapaspada	80.3289	114.56	0.7	6.442	2.512	9.212
9	Khajurijuani	95.7075	114.56	0.7	7.675	2.993	10.975
10	Tara (B)	74.1329	114.56	0.7	5.945	2.318	8.501
11	Badajamuposi	32.3700	114.56	0.7	2.596	1.012	3.712
12	Katarabeda	91.3600	114.56	0.7	7.326	2.857	10.477
13	Mahuldiha	34.5000	114.56	0.7	2.767	1.079	3.956
14	Tara (A)	141.7400	114.56	0.7	11.366	4.433	16.254
15	Tarinipokhari	3.4800	114.56	0.7	0.279	0.109	0.399
16	Bijabahal (A)	18.3531	114.56	0.7	1.472	0.574	2.105
17	Binjabahal (B)	19.8303	114.56	0.7	1.590	0.620	2.274
18	Madhyapur	101.5797	114.56	0.7	8.146	3.177	11.649
19	Oriya	161.0948	114.56	0.7	12.919	5.038	18.473
20	Barhagarh	165.9200	114.56	0.7	13.305	5.189	19.027
21	Bimla-Jharbeda	157.8300	114.56	0.7	12.657	4.936	18.099
22	Binjabahal (C)	140.8300	114.56	0.7	11.293	4.404	16.150
23	Dhenkiswari	690.0100	114.56	0.7	55.333	21.580	79.127
24	Kukudiamba	522.0600	114.56	0.7	41.865	16.327	59.867
25	Kalimasirigida	56.6500	114.56	0.7	4.543	1.772	6.496
26	Padanga	664.9200	114.56	0.7	53.321	20.795	76.249
27	Shyamakud Birabarapur Nuagaon	182.1100	114.56	0.7	14.604	5.695	20.883



Revised Working Plan of Keonjhar Division for the period 2022-23 to 2031-32

28	Tangurubahal	493.8400	114.56	0.7	39.602	15.445	56.631
29	Guptaganga	179.1081	114.56	0.7	14.363	5.602	20.539
30	Katira	483.7163	114.56	0.7	38.790	15.128	55.470
31	Taramakanta	417.5775	114.56	0.7	33.486	13.060	47.886
32	Kalanda	1060.8620	114.56	0.7	85.073	33.178	121.654
33	Kakharua	1240.0730	114.56	0.7	99.444	38.783	142.205
34	Karuagarh	690.0100	114.56	0.7	55.333	21.580	79.127
35	Khandadhar	1956.4480	114.56	0.7	156.891	61.188	224.355
36	Kuanr	2080.6917	114.56	0.7	166.855	65.073	238.602
37	Thakurani	1027.9300	114.56	0.7	82.432	32.148	117.877
38	Pamdadhar Bayakumutia	259.4390	114.56	0.7	20.805	8.114	29.751
39	Sanaghagara(B)	792.8602	114.56	0.7	63.581	24.797	90.921
40	Sunduria	753.7537	114.56	0.7	60.445	23.574	86.436
41	Kumundi(B)	88.6200	114.56	0.7	7.107	2.772	10.162
42	Sanghagara (A)	583.8400	114.56	0.7	46.819	18.260	66.952
43	Siddhamath	1112.6787	114.56	0.7	89.228	34.799	127.596
44	Machhagarh	14.3668	114.56	0.7	1.152	0.449	1.648
45	Mushkhori (A)	50.8829	114.56	0.7	4.080	1.591	5.835
46	Billa (B)	50.5000	114.56	0.7	4.050	1.579	5.791
47	Billa (C)	44.1300	114.56	0.7	3.539	1.380	5.061
48	Chemena II	23.9700	114.56	0.7	1.922	0.750	2.749
49	Dhanaberi	28.3200	114.56	0.7	2.271	0.886	3.248
50	Karanjiapada	13.1500	114.56	0.7	1.055	0.411	1.508
51	Khajuridiha	20.2300	114.56	0.7	1.622	0.633	2.320
52	Nayajagannathpur	42.0800	114.56	0.7	3.374	1.316	4.826
53	Pitamaza	149.7300	114.56	0.7	12.007	4.683	17.170
54	Saharapada	57.6600	114.56	0.7	4.624	1.803	6.612
55	Mushakhori (B)	72.2146	114.56	0.7	5.791	2.259	8.281
56	Barigaon (A)	30.6200	114.56	0.7	2.455	0.958	3.511
57	Barigaon (B)_	194.3900	114.56	0.7	15.589	6.080	22.292
58	Bhandaribilla	20.4700	114.56	0.7	1.642	0.640	2.347
59	Bhadabahali	40.4700	114.56	0.7	3.245	1.266	4.641
60	Dhanurjayapur	44.3700	114.56	0.7	3.558	1.388	5.088
61	Kumudabahali	68.2700	114.56	0.7	5.475	2.135	7.829
	Total	22499.2134			1804.257	703.660	2580.087

**Table No 12.4 (d) Carbon Stock of PF & VF Keonjhar Division**

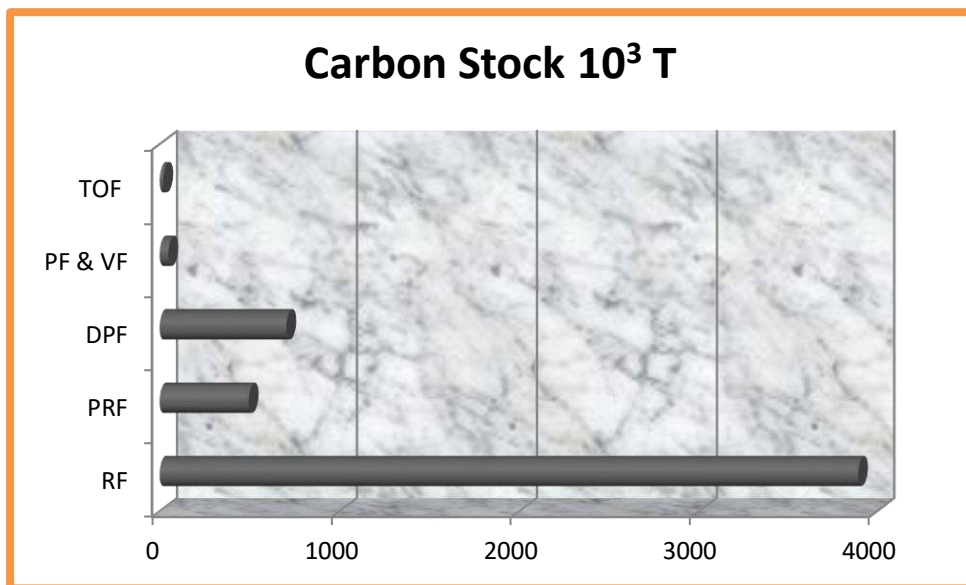
Sl No	Name of PRF	Area in Ha. (Notified)	Growing Stock Cum/ ha	Density T/ Cum	Total G. Stock in 10 ³ Tons	Carbon Equivalent in 10 ³ T	CO ₂ equivalent 10 ³ T
1	Protected Forest	2678.0710	35.0	0.6	56.239	21.933	80.422
2	Village Forest	2678.341	42.0	0.6	67.494	26.323	96.517
	Total	5356.412			123.734	48.256	176.939

12.2.2 Carbon Stock (For TOF Plantations):**Table No 12.4 (e) Carbon Stock of PF & VF Keonjhar Division**

Sl No	Name of PRF	Area in Ha. (Notified)	Growing Stock Cum/ ha	Density T/ Cum	Total G. Stock in 10 ³ Tons	Carbon Equivalent in 10 ³ T	CO ₂ equivalent 10 ³ T
1	Mixed Plantation	1817.54	42.0	0.6			
2	Teak Plantation	190.0	32.0	0.68			
3	Avenue Plantation 576 RKM = 90 ha	90	25.0	0.6			
	Total	2097.54			51.286	20.002	73.340

12.2.3 Total Carbon Stock of the Division:**Table No 12.5 Carbon Stock Keonjhar Division**

Forest / Category	Growing Stock in 10 ³ T	Carbon Stock in 10 ³ T	CO ₂ Equivalent in 10 ³ T
Reserved Forests	9980.327	3892.328	14271.868
PRF	1268.242	494.614	1813.586
DPF	1804.257	703.660	2580.087
PF & VF	123.734	48.256	176.939
TOF	51.286	20.002	73.340
ToTal	13227.846	5158.86	18915.82



The total Carbon stock estimated to be 5158.86×10^3 T which is equivalent to 18915.82×10^3 T of Carbon Dioxide.

It will be the objectives of this plan to enhance Carbon sink through more biomass production and reduced carbon loss due to fire and removal of timber.





REVISED WORKING PLAN
KEONJHAR FOREST DIVISION
PART-II



FOR THE PERIOD 2022-23 TO 2031- 32

BY

SRI SUSHIL KUMAR NAYAK, OFS-A (SB)

WORKING PLAN OFFICER, KEONJHAR



CHAPTER-13

BASIS OF PROPOSALS

13.1: Objectives of Management:

The Forests of Keonjhar Division mostly consists of Moist Deciduous Sal, Dry Deciduous Sal Forests and Mixed Forest. The Baitarani River flows from West to East and it touches the boundary of B & JP, Barbil, Keonjhar, Champua, Patna and Gatgaon Range. River Samakoi originates from boundary of Keonjhar district Telkoi Range and joins with the Brahamani River in Khamar Range of Deogarh Division (Pallahara Sub Division of Angul District).

Hadagarh Reservoir is situated on the eastern part of the division. Its catchment is partly in Keonjhar division. Hadagada Reservoir has been constructed on the river Salandi in Anandapur Sub-division of Keonjhar district. The dam encompasses huge water source for the area for irrigation purpose. A splendorous natural environment with high mountains range beautify the reservoir which is eye catching for natural lovers.

Keonjhar Forest Division is bounded by Karanjia Division & Jharkhand State on North, Deogarh Forest Division & Dhenkanal Forest Division on South, Keonjhar (WL) Division, Anandapur on East & Bonai Forest Division on West. Keonjhar Division has its common boundary over 498.7 Km with four Territorial Division, one Wildlife Division and Jharkhand State.

Karo –Karampada Elephant Corridor (Inter-state Corridor) and Telkoi–Palhara Elephant Corridor are within the Keonjhar Division jurisdiction. The movement of elephant is influenced by both the elephant corridors, Hadgarh Wildlife Sanctuary and River Baitarani. Singbhum Elephant Reserve (Jharkhand State) is on the northern side and elephants movement from Elephant Reserve to Keonjhar District / Division is observed throughout the year especially in crop ripening & harvesting period. Due to heavy mining in Joda- Badbil- Koira iron belt, the movement of elephant in this part of the division is erratic. The cropping pattern is also responsible for frequent crop raiding by elephant.

The Rail line from Daitari-Banspani is bisecting the elephant movement zone. Now Rail line is being expanding from single line to double line and there is possibility of construction of third line in future. Similarly the NH Road from Panikoili –Rimuli-Rajamunda NH20 / NH520 and being upgraded to 4 lanes and work is in progress. Besides above projects fragmenting the elephant movement zone, there are numbers of high power transmission lines (Rengali –Baripada line) in the division.



There are pressures on forests due to upcoming industries, mines in Champua, Barbil and B&JP Range. These industries are likely to put pressure on both forest land and resources.

All these factors are to be taken in to consideration during management prescriptions.

13.1(I): Dynamics of Forests and Stands.

Forest is a living dynamic entity and changes its species composition, growth pattern, bio diversity in passage of time. This plan aims at

- To enhance species composition towards a climatic climax species of more important and of valuable species.
- To ensure Annual Biomass Production is sustainable throughout the plan period so as to ensure a specific quantum of carbon sequestration.
- To enhance Bio-Diversity of a Forest through various management practices & proper documentation.
- To ensure sustainable & dependable production of timber / fuel wood and other available forest produce.
- To enhance availability of NTFP species by conservation, natural regeneration and follow a systematic sustainable harvesting practices.
- To create forests near to habitations / industrial houses to control effect of GHG (Green House Gases)

13.1(II): Forests and Soil:

The Forests and soil condition and its fertility are like two sides of a coin. Forest enriches the soil organic content and as the soil marched forward, the forest luxuriance also marched forward. When the soil is degraded for many reasons, gradually the forest condition & vegetation is degraded. The soil condition & forest covers moves hand in hand. In order to keep the soil health high this plan sets the following objectives to be achieved.

- To follow appropriate management practices to protect the soil against erosion.
- To protect the hill slopes and Forest floor against erosion and restore the humus in forest floor.
- To Protect River banks against erosion and save riparian forests.
- To protect forests against drivers of forest degradation with special importance to Soil conservation.
- To check soil erosion in forest floor – sheet erosion, Rill erosion, Splash erosion, Gully and ravine formation.



- To maintain Soil cover of any form – mostly of woody vegetative / grass cover in forests i.e. enriched undergrowth.
- To maintain adequate humus layer on forest floor.
- To implement appropriate Soil conservation measures to check siltation in Reservoirs.
- To reduce the grazing pressure on forest.

13.1(III): Forests and Water.

The forests are the store house of water. All the rivulets / springs are originating from forests. The flow of water in springs and rivulets depends upon water holding capacity of Forest floor. Recharge of ground water table mostly depends upon runoff time, conditions for percolation of surface water. Reduced time of collection of runoff water enhances the flood menace in rivers. Availability of surface water also decides the carrying capacity of wildlife of any forest. The composition of forests mostly depends on water regime of forest floor. The objectives set out for this plan are

- To protect and maintain thick vegetation at the catchment area of rivers / reservoirs, springs and rivulets.
- To treat the catchment area of water body within the forest block or outside to enhance water holding capacity and enhance flow of water in Rivers, Springs and Rivulets.
- To create new water body within the forest blocks and preserves the existing wet land inside the forests and outside.
- To ensure flow of water in springs – especially those are in the catchment area of River Baitarani.
- To create water body to impound the running waters & enhance utilization of water to a greater extent.

13.1(IV): Forest Bio-diversity.

The natural forests of importance rich in Bio- Diversity are confined to moist forests of the division mostly in Kalapat, Atei, Barabanka, Karo and Part of Ghatgaon range adjacent to Hadgarh Wildlife Sanctuary. The vegetation is of moist Sal forest with riparian vegetation along the river banks. The rich floral diversity requires protection and enrichment. This plan aims

- To preserve bio diversity of natural forests,
- To take appropriate steps to prepare Bio- Diversity Register of the locality.
- To prevent mono culture practices in plantations only on economic consideration.



- To encourage natural regeneration in forest blocks.
- To have Concept of Bio- Diversity park grow among the staffs / villagers.

13.1(V): Climate and Forests:

The relation between climate and forests is complementary to each other. The climate influences the forest composition and forest ameliorates the climate of an area in a larger context. During recent past, loss of forests has its effect on climate and a change in climatic behavior is being experienced. Extreme climatic conditions like high rainfall, low rainfall, Cyclonic storm, merging of seasons to summer and rain only are frequently experienced. Duration of other seasons likes autumn, Dew, winter and spring has been marginalized and sometimes not felt. In order to combat climate change the following objectives has been outlined for this plan. These are

- To improve the crop density of forest vegetations.
- To increase tree cover outside the conventional forest land i.e. TOF.
- To reduce emission of Green House Gases at source through public cooperation and create new carbon sink through Farm Forestry / Urban Plantation.
- To bring Village Woodlots of erstwhile **Social Forestry Project** to the management fold and **enhance forest cover & carbon sequestration**.
- To reduce fuel wood dependency by introducing alternate / renewable source of energy through VSS / EDC constituted under JFM Resolution.
- To enhance Solar Energy generation & utilization than conventional energy i.e. fossil fuels, Petroleum etc.

13.1(VI): Socio-economic Considerations and generation of forest based employment opportunities and livelihood options:

Forest Management is not confined to departmental personnels only. It has encompassed community participatory management practices since 1985 and more effectively thereafter. JFM resolution - 1993 has brought revolutionary changes in participatory Forest Management which has been further fortified in JFM Resolution 2011. This resolution (2011) provided a wider scope for participatory forest management, encompassing the Revenue Forests for joint management with villagers. The Committee is designated as **Vana Surakshya Samiti (VSS)** for forests and **Eco-Development Committee (EDC)** for Sanctuary, National Park and other Protected Areas. EDC are actively involved in management of Eco-Tourism, Nature Camps and Tourist Resorts/ barracks/ Complexes. The Panchyat Raj Institutions (PRI) is also involved in the process of Joint Forest Management in accordance with the JFM Resolution 2011. The objectives intended to be fulfilled / achieved in this plan are as follows.



- To involve VSS in forest management for assigned Forest Fringe areas.
- To enhance / support various forests based livelihood and employment opportunity.
- To strengthen usufruct share ring mechanism for interim / final harvested forest produce from the assigned area.
- To arrange Skill development training camps for VSS on Value addition to NTFP and other Forest Produce.
- To support the VSS to change from traditional fuel wood use to renewable energy resources.
- To protect traditional knowledge / cultural practices and help in documentation of traditional knowledge related to Forest, NTFP and Forest based medicinal practices.
- Strengthening of Village Forest Management through VFC (Village Forest Committee) constituted during erstwhile Social Forestry Project (1985-2003)
- To Involve VSS in Preparing “Peoples Biodiversity Register” and preserve and enhance biodiversity of the area.

13.1(VII): Tools for integrated development:

For overall development of Forest resources / TOF in the division dovetailing of various developmental schemes, make use of modern technology in forest management, Nursery raising, tissue culture etc are required to be implemented / use by Forest personnel. The department is to work hand in hand with the District Administration. Development in Veterinary & Animal Husbandry Sector, Soil Conservation and Water Resource Department are to be integrated with forest activities to make it more scientific, effective and more acceptable for the developing situation. This plan aims

- To develop Forest resources through various Schemes like MANREGA, DPAP, NAP, DMF etc.
- To improve Planting stock through Tissue Culture, other Vegetative Propagation and root trainer nursery.
- To identify and protect plus trees and create improved genetic pool,
- To identify important Seed stand for different important species and improve genetic value & quality of species available in the division.
- To imbibe knowledge on first growing technology in Agriculture / soil conservation to improve forest growing stock.
- To use Satellite related output for forest management with the help of ORSAC, National Institutes of Remote Sensing & Space Application / Forest Research Institute etc.



- Digitization of all forest blocks under administrative control of Forest department and Revenue department.
- To introduce management practices in all revenue forest areas through working schemes.

13.1(VIII): Performance Indicators for different objectives of management(PI)

In order to assess the performance on above outlined broad objectives, a set of performance indicators (PI) has been indicated below. It is required to evaluate / assess the performance in a periodical basis. First year of the Plan (2022-23) may be taken as base value and subsequent results may be compared to evaluate the achievements. The measurable / assessable parameters / attributes are furnished in **Table No 13.1** below.

Table No. 13.1 Sustainable Forest Management: Criteria & Indicators

Sl. No.	Indicators	Norm	Unit of measurement	Periodicity
1	Area of forest under different forest acts management plans	1/3rd of the geographical area should be under forest and tree cover. No decrease in forest area of FMU	Km ² or ha	10 years
2	Change in the area of forest cover (dense, open, scrub-forest, pastures, desert etc.)	There should be improvement of crop density on a time scale basis i.e. open forest to MDF and MDF to DF	Km ² or % of increase	5 years
3	Change in tree cover outside the forest	Tree planting needs to be encouraged on non-forest land, community land and along railway line, canal and roadside etc.	Numbers or converted into ha.	5 years
4	Protected area network	It is desirable to have 5% of the geographical area and 15% of the forest area to be under PA.	Number of prominent habitat and their area	10 years
5	Species diversity	Existing species of animals and plants of the unit area (PA/FMU) should be maintained.	Number of species of plants and animals	10 years
6	Genetic diversity	The uniqueness of the species of plants and animals should be documented and areas should be protected for their existence.	Number of occurrences (species) denoting the area and their details.	10 years
7	Status of Biodiversity conservation in forests	Appropriate silvicultural operations to assist wildlife management and ensure that no viable population of plant species intensively exploited	Working plan area and % of total area	10 years



8	Status of species prone to over exploitation	Harvesting time and level of such species should be prescribed and implemented	Number of species	10 years
9	Status of non-destructive harvest of wood	Areas where such problems are prevailing need to be assessed in terms of area and percentage	Ha. or %	10 years
10	Status of non-destructive harvest of NTFP	Maturity period and regenerative capacity of identified species should be recorded. Based on this information and in consultation with stake holders harvesting time and extent of harvest should be fixed.	Number of species	10 years
11	Status of regeneration	Number of seed origin seedlings should be recorded to determine the state of natural regeneration. The number/range may vary as per FMU level working plan prescriptions.	% forest area having adequate regeneration	5 years
12	Area affected by forest fire	Forest fire management should be integral part of forest working plan and efforts should be made to minimize and manage the forest fire and losses.	Area affected in ha. or % of forest area burnt in each state/FMU	1 years
13	Area damaged by natural calamities	Frequency and extent of area affected should be documented for planning management interventions to minimize the impact.	Ha.	2 years
14	Area protected from grazing	Forest areas under regeneration operations should be notified as closed area for grazing. In other areas which are open to grazing, the number of livestock should be restricted to the carrying capacity of the area. For this purpose, the carrying capacity of the areas need to be assessed	% of forest area	10 years
15	Area infested by invasive weeds in forest	Proper control mechanism should be there to check weed infestation	% area affected	10 years
16	Incidences of pest and diseases	Forest areas prone to such damages should be documented and mapped for applying necessary control measures.	% of forest area and affected species	5 years



17	Area treated under soiland waterconservation measures	Degraded/prone to soil erosion forest areas are generally identified in working plan. They should be treated strictly as per working plan prescriptions and their impact should be periodically monitored and reported.	% forest area	5 years
18	Duration of water flow in the selected seasonal streams	Flow periodicity of major streams need to be recorded at the periodic intervals and should be mapped for national reporting.	Number of perennial streams and duration of water flow	5 years
19	Water bodies and wetlands in forest area	Major water bodies (number and area) in forest areas should be recorded and properly maintained.	Number and area of wetlands in forest area	5 years
20	Water level in the wells in the vicinity (upto 5 km) of forest area	Average ground water level in the wells during past 3-5 years should be recorded to indicate state of forest management and rainfall pattern of the region.	% area indicating the ground water level at the existing or increasing level.	5 years
21	Growing stock of wood	Benchmark/standard (minimum acceptable standard – MAS) for growing stock of major forest types needs to be identified and state of growing stock should be compared with these standards	M ³ /ha.	10 years
22	Annual Increment in volume of identified species of wood	Increment of principal timber species in different forest types is available for comparison. Such data can act as benchmark for comparison.	M ³ /ha.	10 years
23	Effort towards enhancement of forest productivity, areas brought under high-tech plantations	Area under high-tech plantations in each division and state and consequent enhancement in productivity should be recorded.	Area in ha. and productivity in m ³	5 years
24	Extent of seed production area and seed orchards	Extent of seed production areas and seed orchards, number of plus trees etc. should be continually developed to meet the requirement.	Area (ha.) seeds in quintals and plus trees in numbers	5 years



25	Recorded removal of timber	Annual collection should not exceed average annual increment put by growing stock. Total removal by all means should be compared with annual prescribed yield by WP	M ³ or ft ³	5 years
26	Recorded removal of fuel wood	Proper recording of fuel wood removed by community from FMU should be made. Only fallen and dead branches and twigs to be collected by forest dwelling communities. Total removal should be compared with the annual prescribed yield by WP	Number of head loads collected from FMU or quintals or ton harvested	5 years
27	Recorded removal of Bamboo	Efforts made to meet the local bamboo requirement. Total removal by all means should be compared with the annual prescribed yield by WP	Number of culms extracted/distributed	5 years
28	Recorded removal of locally important NTFP	Annual collection of non-timber biomass should not exceed average annual production and average production of the division should be maintained. The total removal of NTFP by all means should be compared with the annual prescribed yield under the Working Plan.	Kg, Metric tonnes	5 years
29	Direct employment in forestry activities	Local communities should be engaged for forestry activities.	Employment generated (man days)	5 years
30	Demand and supply of Timber and important Non-Timber Forest Products	Efforts should be taken to reduce the gap between demand and supply of Timber and Non-Timber Forest Products. Demand and supply studies at periodic intervals need to be done at the National level also	Production unit of various forests products and demand of local community	5 years
31	Import and Export of wood and wood products	Export and import data of wood and wood products should be maintained with their economic values in uniform units of measurements	Production units of various forest wood and products	2 years
32	Import and Export of NTFP	Enhance the value by value addition and export of NTFP	Value	2 years



33	Value and % age contribution of forestry sector to Gross Domestic Products (GDP)	Efforts should be made to collect and report actual contribution of forests to national GDP.	%	5 years
34	Number of JFM committees and area protected by them	Forest area to the extent possible should be under participatory management regime.	ha.	5 years
35	Status of people's participation in the management and benefit sharing	High Percentage (at least 60%) of participation and regular meetings held. Woman and Self-Help Group participation is critical for success	Number of meeting and % of participation and gender equity	5 years
36	Use of indigenous knowledge	Different communities living in and around forest have different type of indigenous knowledge. Extent of their applications in maintaining biodiversity and forest management should be recorded and incorporated in micro plans.	Illustration use of indigenous knowledge in preparation of micro plans through conservation of biodiversity and sustainable forest management. Extent of documentation of indigenous knowledge	5 years
37	Extent of Cultural/Sacred groves	Information on the area/species and communities involved in the conservation and maintenance should be documented and communities should be encouraged & supported in their efforts.	Affirmative action	5 years
38	Existence of Policy and Legal framework.	Provisions of policy and legal framework should be largely complied.	Affirmative action	5 years
39	Status of approved working plans	All the forest division/FMU should have approved WP in operation	Affirmative action	5 years
40	Number of forest related offences	Number of forest offences should show declining trend.	Number and category of forest related offences.	5 years



41	Status of research and development	Increasing financial investment in R&D; researchers and number of research projects/thematic studies	Amount, projects, technology transferred	5 years
42	Human resource capacity building efforts	Adequate and appropriate training modules for each level of officials, communities and other stakeholders are to be planned and implemented.	Number of training programs, participants and expenditure.	5 years
43	Forest resource accounting (FRA)	Detailed data on different products, services and their values should be maintained as per the valuation; methods to develop the guidelines for this purpose.	Volumes/numbers/monetary values	5 years
44	Budgetary allocations to the sector	Budget allocation should be as per the requirement given in the WP.	Amount	5 years
45	Monitoring and Evaluation mechanisms of forestry development activities.	Evaluation of changes as per the prescribed norms. The deviations, if any, from the policy and legal framework needs to be explained.	As per indicators	5 years
46	Status of data collection, information dissemination and utilization.	Institutional mechanism for the purpose to be developed.	As per requirements.	5 years
47	Adequate man power in FMU	Proper balance of age and gender in the existing hierarchy.	Number of personnel and work-man days ratio.	5 years



13.2: Method of treatment to be adopted:

The forests of Keonjhar Division are broadly categorized in to six categories i.e.

- i) Moist Peninsular valley Sal Forest having site quality (III/IV/V) in most blocks.
- ii) Dry Deciduous mixed forests with biotic interference.
- iii) Forests assigned to VSS for Protection, Enrichment & Management.
- iv) Village Forests of erstwhile Social Forestry Project.
- v) Economic Plantations (Mostly Teak) in some blocks.

13.2.1 Natural vegetations having Crop Density > 40%

Forest Blocks having good Sal and Miscellaneous crop previously managed under Selection system and Improvement working circle and the Crop Density is above 40% at present. The crop consists of all age classes and having good regeneration. The forests previously under Selection system will be managed under Selection Working system and the forests previously managed under Improvement Working Circle will be managed under Improvement concept / system. All such blocks constitutes around 68.33% of the Forest under management and proposed to be managed under **Selection WC and Improvement Working Circle separately.**

13.2.2 Natural vegetations having Crop Density <40%.

The Forest Blocks having natural vegetation and crop density less than 40% is proposed to be treated for Rehabilitation of Degraded Forests with the help of VSS. The treatment for these forest blocks to enhance the regeneration of natural species in normal silvicultural practices i.e. High Forest System mixed with Aided Natural Regeneration, Soil & Moisture Conservation, and Strict protection against fire and closed to grazing. These Forests will be managed under **Rehabilitation Working Circle.**

13.2.3 Plantations Raised within Forest Blocks.

Under various plantation schemes, plantations have been raised in forest blocks in as and when approach. Mixed plantations in small patches has merged with natural vegetation and enriched the crop. For mixed plantations raised within natural forests **“as enrichment Plantations”** in forests will not specially managed rather will be treated at par with natural vegetation. The Teak Plantations (Economic Plantations) will be managed to improve its growth status through silvicultural practices (Thinning).

The plantations raised under Social Forestry Project during 1985-2003 will also be brought to management fold. The system to be adopted for SFP plantations is clear felling with standard. Similarly Plantations raised under Compensatory Afforestation and



declared as Protected Forest will also be managed at par with SFP Plantation. All these forests will be managed under **“Plantation Working Circle”**. There are encroachments in forest blocks. Steps will be taken to make such area free from encroachment and bring under plantation program.

13.2.4: Management of Fragile & Sensitive Areas:

There are forest blocks on the upper catchment area and in and around the origin of River Baitarani (Baya kumtia PRF, Gonasika PRF, Talabaitarani PF which are highly Eco Sensitive Zone. These Forest blocks are to be maintained as “No Disturbance Zone” and will be managed under **“Protection Working Circle”**.

13.2.5 Management of shifting (podu) cultivation:

Shifting Cultivation is generally noticed in B&JP Range of the Division. Although shifting cultivation in some area of Ghatgaon Range and Telkoi Range are noticed, they are very negligible. It will be managed under Podu Reclamation Working circle.

13.2.6 Management of Non-Timber Forest Produce:

Forests of Keonjhar division are having Siali leaf, Sal Leaf, Sal seeds, Siali fiber, Myrobalance, Mango, Kendu, Char, Mahula and important MAP (Medicinal & Aromatic Plants). The forest blocks with rich Bio-Diversity harbor NTFP species of local importance. The Tribal's knowledge in traditional treatment depends upon herbs / shrubs found in forests. It will be managed under **“NTFP (Overlapping) Working Circle”**.

13.2.7 Management of Wildlife:

There is no wildlife sanctuary in Keonjhar Division. Karo- Karampada Elephant corridor and Telkoi-Pallahada Elephant Corridor has been identified in Keonjhar Division. Keonjhar Division as a whole, considered to be a good migratory area due to Baitarani River in one side and Hadgarh Wildlife sanctuary in other side. Two prominent elephant corridors i.e. Karo- Karampada (inter-state) and Telkoi- Pallahar (interdistrict) are required to be managed to maintain the elephant smooth passage. Congregation of winter birds on wetlands attracts local people. For management of Wildlife an **Overlapping Working Circle** will be constituted and the problems related to wildlife management will be addressed suitably.

13.2.8: Participatory Forest Management:

Forest fringe villages have been assigned with responsibility of Protection & Management of Forests and Wildlife under provisions of Joint Forest Management Resolution -2011 and subsequent amendment -2015 and 2019. **“Aama Jungal Yojana”** is also being implemented and being managed by Village Forest Committee constituted



under provisions of Village Forest Rule-1985. These forests will be managed under Participatory Forest Management in JFM Mode. These forests except those of SIDA Assisted Social forestry plantations will be considered & managed under **JFM (Overlapping) working Circle. SIDA Assisted Social Forestry Plantations** will be managed under provisions of Village Forest Rule 1985 in JFM Mode also.

13.2.9 SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis:

SWOT stands for Strengths, Weaknesses, Opportunities, and Threats, and so a SWOT analysis is a technique for assessing these four aspects of the Division.

Threat: (T)

- (i) Threat to the Forest (Both Natural and Biotic) under Chapter 2 Para 2.5
- (ii) Threat to Animals / wildlife (Chapter3, Para 3.7)
- (iii) Species subjected to Over Exploitation (Chapter 3, Para 3.4)
- (iv) Forest Degradation & its drivers. (Chapter4, Para 4.8)
- (v) Shifting Cultivation (para 2.8 chapter 2)
- (vi) Massive Mining activities in the Division (Para 4.9.8)

Weaknesses: (W)

- v) Inadequate Man Power (Cadre Strength) Chapter 9, Para 9.10)
- vi) Budgetary provisions (In adequacy described under Para 9.7, Chapter 9)
- vi) Mining is a development and Revenue earning activities. Balancing on Environment & Mining requires to be maintained.

Opportunities: (O)

- vii) Provisions for Preparation & approval of Site Specific Wildlife conservation Plan and availability of additional Resource.
- viii) Availability of funds under MANREGA at district level.
- ix) AJY (Aam Jungal Yojana), OFSDP Phase-II being implemented.



- x) Additional Fund Flow under DMF from State Govt and Central Govt.
- xi) Use of Satellite / modern technology for detection of Forest Fire, large scale felling and related study through Google Earth.
- xii) Skill up gradation / development training courses for Staff/ VSS members (Para 9.5 Chapter-9)

Strength: (S)

- xiii) Adequacy of Legal Provisions (Chapter 9, Para 9.1)
- xiv) Provisions for deployment of additional man power through Squads / DEO,
- xv) Availability of Modern technology for forest management.
- xvi) Improved communication facilities (VHF, Video Conferencing, Mobile applications, Mobile networks)
- xvii) Modern Nursery techniques and improved planting techniques.

These are Strength Opportunities Weaknesses and Threat (SOWT) basing on which the future management will be prescribed. .

13.2.10: Management of Forest Resource outside the Forest area:

Tree Outside the forest (TOF) has been enriched through various plantation programs under different schemes (State plan, Central Plan, Special Schemes). Road side Plantations / Avenue Plantation has been created for aesthetic value. There is a high level meeting / discussion to constitute a Working Circle namely "Development Working Circle" on 13.02.2019. After discussion / deliberations, it is decided to constitute a working Circle to manage Forest Resource outside the Forest area vide letter no 3628/11F (SFM)-15 / 2018 dated 26.02.2019. **(Annexure-XIV)**. This working circle will comprise the forests created outside the forest area including Avenue Plantations, other plantations of first growing species, other need based plantations like Fuel wood and Fodder Plantations, National Afforestation Program i.e. Plantations taken up under FDA Program. Regulating guidelines for TOF management will be embodied in the "TOF Working Circle".

**13.3: Constitution of Working Circle**

With the guiding factors as stated above and taken in to consideration it is felt to have the following working circles for scientific management of available forest resources of the Division.

- i. Selection Working circle (28563.4757ha)
- ii. Improvement working circle(71156.9206ha)
- iii. Rehabilitation working circle(38113.4625ha)
- iv. Plantation working circle(8234.3647ha)
- v. Protection working circle(448.3916ha)
- vi. Podu Reclamation (Overlapping) Working Circle (1086.0ha)
- vii. Non-Timber Forest Produce (Overlapping) Working circle (141223.2031ha)
- viii. Wildlife (Overlapping) Working circle (141223.2031ha)
- ix. Joint Forest Management (Overlapping) Working circle(35735.0809ha)
- x. TOF Working circle (2007.54 haand 576 RKM Avenue plantation)

13.3.1 Comparison of area proposed for Management vis- a- vis outgoing Plan:

Table No 13.2 Comparison of Area under management in Outgoing Plan vrs Current Plan					
Category of Forests	Area under Out Going Plan	Total area in Ha	Area under this Plan	Total area in ha	Remark
Reserved forest	115755.2302	128623.0698	112899.1035	146516.6151	Besides RF and PRF; DPF, PF and VF are considered for management in this plan
Proposed Reserved forest	12867.8396		14965.2026		
Demarcated Protected Forest			13358.8970		
Protected Forest			2678.071		
Village Forest (u/s30 of OFA, 1972)			2615.341		

The area allotted to different Working circle is furnished below (Table No 13.3 (A) and 13.3 (B) and at **Annexure -XV** .

The Divisional Area Statement is at Annexure-XVI.

Table No 13.3 (A) Forest Blocks and area available for Management in ha



Sl No	Name of the Forests	Comp No	Comp Area (GIS Comp.)	Diverted under FC Act		Area Available for management in ha
				FC Act	FRA	
	RESERVE FOREST					
	Badbil Range					
	Forest Block					
1	Kandara-A		6.6300			6.6300
2	Kandara-B		136.3800	28.738		107.6420
3	Kandara-C		81.3400			81.3400
4	Karo	1	300.8464	104.25	0.37	196.2264
	Karo	2	285.3134	98.76		186.5534
	Karo	3	386.7091	97.258		289.4511
	Karo	4	258.1584	99.258		158.9004
	Karo	5	235.9982	108.214		127.7842
	Karo	6	314.9166	107.256		207.6606
	Karo	7	301.5457	88.49		213.0557
	Karo	8	341.7948	88.236		253.5588
	Karo	9	210.7609	89.247		121.5139
	Karo	10	176.1359	115.42		60.7159
	Karo	11	176.1514	96.358		79.7934
	Karo	12	184.0122	88.913		95.0992
	Karo	13	292.0040			292.0040
	Karo	14	104.1279			104.1279
	Karo	15	135.8676			135.8676
	Karo	16	73.0508			73.0508
	Karo	17	93.2023			93.2023
	Karo	18	79.8511			79.8511
	Karo	19	212.3228			212.3228
	Karo	20	240.9238			240.9238
	Karo	21	550.9151			550.9151
	Karo	22	83.6114			83.6114
	Total Karo		5038.2198	1181.6600	0.3700	3856.1898
5	Siddhamatha	1	135.6073			135.6073
	Siddhamatha	2	196.3312	94.586		101.7452
	Siddhamatha	3	163.4125			163.4125
	Siddhamatha	4	220.9424	102.357		118.5854
	Siddhamatha	5	66.0095			66.0095
	Siddhamatha	6	181.8248	98.377		83.4478
	Siddhamatha	7	115.3415			115.3415
	Siddhamatha	8	125.0182	49.257		75.7612



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	Siddhamatha	9	72.5169			72.5169
	Siddhamatha	10	93.0014	44.215		48.7864
	Siddhamatha	11	198.2547			198.2547
	Siddhamatha	12	348.6024	50.213		298.3894
	Siddhamatha	13	121.2498			121.2498
	Siddhamatha	14	163.9294	49.168		114.7614
	Siddhamatha	15	374.9207			374.9207
	Siddhamatha	16	94.5786			94.5786
	Siddhamatha	17	240.3127			240.3127
	Siddhamatha	18	223.1030			223.1030
	Siddhamatha	19	501.2417			501.2417
	Siddhamatha	20	105.1268			105.1268
	Siddhamatha	21	205.1073			205.1073
	Siddhamatha	22	115.1284			115.1284
	Siddhamatha	23	680.1153			680.1153
	Siddhamatha	24	156.5907			156.5907
	Siddhamatha	25	162.2515			162.2515
	Siddhamatha	26	85.6742			85.6742
	Siddhamatha	27	211.5879			211.5879
	Siddhamatha	28	202.1652			202.1652
	Siddhamatha	29	309.8240			309.8240
	Total Siddhamatha		5869.7700	488.1730	0.0000	5381.5970
6	Thakurani		4679.9500	1801.3657	1.455	2877.1293
7	Uliburu		1499.8100	17.083	0	1482.7270
	Total Barbil		17312.0998	3517.0197	1.8250	13793.2551
	BJP RANGE					
8	Anjar		196.4941			196.4941
9	Gadgadei		218.0103			218.0103
10	Jagar		155.9472			155.9472
11	Kanjipani		725.9460		1	724.9460
12	Khajurimundi		180.6000			180.6000
13	Mundala		432.0270			432.0270
14	Saharpur		834.3484			834.3484
	Total BJP		2743.3730	0.0000	1.0000	2742.3730
	CHAMPUA RANGE					
15	Baitarani-A		2358.9900	912.633	0.716	1445.6410
16	Baitarani - B		1278.4400	644.667	0	633.7730
17	Balibandha		920.6900	4.55	0.6	915.5400



18	Bardhana		944.5600	2	0	942.5600
19	Jyotipur		882.2400			882.2400
20	Kalikaprasad		1416.4500	5.984	0	1410.4660
21	Lakshmiposi ©		866.8600			866.8600
22	Mooney		89.0300			89.0300
23	Naibuga		309.8300	16.0489	0	293.7811
24	Pedipokhari		1487.2700	0	0.92	1486.3500
25	Ukhunda		946.5900			946.5900
	Total Champua		11500.9500	1585.8829	2.2360	9912.8311
	GATGAON RANGE					
26	Atai	11	426.0355	31.25		394.7855
	Atai	12	617.6353	15.17		602.4653
	Atai	13	209.1063	23.58		185.5263
	Atai	14	548.0387	6.269	1.955	539.8147
	Atai	15	349.0257			349.0257
	Atai	16	435.2590			435.2590
	Atai	17	380.7564			380.7564
	Atai	18	362.5317			362.5317
	Atai	19	715.6719			715.6719
	Atai	20	521.9792			521.9792
	Atai	21	818.5801			818.5801
	Atai	22	469.1674			469.1674
	Atai	23	198.2388			198.2388
	Atai	24	476.8597			476.8597
	Atai	25	452.4763			452.4763
	Atai	26	520.4199			520.4199
	Atai	27	308.1595			308.1595
	Atai	28	563.8569			563.8569
	Atai	29	517.0846			517.0846
	Atai	30	342.4076			342.4076
	Atai	31	567.2393			567.2393
	Atai	32	426.6912			426.6912
	Atai	33	375.0607			375.0607
	Atai	34	349.5217			349.5217
	Atai	35	257.7466			257.7466
	Atai	36	160.9435			160.9435
	Atai	37	216.4438			216.4438
	Atai	38	244.7985			244.7985



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	Atai	39	326.4856			326.4856
	Atai	40	288.5376			288.5376
	Atai	41	342.7302			342.7302
	Atai	42	570.7267			570.7267
	Atai	43	635.1144			635.1144
	Atai	44	516.2266			516.2266
	Atai	45	484.4328			484.4328
	Atai	46	249.3127			249.3127
	Atai	47	508.1466			508.1466
	Atai	48	656.1133			656.1133
	Atai	49	249.3177			249.3177
	S. Total (Atei)		16658.8800	76.2690	1.9550	16580.6560
27	Badmasinabila		66.2200			66.2200
28	Balipokhari		1011.7500			1011.7500
29	Barabanka	4	486.1999			486.1999
	Barabanka	5	630.7777			630.7777
	Barabanka	6	314.2193			314.2193
	Barabanka	7	453.2338			453.2338
	Barabanka	8	420.1626			420.1626
	Barabanka	9	843.4398			843.4398
	Barabanka	10	479.1197			479.1197
	Barabanka	11	635.6119			635.6119
	Barabanka	12	518.7778			518.7778
	Barabanka	13	476.4392			476.4392
	Barabanka	14	436.6983			436.6983
	S. Total (Barabanka)		5694.6800	0.0000	0.0000	5694.6800
30	Ghatagaon		810.8100	0	0.9635	809.8465
31	Kalimati		914.6200	79.76	0	834.8600
32	Masinabila		473.4900	6.12	0.034	467.3360
33	Nalapanga(p)	1	352.8800			352.8800
34	Pipilia		771.8600	1.17	0.109	770.5810
	Total Ghatgaon		26755.1900	163.3190	3.0615	26588.8095
	KEONJHAR RANGE					
35	Balabhadrapur		746.6700			746.6700
	Barabanka	1	440.4002			440.4002
	Barabanka	2	462.7707			462.7707
	Barabanka	3	353.5892	10.35	1.066	342.1732
	Barabanka	15	236.8039			236.8039



	Barabanka	16	248.2354			248.2354
	Barabanka	17	566.8606			566.8606
	S. Total (Barabanka)		2308.6600	10.3500	1.0660	2297.2440
36	Basantapur		1187.7900			1187.7900
37	Belda		1059.9000		0.96	1058.9400
38	Jadipada		1329.8400		0.6	1329.2400
39	Maidankel		872.5300			872.5300
	Nalapanga(p)	2	834.1000			834.1000
40	Narayanpur		1644.7800	13.143	0	1631.6370
41	Nayagarh		2842.6100			2842.6100
42	Nelung		624.0400			624.0400
43	Raghunathpur		1221.3800	0	0	1221.3800
44	Raikala		690.0100			690.0100
45	Sarupat		317.6800			317.6800
46	Tangarani		410.6600	1.4985	0	409.1615
	S. Total		13035.3200	14.6415	1.5600	13019.1185
	Total Keonjhar		16090.6500	24.9915	2.6260	16063.0325
	PATNA RANGE					
	Atai	1	279.3762			279.3762
	Atai	2	210.9156			210.9156
	Atai	3	191.8487			191.8487
	Atai	4	497.0775			497.0775
	Atai	5	481.9294			481.9294
	Atai	6	555.9434			555.9434
	Atai	7	231.2487			231.2487
	Atai	8	512.9323			512.9323
	Atai	9	501.0262			501.0262
	Atai	10	505.2520			505.2520
	S. Total (Atai)		3967.5500	0.0000	0.0000	3967.5500
47	Barbil		17.8600			17.8600
48	Baunsuli		629.3000			629.3000
49	Belapasi		46.1000			46.1000
50	Billa-A		43.0800			43.0800
51	Budhikapudi 'II'		21.7100			21.7100
52	Chadheibhol		48.8800			48.8800
53	Chemena-A		26.8900			26.8900
54	Lakshmiposi (P)		23.1900	7.1	0	16.0900
55	Ninua		60.5800			60.5800



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56	Padmapur		795.6400			795.6400
57	Palaspada		14.7200			14.7200
58	Patna		1193.8600			1193.8600
59	Poipani		533.7900			533.7900
60	Pradhanpada		21.0600			21.0600
61	Purunapani		180.5200			180.5200
62	Rasapada		9.9500			9.9500
63	Sarasposi		13.4800			13.4800
64	Tando		15.5400			15.5400
	Total Patna		7663.7000	7.1000	0.0000	7656.6000
	TELKOI RANGE					
65	Bandhanjhari	1	288.6363			288.6363
	Bandhanjhari	2	328.6551			328.6551
	Bandhanjhari	3	400.7579			400.7579
	Bandhanjhari	4	422.4213			422.4213
	Bandhanjhari	5	1226.0894			1226.0894
	Total Bandhanjhari		2666.5600	0.0000	0.0000	2666.5600
66	Benamunda	1	536.1099			536.1099
	Benamunda	2	420.4424			420.4424
	Benamunda	3	329.3223			329.3223
	Benamunda	4	754.5780			754.5780
	Benamunda	5	743.4774			743.4774
	Total Benamunda		2783.9300	0.0000	0.0000	2783.9300
67	Dhanurjaypur		85.2700			85.2700
68	C. Golabandha		41.5000			41.5000
69	Jharbeda	1	360.0643			360.0643
	Jharbeda	2	914.7357			914.7357
	Total Jharbeda		1274.8000	0.0000	0.0000	1274.8000
70	Kalapat	1	352.2428			352.2428
	Kalapat	2	487.4167			487.4167
	Kalapat	3	643.1869			643.1869
	Kalapat	4	315.2613			315.2613
	Kalapat	5	576.0822			576.0822
	Kalapat	6	473.7798			473.7798
	Kalapat	7	369.6760			369.6760
	Kalapat	8	517.9873			517.9873
	Kalapat	9	768.0637			768.0637
	Kalapat	10	418.3862			418.3862



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	Kalapat	11	534.1609			534.1609
	Kalapat	12	547.0863			547.0863
	Kalapat	13	355.2373			355.2373
	Kalapat	14	601.7675			601.7675
	Kalapat	15	491.6894			491.6894
	Kalapat	16	286.5535			286.5535
	Kalapat	17	955.5484			955.5484
	Kalapat	18	625.2245			625.2245
	Kalapat	19	902.0019			902.0019
	Kalapat	20	605.7983			605.7983
	Kalapat	21	912.4849			912.4849
	Kalapat	22	1036.0643			1036.0643
	Kalapat	23	650.7507			650.7507
	Kalapat	24	311.6974			311.6974
	Kalapat	25	432.6041			432.6041
	Kalapat	26	395.4647			395.4647
	Kalapat	27	543.1030			543.1030
	Kalapat	28	491.6586			491.6586
	Kalapat	29	437.3879			437.3879
	Kalapat	30	239.1701			239.1701
	Kalapat	31	640.3406			640.3406
	Kalapat	32	496.3186			496.3186
	Kalapat	33	474.7783			474.7783
	Kalapat	34	1029.9871			1029.9871
	Kalapat	35	478.2234			478.2234
	Kalapat	36	829.3076			829.3076
	Kalapat	37	374.5966			374.5966
	Kalapat	38	354.6524			354.6524
	Kalapat	39	532.6088			532.6088
	Total Kalapat		21488.3500	0.0000	0.0000	21488.3500
71	Kodbil	1	466.7712			466.7712
	Kodbil	2	529.7740			529.7740
	Kodbil	3	561.5448			561.5448
	Total Kodbil		1558.0900	0.0000	0.0000	1558.0900
72	Krushnapur	1	469.0400			469.0400
	Krushnapur	2	150.9600			150.9600
	Total Krushnapur		620.0000	0.0000	0.0000	620.0000
73	Mankadchua	1	184.2127			184.2127



	Mankadchua	2	140.4240			140.4240
	Mankadchua	3	357.6833			357.6833
	Total Mankadchua		682.3200	0.0000	0.0000	682.3200
74	Ranibeda	1	941.1202			941.1202
	Ranibeda	2	891.2982			891.2982
	Ranibeda	3	424.6781			424.6781
	Ranibeda	4	611.8135			611.8135
	Total Ranibeda		2868.9100	0.0000	0.0000	2868.9100
75	Salaikena Siriabahal		89.4599			89.4599
76	Samakoi		620.3700	0	0	620.3700
77	Tamanga		1362.6424			1362.6424
	Total Telkoi		36142.2023	0.0000	0.0000	36142.2023
	Total RF		118208.1651	5298.3131	10.7485	112899.1035
	PRF					
	BJP RANGE					
1	Amuni		50.5987			50.5987
2	Bayakumutia		118.0045			118.0045
3	Champey		363.8651			363.8651
4	Danla		170.7029			170.7029
5	Digachampey		170.0146			170.0146
6	Dumuridiha		501.9573			501.9573
7	Gandhamardan		2295.9907	124.6427		2171.3480
8	Gonasika		334.3871			334.3871
9	Gouda champey		447.3693			447.3693
10	Lunaghar-I		131.6830			131.6830
11	Lunaghar-II		360.9440			360.9440
12	Raiguda		489.3750			489.3750
13	Suakati-I		475.3921			475.3921
14	Suakati-II		134.9700			134.9700
	Total BJP		6045.2543	124.6427	0.0000	5920.6116
	CHAMPUA RANGE					
15	Baitarani East 'A'		154.1400			154.1400
16	Baitarani East 'B'		309.2000			309.2000
	Total Champua	0	463.3400	0.0000	0.0000	463.3400
	Keonjhar Range					
17	Khajuribani		3575.4201			3575.4201
	Patna Range					
18	Budhikapudi 'I'		31.0200			31.0200



	TELKOI RANGE					
19	Dublupal		88.2300			88.2300
20	Godhihudi		78.8700			78.8700
21	Rekuti		275.3000			275.3000
22	Renda		1282.4329			1282.4329
23	Sikheswari		3105.5000		3.8	3101.7000
24	Syamanali Koilisuta		341.4900		193.212	148.2780
	Total Telkoi		5171.8229	0.0000	197.0120	4974.8109
	Total PRF	0	15286.8573	124.6427	197.012	14965.2026
	PF					
	BJP RANGE					
1	Tala Baitarani		13.4800			13.48
2	Jantari		22.8392			22.8392
3	Fhuljhar-C		24.6000			24.6
4	Tentuli		28.6000			28.6
5	Dhaladihi		159.9685			159.9685
6	Guptaganga		38.9050			38.905
7	Sukodola		85.5500			85.55
8	Sikulapada		9.6900			9.69
9	Jatra		14.3625			14.3625
10	Tentulikhunti		287.0685			287.0685
11	Sukodola		348.0119			348.0119
12	Kalanda (Kha)		94.4965			94.4965
13	Kendughati		39.5046			39.5046
14	Benidihi		22.1000			22.1
15	Anasuan		44.3210			44.321
16	Benidihi(A)		38.3300			38.33
17	Baragoda		276.3000			276.3
18	Raidiha(A)		20.3200			20.32
19	Lungajhar(i)		31.4081			31.4081
20	Lungajhar		32.7186			32.7186
21	Lungajhar-A		15.2770			15.277
22	Tentulikhunti		45.3220			45.322
23	Jatra		117.9648			117.9648
24	Champajhar		31.0000			31
25	Champajhar(A)		20.3619			20.3619
26	Phuljhar-D		34.6500			34.65
27	Tana		64.3320			64.332



28	Anasuan(A)		0.1959			0.1959
29	Kadalibadi		43.8900			43.89
30	Champajhar-B		3.1400			3.14
31	Champajhar		2.4500			2.45
32	Anasuan		55.0840			55.084
33	Champajhar		2.5000			2.5
34	Podadihi		120.8380			120.838
35	Upparabirikala-i		3.2280			3.228
36	Upparabirikala-ii		12.6900			12.69
	BJP Range Total		2205.4980			2205.4980
	Champua Range					
33	Kasia		105.3960			105.396
34	Kasia		7.6220			7.622
35	Chhatia		59.7082			59.7082
36	Kaliapal		165.7930			165.793
	CHAMPUA(T)		338.5192			338.5192
	KEONJHAR RANGE					
37	Hunda		82.5560			82.556
	TELKOI RANGE					
38	Dandargauni		34.0000			34
39	Kaliapani		13.7978			13.7978
40	Rangamatia		3.7000			3.7
	TELOI(T)		51.4978			51.4978
	Total PF	0	2678.0710	0.0000	0.0000	2678.0710
	DPF					
	Barbil RANGE					
1	Murgabeda		518.23			518.23
	BJP RANGE					
2	Guptaganga		179.1081			179.1081
3	Katira		483.7163			483.7163
4	Pandadhar-Bayakumutia		259.439			259.439
5	Sanaghagara(B)		792.8602			792.8602
6	Sundurua		753.7537			753.7537
7	Taramakanta		417.5775			417.5775
8	Kalanda		1060.862			1060.862
9	Kakharua		1240.073			1240.073
10	Khandadhar		1956.448			1956.448
11	Kuanr		2080.6917			2080.6917



12	Kumundi(B)		88.62			88.62
13	Sanghagara (A)		583.84			583.84
14	Siddhamath		1112.6787			1112.6787
	BJP RANGE(TOTAL)		11009.6682			11009.6682
	CHAMPUA RANGE					0
15	Jamirta		313.6505			313.6505
16	Kankana		170.2168			170.2168
	CHAMPUA RANGE(T)		483.8673			483.8673
	GHATGAON RANGE					0
17	Kapaspada		80.3289			80.3289
18	Khajurijuani		95.7075			95.7075
19	Tara (B)		74.1329			74.1329
	GHATGAON(TOTAL)		250.1693			250.1693
	PATNA RANGE					
20	Machhagarh		14.3668			14.3668
21	Mushkhori (A)		50.8829			50.8829
22	Mushakhori (B)		72.2146			72.2146
23	Chemena II		23.97			23.97
	PATNA(T)		161.4343			161.4343
	TELKOI RANGE					
24	Binjabahal (A)		18.3531			18.3531
25	Binjabahal (B)		19.8303			19.8303
26	Madhyapur		101.5797			101.5797
27	Oriya		161.0948			161.0948
28	Binjabahal (C)		140.83			140.83
29	Tangurubahal		493.84			493.84
	TELKOI(T)		935.5279			935.5279
	TOTAL DPF		13358.897	0	0	13358.897
	Total VF (456 Site)		2678.341		63.0	2615.341
TOTAL (RF, PRF, PF, PRF,VF)			152210.3314	5422.9558	270.7605	146516.6151



Table No 13.3(B) Area allotment to different Working Circle.

Name of the Forests	Comp No	Area Available for management	S.W.C.	I.W.C.	R.W.C.	Pl.W.C.	Pr. W.C.	Podu Reclamation (O) WC	NTPF (O) WC	WL(O) WC	JFM (O) WC
RESERVE FOREST											
Badbil Range											
Forest Block											
Kandara-A		6.6300			6.6300				6.6300	6.6300	6.0000
Kandara-B		107.6420		107.6420	0.0000				107.6420	107.6420	18.0000
Kandara-C		81.3400		81.3400	0.0000				81.3400	81.3400	
Karo	1	196.2264		0	196.2264	0			196.2264	196.2264	50.0000
Karo	2	186.5534		0	186.5534	0			186.5534	186.5534	50.0000
Karo	3	289.4511		0	289.4511	0			289.4511	289.4511	
Karo	4	158.9004		0	158.9004	0			158.9004	158.9004	
Karo	5	127.7842		0	127.7842	0			127.7842	127.7842	
Karo	6	207.6606		207.6606	0.0000	0			207.6606	207.6606	
Karo	7	213.0557		201.5457	11.5100	0			213.0557	213.0557	
Karo	8	253.5588		241.7948	11.7640	0			253.5588	253.5588	
Karo	9	121.5139		110.7609	10.7530	0			121.5139	121.5139	
Karo	10	60.7159		20.2134	0.0000	40.5025			60.7159	60.7159	
Karo	11	79.7934		59.7934	0.0000	20.0000			79.7934	79.7934	
Karo	12	95.0992		95.0992	0.0000	0			95.0992	95.0992	
Karo	13	292.0040		252.0040	0.0000	40.0000			292.0040	292.0040	
Karo	14	104.1279		104.1279	0.0000	0			104.1279	104.1279	
Karo	15	135.8676		135.8676	0.0000	0			135.8676	135.8676	



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Karo	16	73.0508		73.0508	0.0000	0			73.0508	73.0508	
Karo	17	93.2023		93.2023	0.0000	0			93.2023	93.2023	
Karo	18	79.8511		79.8511	0.0000	0			79.8511	79.8511	
Karo	19	212.3228		212.3228	0.0000	0			212.3228	212.3228	
Karo	20	240.9238		240.9238	0.0000	0			240.9238	240.9238	
Karo	21	550.9151		550.9151	0.0000	0			550.9151	550.9151	
Karo	22	83.6114		83.6114	0.0000	0			83.6114	83.6114	
Total Karo		3856.1898	0.0000	2762.7448	992.9425	100.5025	0.0000	0.0000	3856.1898	3856.1898	100.0000
Siddhamatha	1	135.6073			135.6073				135.6073	135.6073	34.0000
Siddhamatha	2	101.7452			97.7762	3.969			101.7452	101.7452	41.0000
Siddhamatha	3	163.4125		163.4125	0.0000				163.4125	163.4125	51.0000
Siddhamatha	4	118.5854		118.5854	0.0000				118.5854	118.5854	41.0000
Siddhamatha	5	66.0095			66.0095				66.0095	66.0095	50.0000
Siddhamatha	6	83.4478			83.4478				83.4478	83.4478	51.0000
Siddhamatha	7	115.3415			115.3415				115.3415	115.3415	51.0000
Siddhamatha	8	75.7612			75.7612				75.7612	75.7612	
Siddhamatha	9	72.5169		72.5169	0.0000				72.5169	72.5169	
Siddhamatha	10	48.7864		48.7864	0.0000				48.7864	48.7864	
Siddhamatha	11	198.2547		198.2547	0.0000				198.2547	198.2547	
Siddhamatha	12	298.3894		298.3894	0.0000				298.3894	298.3894	
Siddhamatha	13	121.2498		121.2498	0.0000				121.2498	121.2498	
Siddhamatha	14	114.7614		114.7614	0.0000				114.7614	114.7614	
Siddhamatha	15	374.9207		374.9207	0.0000				374.9207	374.9207	
Siddhamatha	16	94.5786		94.5786	0.0000				94.5786	94.5786	



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Siddhamatha	17	240.3127		240.3127	0.0000				240.3127	240.3127	
Siddhamatha	18	223.1030		223.1030	0.0000				223.1030	223.1030	
Siddhamatha	19	501.2417		501.2417	0.0000				501.2417	501.2417	
Siddhamatha	20	105.1268		105.1268	0.0000				105.1268	105.1268	
Siddhamatha	21	205.1073		205.1073	0.0000				205.1073	205.1073	
Siddhamatha	22	115.1284			115.1284				115.1284	115.1284	
Siddhamatha	23	680.1153			680.1153				680.1153	680.1153	
Siddhamatha	24	156.5907			156.5907				156.5907	156.5907	
Siddhamatha	25	162.2515			162.2515				162.2515	162.2515	
Siddhamatha	26	85.6742			85.6742				85.6742	85.6742	
Siddhamatha	27	211.5879			211.5879				211.5879	211.5879	
Siddhamatha	28	202.1652			202.1652				202.1652	202.1652	
Siddhamatha	29	309.8240			309.8240				309.8240	309.8240	
Total Siddhamatha		5381.5970	0.0000	2880.3473	2497.2807	3.9690	0.0000	0.0000	5381.5970	5381.5970	319.0000
Thakurani		2877.1293			2848.9218	28.2075			2877.1293	2877.1293	93.0000
Uliburu		1482.7270		1482.7270	0.0000				1482.7270	1482.7270	50.0000
Total Barbil		13793.2551	0.0000	7314.8011	6345.7750	132.6790	0.0000	0.0000	13793.2551	13793.2551	586.0000
BJP RANGE											
Anjar		196.4941		196.0891	0.0000	0.4050			196.4941	196.4941	
Gadgadei		218.0103			218.0103			17.0	218.0103	218.0103	49.46
Jagar		155.9472			155.9472				155.9472	155.9472	
Kanjipani		724.9460			724.9460			50.0	724.946	724.946	190
Khajurimundi		180.6000			164.6000	16		20.0	180.6	180.6	180.5
Mundala		432.0270		432.027	0.0000			50.0	432.027	432.027	194.7



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Saharpur		834.3484			670.0934	164.255			834.3484	834.3484	301.45
Total BJP		2742.3730	0.0000	628.1161	1933.5969	180.6600	0.0000	137.0000	2742.3730	2742.3730	916.1100
CHAMPUA RANGE(T)											
Baitarani-A		1445.6410		1439.1610	0.0000	6.48			1445.641	1445.641	
Baitarani - B		633.7730		633.7730	0.0000				633.773	633.773	64.6
Balibandha		915.5400		845.5400	0.0000	70			915.54	915.54	571.2
Bardhana		942.5600		930.3897	0.0000	12.1703			942.56	942.56	313.23
Jyotipur		882.2400		881.4300	0.0000	0.81			882.24	882.24	391.68
Kalikaprasad		1410.4660		1280.3809	0.0000	130.0851			1410.466	1410.466	1410.466
Lakshmiposi ©		866.8600		866.8600	0.0000				866.86	866.86	710
Mooney		89.0300		89.0300	0.0000				89.03	89.03	50
Naibuga		293.7811		293.7811	0.0000				293.7811	293.7811	
Pedipokhari		1486.3500		1485.1350	0.0000	1.215			1486.35	1486.35	
Ukhunda		946.5900		885.7800	0.0000	60.81			946.59	946.59	220
Total Champua		9912.8311	0.0000	9631.2607	0.0000	281.5704	0.0000	0.0000	9912.8311	9912.8311	3731.1760
GATGAON RANGE											
Atai	11	394.7855			394.7855	0			394.7855	394.7855	310
Atai	12	602.4653			526.6695	75.7958			602.4653	602.4653	552.4
Atai	13	185.5263			185.5263	0			185.5263	185.5263	103
Atai	14	539.8147			539.8147	0			539.8147	539.8147	410
Atai	15	349.0257		349.0257	0.0000				349.0257	349.0257	280
Atai	16	435.2590		435.2590	0.0000				435.259	435.259	359.507
Atai	17	380.7564		370.7564	0.0000	10			380.7564	380.7564	124
Atai	18	362.5317		362.5317	0.0000				362.5317	362.5317	



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Atai	19	715.6719		715.6719	0.0000				715.6719	715.6719	
Atai	20	521.9792		521.9792	0.0000				521.9792	521.9792	
Atai	21	818.5801		808.5801	0.0000	10			818.5801	818.5801	
Atai	22	469.1674		469.1674	0.0000				469.1674	469.1674	
Atai	23	198.2388		198.2388	0.0000				198.2388	198.2388	
Atai	24	476.8597		476.8597	0.0000				476.8597	476.8597	
Atai	25	452.4763		452.4763	0.0000				452.4763	452.4763	
Atai	26	520.4199		520.4199	0.0000				520.4199	520.4199	
Atai	27	308.1595		308.1595	0.0000				308.1595	308.1595	
Atai	28	563.8569		563.8569	0.0000				563.8569	563.8569	
Atai	29	517.0846		517.0846	0.0000				517.0846	517.0846	
Atai	30	342.4076		342.4076	0.0000				342.4076	342.4076	
Atai	31	567.2393		567.2393	0.0000				567.2393	567.2393	
Atai	32	426.6912			426.6912				426.6912	426.6912	
Atai	33	375.0607			365.0607	10			375.0607	375.0607	
Atai	34	349.5217			339.5217	10			349.5217	349.5217	
Atai	35	257.7466			257.7466				257.7466	257.7466	
Atai	36	160.9435			160.9435				160.9435	160.9435	
Atai	37	216.4438			216.4438				216.4438	216.4438	
Atai	38	244.7985			244.7985				244.7985	244.7985	
Atai	39	326.4856			326.4856				326.4856	326.4856	
Atai	40	288.5376			288.5376				288.5376	288.5376	
Atai	41	342.7302			342.7302				342.7302	342.7302	
Atai	42	570.7267			570.7267				570.7267	570.7267	



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Atai	43	635.1144			635.1144				635.1144	635.1144	
Atai	44	516.2266			516.2266				516.2266	516.2266	
Atai	45	484.4328			484.4328				484.4328	484.4328	
Atai	46	249.3127			249.3127				249.3127	249.3127	
Atai	47	508.1466			508.1466				508.1466	508.1466	
Atai	48	656.1133			656.1133				656.1133	656.1133	
Atai	49	249.3177			225.3177	24			249.3177	249.3177	
S. Total (Atei)		16580.6560	0.0000	7979.7140	8461.1462	139.7958	0.0000	0.0000	16580.6560	16580.6560	2138.9070
Badmasinabila		66.2200		66.2200	0.0000				66.22	66.22	
Balipokhari		1011.7500		967.7500	0.0000	44.0			1011.75	1011.75	469.688
Barabanka	4	486.1999		486.1999	0.0000				486.1999	486.1999	432.1
Barabanka	5	630.7777		580.7777	0.0000	50.00			630.7777	630.7777	500
Barabanka	6	314.2193		289.2193	0.0000	25.00			314.2193	314.2193	202.2
Barabanka	7	453.2338		418.2338	0.0000	35.00			453.2338	453.2338	341.3
Barabanka	8	420.1626		395.1626	0.0000	25.00			420.1626	420.1626	292
Barabanka	9	843.4398		821.4398	0.0000	22.00			843.4398	843.4398	753.15
Barabanka	10	479.1197		469.1197	0.0000	10.00			479.1197	479.1197	
Barabanka	11	635.6119		605.6119	0.0000	30.00			635.6119	635.6119	
Barabanka	12	518.7778		510.7778	0.0000	8.00			518.7778	518.7778	
Barabanka	13	476.4392		476.4392	0.0000				476.4392	476.4392	
Barabanka	14	436.6983		435.8883	0.0000	0.81			436.6983	436.6983	
S. Total (Barabanka)		5694.6800	0.0000	5488.8700	0.0000	205.8100	0.0000	0.0000	5694.6800	5694.6800	2520.7500
Ghatagaon		809.8465		809.8465	0.0000				809.8465	809.8465	809.8
Kalimati		834.8600		734.8600	0.0000	100			834.86	834.86	381.872



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Masinabila		467.3360		455.0875	0.0000	12.2485			467.336	467.336	120
Nalapanga	1	352.8800			344.5775	8.3025			352.88	352.88	100
Pipilia		770.5810			770.5810				770.581	770.581	166.4
Total Ghatgaon		26588.8095	0.0000	16502.3480	9576.3047	510.1568	0.0000	0.0000	26588.8095	26588.8095	6707.4170
KEONJHAR RANGE											
Balabhadrapur		746.6700		706.6700	0.0000	40			746.67	746.67	378.233
Barabanka	1	440.4002		440.4002	0.0000				440.4002	440.4002	361.907
Barabanka	2	462.7707		462.7707	0.0000				462.7707	462.7707	388.692
Barabanka	3	342.1732		342.1732	0.0000				342.1732	342.1732	
Barabanka	15	236.8039		170.9689	0.0000	65.835			236.8039	236.8039	
Barabanka	16	248.2354		228.2354	0.0000	20			248.2354	248.2354	
Barabanka	17	566.8606		533.8606	0.0000	33			566.8606	566.8606	
S. Total (Barabanka)		2297.2440	0.0000	2178.4090	0.0000	118.8350	0.0000	0.0000	2297.2440	2297.2440	750.5990
Basantapur		1187.7900		1137.3475	0.0000	50.4425			1187.79	1187.79	391
Belda		1058.9400		972.9480	0.0000	85.992			1058.94	1058.94	432.88
Jadipada		1329.2400		1197.8275	0.0000	131.4125			1329.24	1329.24	782
Maidankel		872.5300		871.3150	0.0000	1.215			872.53	872.53	498.58
Nalapanga	2	834.1000		829.6450	0.0000	4.455			834.1	834.1	193.15
Narayanpur		1631.6370		1620.3565	0.0000	11.2805			1631.637	1631.637	1048.46
Nayagarh		2842.6100		2800.6100	0.0000	42			2842.61	2842.61	838.146
Nelung		624.0400		619.0423	0.0000	4.9977			624.04	624.04	369.476
Raghunathpur		1221.3800		1181.3800	0.0000	40			1221.38	1221.38	1221.38
Raikala		690.0100		653.5847	0.0000	36.4253			690.01	690.01	368.093
Sarupat		317.6800		317.6800	0.0000	0			317.68	317.68	



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Tangarani		409.1615		387.9387	0.0000	21.2228			409.1615	409.1615	338
S. Total		13019.1185	0.0000	12589.6752	0.0000	429.4433	0.0000	0.0000	13019.1185	13019.1185	6481.165
Total Keonjhar		16063.0325	0.0000	15474.7542	0.0000	588.2783	0.0000	0.0000	16063.0325	16063.0325	7609.9970
PATNA RANGE											
Atai	1	279.3762			279.3762				279.3762	279.3762	166
Atai	2	210.9156			170.9156	40			210.9156	210.9156	200
Atai	3	191.8487			147.0007	44.848			191.8487	191.8487	44
Atai	4	497.0775			497.0775				497.0775	497.0775	199
Atai	5	481.9294			481.9294				481.9294	481.9294	
Atai	6	555.9434		555.9434	0.0000				555.9434	555.9434	
Atai	7	231.2487		231.2487	0.0000				231.2487	231.2487	
Atai	8	512.9323		477.9323	0.0000	35			512.9323	512.9323	
Atai	9	501.0262		501.0262	0.0000				501.0262	501.0262	
Atai	10	505.2520			430.5520	74.7			505.252	505.252	
S. Total (Atai)		3967.5500	0.0000	1766.1506	2006.8514	194.5480	0.0000	0.0000	3967.5500	3967.5500	609.0000
Barbil		17.8600			17.8600				17.86	17.86	17.86
Baunsuli		629.3000		532.3000	0.0000	97			629.3	629.3	482
Belapasi		46.1000		41.1000	0.0000	5			46.1	46.1	42
Billa-A		43.0800		33.0800	0.0000	10			43.08	43.08	43.08
Budhikapudi 'II'		21.7100		21.7100	0.0000				21.71	21.71	
Chadheibhol		48.8800		48.8800	0.0000				48.88	48.88	48
Chemena-A		26.8900		26.8900	0.0000				26.89	26.89	26.89
Lakshmiposi (P)		16.0900		16.0900	0.0000				16.09	16.09	16.09
Ninua		60.5800		60.5800	0.0000				60.58	60.58	50



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Padmapur		795.6400		655.6400	0.0000	140			795.64	795.64	370.62
Palaspada		14.7200			14.7200				14.72	14.72	
Patna		1193.8600		1064.8600	0.0000	129			1193.86	1193.86	726.742
Poipani		533.7900		518.7900	0.0000	15			533.79	533.79	552.91
Pradhanpada		21.0600		11.0600	0.0000	10			21.06	21.06	21.06
Purunapani		180.5200		156.0542	0.0000	24.4658			180.52	180.52	180.52
Rasapada		9.9500		9.9500	0.0000				9.95	9.95	9.95
Sarasposi		13.4800		13.4800	0.0000				13.48	13.48	13.48
Tando		15.5400		15.5400	0.0000				15.54	15.54	15
Total Patna		7656.6000	0.0000	4992.1548	2039.4314	625.0138	0.0000	0.0000	7656.6000	7656.6000	3225.2020
TELKOI RANGE											
Bandhanjhari	1	288.6363	286.8948		0.0000	1.7415			288.6363	288.6363	61.05
Bandhanjhari	2	328.6551	328.6551		0.0000				328.6551	328.6551	275
Bandhanjhari	3	400.7579	400.7579		0.0000				400.7579	400.7579	130.192
Bandhanjhari	4	422.4213	422.4213		0.0000				422.4213	422.4213	296.12
Bandhanjhari	5	1226.0894	1212.0894		0.0000	14			1226.0894	1226.0894	485.349
Total Bandhanjhari		2666.5600	2650.8185	0.0000	0.0000	15.7415	0.0000	0.0000	2666.5600	2666.5600	1247.7110
Benamunda	1	536.1099	528.4351		0.0000	7.6748			536.1099	536.1099	215.6
Benamunda	2	420.4424	420.4424		0.0000				420.4424	420.4424	
Benamunda	3	329.3223	329.3223		0.0000				329.3223	329.3223	
Benamunda	4	754.5780	754.5780		0.0000				754.578	754.578	
Benamunda	5	743.4774	677.9774		0.0000	65.5			743.4774	743.4774	
Total Benamunda		2783.9300	2710.7552	0.0000	0.0000	73.1748	0.0000	0.0000	2783.9300	2783.9300	215.6000
Dhanurjaypur		85.2700		85.27	0.0000				85.27	85.27	85.27



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C. Golabandha		41.5000		36.5	0.0000	5			41.5	41.5	41.5
Jharbeda	1	360.0643		345.0643	0.0000	15			360.0643	360.0643	
Jharbeda	2	914.7357		902.7357	0.0000	12			914.7357	914.7357	249.944
Total Jharbeda		1274.8000	0.0000	1247.8000	0.0000	27.0000	0.0000	0.0000	1274.8000	1274.8000	249.9440
Kalapat	1	352.2428	352.2428		0.0000				352.2428	352.2428	271.02
Kalapat	2	487.4167	487.4167		0.0000				487.4167	487.4167	200
Kalapat	3	643.1869	608.1869		0.0000	35			643.1869	643.1869	200
Kalapat	4	315.2613	315.2613		0.0000				315.2613	315.2613	50
Kalapat	5	576.0822	576.0822		0.0000				576.0822	576.0822	17.8
Kalapat	6	473.7798	473.7798		0.0000				473.7798	473.7798	30.2
Kalapat	7	369.6760	369.6760		0.0000				369.676	369.676	364.1
Kalapat	8	517.9873	517.9873		0.0000				517.9873	517.9873	400
Kalapat	9	768.0637	760.0637		0.0000	8			768.0637	768.0637	213.74
Kalapat	10	418.3862	418.3862		0.0000				418.3862	418.3862	80.751
Kalapat	11	534.1609	534.1609		0.0000				534.1609	534.1609	112.98
Kalapat	12	547.0863	547.0863		0.0000				547.0863	547.0863	400
Kalapat	13	355.2373	355.2373		0.0000				355.2373	355.2373	284.38
Kalapat	14	601.7675		506.6575	0.0000	95.11			601.7675	601.7675	
Kalapat	15	491.6894		491.6894	0.0000				491.6894	491.6894	
Kalapat	16	286.5535	286.5535		0.0000				286.5535	286.5535	
Kalapat	17	955.5484	955.5484		0.0000				955.5484	955.5484	
Kalapat	18	625.2245		625.2245	0.0000				625.2245	625.2245	
Kalapat	19	902.0019	857.0019		0.0000	45			902.0019	902.0019	
Kalapat	20	605.7983	605.7983		0.0000				605.7983	605.7983	



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Kalapat	21	912.4849		852.4849	0.0000	60			912.4849	912.4849	
Kalapat	22	1036.0643	1036.0643		0.0000				1036.0643	1036.0643	
Kalapat	23	650.7507		650.7507	0.0000				650.7507	650.7507	
Kalapat	24	311.6974		311.6974	0.0000				311.6974	311.6974	
Kalapat	25	432.6041	432.6041		0.0000				432.6041	432.6041	
Kalapat	26	395.4647	395.4647		0.0000				395.4647	395.4647	
Kalapat	27	543.1030		543.1030	0.0000				543.103	543.103	
Kalapat	28	491.6586	491.6586		0.0000				491.6586	491.6586	
Kalapat	29	437.3879	437.3879		0.0000				437.3879	437.3879	
Kalapat	30	239.1701	239.1701		0.0000				239.1701	239.1701	
Kalapat	31	640.3406		640.3406	0.0000				640.3406	640.3406	
Kalapat	32	496.3186	496.3186		0.0000				496.3186	496.3186	
Kalapat	33	474.7783	474.7783		0.0000				474.7783	474.7783	
Kalapat	34	1029.9871	1029.9871		0.0000				1029.9871	1029.9871	
Kalapat	35	478.2234	478.2234		0.0000				478.2234	478.2234	
Kalapat	36	829.3076	829.3076		0.0000				829.3076	829.3076	
Kalapat	37	374.5966	374.5966		0.0000				374.5966	374.5966	
Kalapat	38	354.6524	354.6524		0.0000				354.6524	354.6524	
Kalapat	39	532.6088	532.6088		0.0000				532.6088	532.6088	
Total Kalapat		21488.3500	16623.2920	4621.9480	0.0000	243.1100	0.0000	0.0000	21488.3500	21488.3500	2624.9710
Kodbil	1	466.7712		466.7712	0.0000				466.7712	466.7712	259.22
Kodbil	2	529.7740		523.774	0.0000	6			529.774	529.774	340
Kodbil	3	561.5448		537.5448	0.0000	24			561.5448	561.5448	
Total Kodbil		1558.0900	0.0000	1528.0900	0.0000	30.0000	0.0000	0.0000	1558.0900	1558.0900	599.2200



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Krushnapur	1	469.0400	469.0400		0.0000				469.04	469.04	
Krushnapur	2	150.9600	150.9600		0.0000				150.96	150.96	
Total Krushnapur		620.0000	620.0000	0.0000	0.0000	0.0000	0.0000	0.0000	620.0000	620.0000	0.0000
Mankadchua	1	184.2127		181.2127	0.0000	3			184.2127	184.2127	80.961
Mankadchua	2	140.4240		140.4240	0.0000				140.424	140.424	57.1
Mankadchua	3	357.6833		357.6833	0.0000				357.6833	357.6833	298.5
Total Mankadchua		682.3200	0.0000	679.3200	0.0000	3.0000	0.0000	0.0000	682.3200	682.3200	436.5610
Ranibeda	1	941.1202	941.1202		0.0000				941.1202	941.1202	13
Ranibeda	2	891.2982	891.2982		0.0000				891.2982	891.2982	72.75
Ranibeda	3	424.6781	424.6781		0.0000				424.6781	424.6781	125
Ranibeda	4	611.8135	606.8135		0.0000	5			611.8135	611.8135	400
Total Ranibeda		2868.9100	2863.9100	0.0000	0.0000	5.0000	0.0000	0.0000	2868.9100	2868.9100	610.7500
Salaikena Siriabahal		89.4599		75.4599	0.0000	14			89.4599	89.4599	75
Samakoi		620.3700		610.3700	0.0000	10			620.37	620.37	620.37
Tamanga		1362.6424		1359.6424	0.0000	3		10.0	1362.6424	1362.6424	377.1
Total Telkoi		36142.2023	25468.7757	10244.4003	0.0000	429.0263	0.0000	10.0000	36142.2023	36142.2023	7183.9970
Total RF		112899.1035	25468.7757	64787.8352	19895.1080	2747.3846	0.0000	147.0000	112899.1035	112899.1035	29959.8990
PRF											
BJP RANGE											
Amuni		50.5987			50.5987				50.5987	50.5987	
Bayakumutia		118.0045				4	114.0045	5.0	118.0045	118.0045	118
Champe		363.8651			303.8651	60		20.0	363.8651	363.8651	317
Danla		170.7029			170.7029				170.7029	170.7029	80



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Digachampe		170.0146			120.0146	50			170.0146	170.0146	166.862
Dumuridiha		501.9573			501.9573				501.9573	501.9573	60
Gandhamardan		2171.3480			2171.3480				2171.348	2171.348	
Gonasika		334.3871					334.3871	80.0	334.3871	334.3871	100
Gouda champei		447.3693		447.3693				60.0	447.3693	447.3693	
Lunaghar-I		131.6830			120.2898	11.3932		20.0	131.683	131.683	131.683
Lunaghar-II		360.9440			320.944	40		50.0	360.944	360.944	103.36
Raiguda		489.3750			489.375			60.0	489.375	489.375	71.6
Suakati-I		475.3921			475.3921				475.3921	475.3921	159
Suakati-II		134.9700			134.97				134.97	134.97	42.73
Total BJP		5920.6116	0.0000	447.3693	4859.4575	165.3932	448.3916	295.0000	5920.6116	5920.6116	1350.2350
CHAMPUA RANGE											
Baitarani East 'A'		154.1400		154.14					154.14	154.14	147.4
Baitarani East 'B'		309.2000		309.2					309.2	309.2	151
Total Champua	0	463.3400	0.0000	463.3400	0.0000	0.0000	0.0000	0.0000	463.3400	463.3400	298.4
Keonjhar Range											
Khajuribani		3575.4201		3569.4201		6		15.0	3575.4201	3575.4201	535.33
Patna Range											
Budhikapudi 'I'		31.0200		31.02				0	31.02	31.02	31.02
TELKOI RANGE											
Dublapal		88.2300		88.23					88.23	88.23	
Godhihudi		78.8700		78.87					78.87	78.87	
Rekuti		275.3000		273.1251		2.1749			275.3	275.3	54.48
Renda		1282.4329		1279.4329		3		4.0	1282.4329	1282.4329	258.823



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Sikheswari		3101.7000	3094.7000			7			3101.7	3101.7	339.429
Syamanali Koilisuta		148.2780		138.2780		10			148.278	148.278	148.278
Total Telkoi		4974.8109	3094.7000	1857.9360	0.0000	22.1749	0.0000	4.0000	4974.8109	4974.8109	801.0100
Total PRF	0	14965.2026	3094.7	6369.0854	4859.4575	193.5681	448.3916	314.0	14965.2026	14965.2026	3015.9950
PF											
BJP RANGE											
Tala Baitarani		13.48				13.48					
Jantari		22.8392				22.8392					
Fhuljhar-C		24.6				24.6					
Tentuli		28.6				28.6					
Dhaladihi		159.9685				159.9685					
Guptaganga		38.905				38.905		10.0			
Sukodola		85.55				85.55					
Sikulapada		9.69				9.69					
Jatra		14.3625				14.3625					
Tentulikhunti		287.0685				287.0685					
Sukodola		348.0119				348.0119					
Kalanda (Kha)		94.4965				94.4965		65.0			83
Kendughati		39.5046				39.5046					
Benidihi		22.1				22.1					
Anasuan		44.321				44.321					
Benidihi(A)		38.33				38.33					
Baragoda		276.3				276.3					
Raidiha(A)		20.32				20.32					



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Lungajhar(i)		31.4081				31.4081					
Lungajhar		32.7186				32.7186					
Lungajhar-A		15.277				15.277					
Tentulikhunti		45.322				45.322					
Jatra		117.9648				117.9648					
Champajhar		31				31					
Champajhar(A)		20.3619				20.3619					
Phuljhar-D		34.65				34.65					
Tana		64.332				64.332					
Anasuan(A)		0.1959				0.1959					
Kadalibadi		43.89				43.89					
Champajhar-B		3.14				3.14					
Champajhar		2.45				2.45					
Anasuan		55.084				55.084					
Champajhar		2.5				2.5					
Podadihi		120.838				120.838					
Upparabirikala-i		3.228				3.228					
Upparabirikala-ii		12.69				12.69					
BJP RANGE(T)		2205.498				2205.498	0.0000	75.0			83
CHAMPUA RANGE											
Kasia		105.396				105.396					
Kasia		7.622				7.622					
Chhatia		59.7082				59.7082					
Kaliapal		165.793				165.793					



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CHAMPUA(T)		338.5192				338.5192	0	0			
KEONJHAR RANGE											
Hunda		82.556				82.556					
TELKOI RANGE											
Dandargauni		34				34					
Kaliapani		13.7978				13.7978					
Rangamatia		3.7				3.7					
TELOI(T)		51.4978				51.4978	0	0			
Total PF	0	2678.0710	0.0000	0.0000	0.0000	2678.0710	0	75.0			83
DPF											
Barbil RANGE											
Murgabeda		518.23			518.23				518.23	518.23	
BJP RANGE											
Guptaganga		179.1081			179.1081				179.1081	179.1081	249.483
Katira		483.7163			483.7163			20.0	483.7163	483.7163	211
Pandadhar- Bayakumutia		259.439			259.439			20.0	259.439	259.439	30
Sanaghagara(B)		792.8602			792.8602				792.8602	792.8602	
Sundurua		753.7537			753.7537				753.7537	753.7537	65.5
Taramakanta		417.5775			417.5775				417.5775	417.5775	540.82
Kalanda		1060.862			1060.862				1060.862	1060.862	40
Kakharua		1240.073			1240.073			275.0	1240.073	1240.073	60.17
Khandadhar		1956.448			1956.448			85.0	1956.448	1956.448	64.68
Kuanr		2080.6917			2080.6917			150.0	2080.6917	2080.6917	272.74



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Kumundi(B)		88.62			88.62				88.62	88.62	88
Sanghagara (A)		583.84			583.84				583.84	583.84	40
Siddhamath		1112.6787			1112.6787				1112.6787	1112.6787	436.1
BJP RANGE(TOTAL)		11009.6682			11009.6682			550.0	11009.6682	11009.6682	2098.493
CHAMPUA RANGE		0			0				0	0	
Jamirta		313.6505			313.6505				313.6505	313.6505	
Kankana		170.2168			170.2168				170.2168	170.2168	50
CHAMPUA RANGE(T)		483.8673			483.8673				483.8673	483.8673	50
GHATGAON RANGE		0			0				0	0	
Kapaspada		80.3289			80.3289				80.3289	80.3289	
Khajurijuani		95.7075			95.7075				95.7075	95.7075	
Tara (B)		74.1329			74.1329				74.1329	74.1329	
GHATGAON(TOTAL)		250.1693			250.1693				250.1693	250.1693	
PATNA RANGE					0						
Machhagarh		14.3668			14.3668				14.3668	14.3668	
Mushkhori (A)		50.8829			50.8829				50.8829	50.8829	50.8829
Mushakhori (B)		72.2146			72.2146				72.2146	72.2146	54.161
Chemena II		23.97			23.97				23.97	23.97	23.97
PATNA(T)		161.4343			161.4343				161.4343	161.4343	129.0139
TELKOI RANGE					0						
Binjabahal (A)		18.3531			18.3531				18.3531	18.3531	
Binjabahal (B)		19.8303			19.8303				19.8303	19.8303	
Madhyapur		101.5797			101.5797				101.5797	101.5797	



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Oriya		161.0948			161.0948				161.0948	161.0948	159
Binjabahal (C)		140.83			140.83				140.83	140.83	125
Tangurubahal		493.84			493.84				493.84	493.84	114.68
TELKOI(T)		935.5279			935.5279				935.5279	935.5279	398.68
TOTAL DPF		13358.897	0	0	13358.897	0	0	550.0	13358.897	13358.897	2676.1869
Total VF (456 Site)		2615.341				2615.3410					
TOTAL (RF, PRF, PF, PRF,VF)		146516.6151	28563.4757	71156.9206	38113.4625	8234.3647	448.3916	1086.0000	141223.2031	141223.2031	35735.0809



13.4: Period of Working Plan and necessity for intermediate revision.

The period of this working Plan is from **1st April'2022 to 31st March 2032**. The implementation and probable impact of various prescriptions may be reviewed after five years of working, if it is so required



CHAPTER 14

SELECTION WORKING CIRCLE (S.W.C)

14.1 Name of working circle:

The Forest blocks having good crop with crop density above 40% and trees above harvestable diameter / Girth at Breast Height and in approach class are available, it is proposed to harvest silviculturally available trees. Previously these blocks were also managed under Selection Working Circle and at present are in a good health. There are also areas / patches in some compartment included in this Working Circle where congested pole crops are available and diameter growth is hampered due to non availability of adequate space to grow. These pockets coming in the same compartment needs to be thinned to put diameter growth. Other silvicultural operations are also required to retain or improve the stand through silvicultural operations. Hence **"Selection Working Circle"** is constituted for better management. The total Area assigned to this Working Circle is **28563.4757ha** which constitutes about 19.536% of the forest under management.

14.2 General constitution of working circle:

The forest blocks included in this working circle consists of Moist Sal Forests & dry Sal Forest in a mosaic form. Sal is up to 40% and above of the stand. The area assigned to this Working Circle is at **Table No 14.1 below**.

Table No 14.1 Forest blocks / Area allotted to Selection WC: Keonjhar Division.					
Sl No	Block	Compt.	Area for management	SWC	JFM
	Reserved Forest				
	TELKOI RANGE				



1	Bandhanjhari	1	288.6363	286.8948	61.05
	Bandhanjhari	2	328.6551	328.6551	275
	Bandhanjhari	3	400.7579	400.7579	130.192
	Bandhanjhari	4	422.4213	422.4213	296.12
	Bandhanjhari	5	1226.0894	1212.0894	485.349
	Total Bandhanjhari		2666.5600	2650.8185	1247.7110
2	Benamunda	1	536.1099	528.4351	215.6
	Benamunda	2	420.4424	420.4424	
	Benamunda	3	329.3223	329.3223	
	Benamunda	4	754.5780	754.5780	
	Benamunda	5	743.4774	677.9774	
	Total Benamunda		2783.9300	2710.7552	215.6000
3	Kalapat	1	352.2428	352.2428	271.02
	Kalapat	2	487.4167	487.4167	200
	Kalapat	3	643.1869	608.1869	200
	Kalapat	4	315.2613	315.2613	50
	Kalapat	5	576.0822	576.0822	17.8
	Kalapat	6	473.7798	473.7798	30.2
	Kalapat	7	369.6760	369.6760	364.1
	Kalapat	8	517.9873	517.9873	400
	Kalapat	9	768.0637	760.0637	213.74
	Kalapat	10	418.3862	418.3862	80.751
	Kalapat	11	534.1609	534.1609	112.98
	Kalapat	12	547.0863	547.0863	400
	Kalapat	13	355.2373	355.2373	284.38
	Kalapat	16	286.5535	286.5535	
	Kalapat	17	955.5484	955.5484	
	Kalapat	19	902.0019	857.0019	
	Kalapat	20	605.7983	605.7983	
	Kalapat	22	1036.0643	1036.0643	
	Kalapat	25	432.6041	432.6041	
	Kalapat	26	395.4647	395.4647	
	Kalapat	28	491.6586	491.6586	
	Kalapat	29	437.3879	437.3879	
	Kalapat	30	239.1701	239.1701	
	Kalapat	32	496.3186	496.3186	
	Kalapat	33	474.7783	474.7783	
	Kalapat	34	1029.9871	1029.9871	
	Kalapat	35	478.2234	478.2234	



	Kalapat	36	829.3076	829.3076	
	Kalapat	37	374.5966	374.5966	
	Kalapat	38	354.6524	354.6524	
	Kalapat	39	532.6088	532.6088	
	Total Kalapat		21488.3500	16623.2920	2624.9710
4	Krushnapur	1	469.0400	469.0400	
	Krushnapur	2	150.9600	150.9600	
	Total Krushnapur		620.0000	620.0000	
5	Ranibeda	1	941.1202	941.1202	13
	Ranibeda	2	891.2982	891.2982	72.75
	Ranibeda	3	424.6781	424.6781	125
	Ranibeda	4	611.8135	606.8135	400
	Total Ranibeda		2868.9100	2863.9100	610.7500
	S.Total		30427.7500	25468.7757	4699.0320
	PRF				
	TELKOI RANGE				
6	Sikheswari		3101.7000	3094.7000	339.429
	S.Total		3101.7000	3094.7000	339.429
	G.Total		33529.4500	28563.4757	5038.4610

14.3 General characteristics of vegetation:

The forest included in this working circle bears a good Sal forests along with associates of drier vegetation and having trees in different Girth Classes well distributed as detailed in the Table no 14.2. The forest blocks considered for harvesting are furnished below.

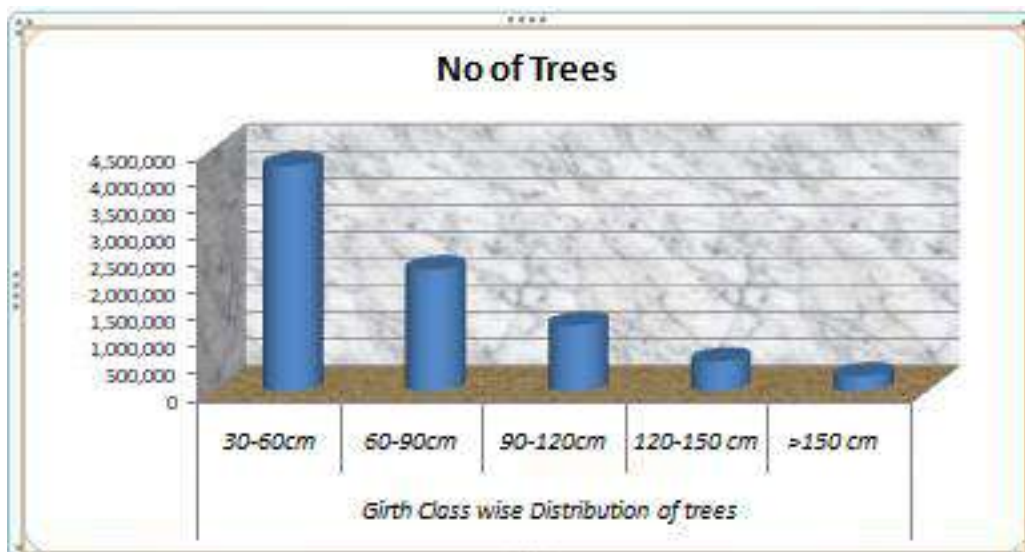
Table No 14.2 Girth Class wise distribution of Trees in SWC: Keonjhar Division

Sl No	Name of Block	Comp No	Girth Class wise Distribution of trees					Total
			30-60cm	60-90cm	90-120cm	120-150 cm	>150 cm	
1	Bandhanjhari	1	50,291	21,505	11,212	4,748	2,656	90,412
		2	46,763	16,681	7,812	3,213	1,749	76,218
		3	58,412	33,038	17,319	8,458	3,873	1,21,100
		4	72,917	35,573	18,737	8,593	4,181	1,40,001
		5	1,74,480	75,882	41,192	16,529	7,165	3,15,248
2	Benamunda	1	84,506	42,515	22,969	10,169	5,323	1,65,482
		2	65,814	31,072	16,503	7,234	3,926	1,24,549
		3	34,050	13,351	6,105	2,596	1,436	57,538
		4	1,14,423	64,765	37,633	14,399	8,871	2,40,091
		5	87,396	34,867	10,774	7,122	3,953	1,44,112
3	Kalapat	1	53,224	31,678	19,549	9,438	4,453	1,18,342
		2	52,380	35,445	22,161	11,129	4,680	1,25,795

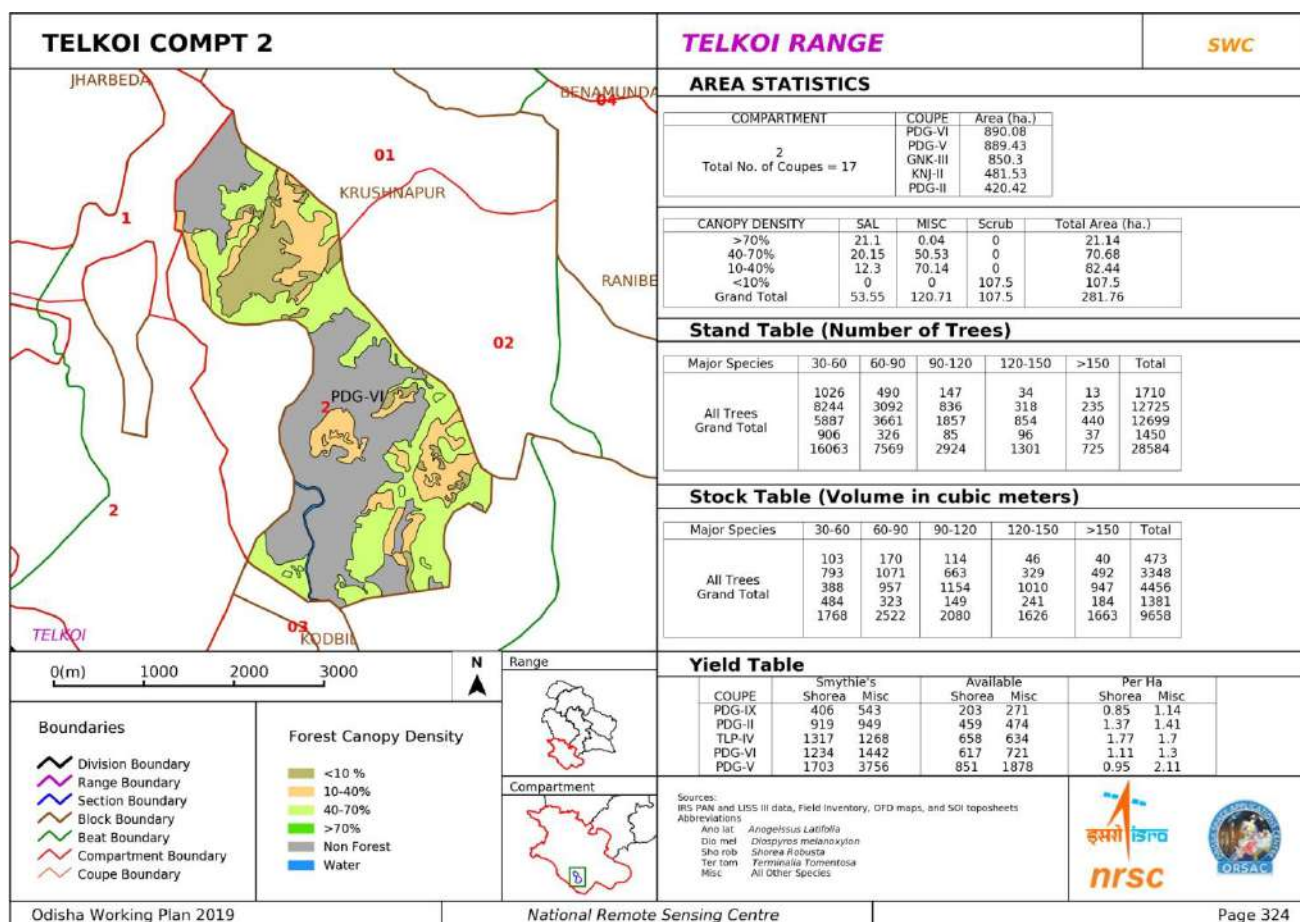


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		3	97,759	56,564	30,697	14,351	6,928	2,06,299
		4	57,236	29,447	14,439	6,373	3,384	1,10,879
		5	96,988	63,487	29,660	17,502	9,571	2,17,208
		6	81,836	43,317	24,849	11,261	5,830	1,67,093
		7	61,480	34,976	20,109	9,679	4,531	1,30,775
		8	42,670	25,845	15,198	7,422	3,300	94,435
		8	39,374	23,825	14,014	6,793	3,087	87,093
		9	1,32,412	68,089	38,658	17,620	8,918	2,65,697
		10	77,538	50,300	23,616	11,604	4,826	1,67,884
	Kalapat	11	1,03,681	52,618	24,464	11,304	6,120	1,98,187
		12	99,210	50,248	24,124	11,062	6,122	1,90,766
		13	66,679	30,079	15,586	6,839	3,871	1,23,054
		16	54,498	29,363	12,986	6,286	3,340	1,06,473
		17	2,09,634	81,319	37,484	13,959	6,700	3,49,096
		19	1,17,073	72,096	43,725	18,100	10,644	2,61,638
		20	88,952	45,677	24,291	11,140	5,648	1,75,708
	Kalapat	22	1,63,226	1,03,453	63,769	25,051	9,797	3,65,296
		25	62,176	25,670	9,588	7,062	5,689	1,10,185
		25	15,792	7,651	3,186	1,533	844	29,006
		26	70,542	39,231	19,391	9,240	4,603	1,43,007
		28	77,134	59,514	37,406	8,827	3,115	1,85,996
		29	49,654	31,314	17,991	9,358	3,654	1,11,971
		30	31,267	19,722	11,009	5,894	2,176	70,068
	Kalapat	32	66,600	39,498	21,261	11,768	5,666	1,44,793
		33	79,789	44,560	24,668	12,169	5,248	1,66,434
		34	1,46,159	81,704	50,765	24,797	11,633	3,15,058
		35	39,179	23,028	11,905	6,199	2,670	82,981
		35	36,011	18,854	10,995	5,144	2,586	73,590
		36	1,33,818	72,569	43,147	20,535	9,359	2,79,428
		37	64,004	36,237	17,784	9,279	4,206	1,31,510
		38	13,793	9,236	6,047	4,213	1,186	34,475
		38	31,150	19,615	12,131	8,460	2,460	73,816
		39	81,084	50,927	24,655	14,475	5,456	1,76,597
4	R a n i b e d a	1	1,41,158	85,348	56,910	18,400	15,022	3,16,838
		2	1,51,069	82,535	45,931	19,725	13,560	3,12,820
		3	58,638	30,210	18,559	8,435	4,608	1,20,450
		4	87,841	61,663	34,703	14,061	5,690	2,03,958
5	Krushnapur	1 & 2	92,014	43,210	22,750	9,938	5,616	1,73,528
6	Sikheswari		1,86,647	87,370	37,338	18,732	10,855	3,40,942
	Total		42,00,421	22,66,741	12,27,755	5,58,218	2,80,785	85,33,920
	Percentage		49.2	26.6	14.4	6.5	3.3	100.0

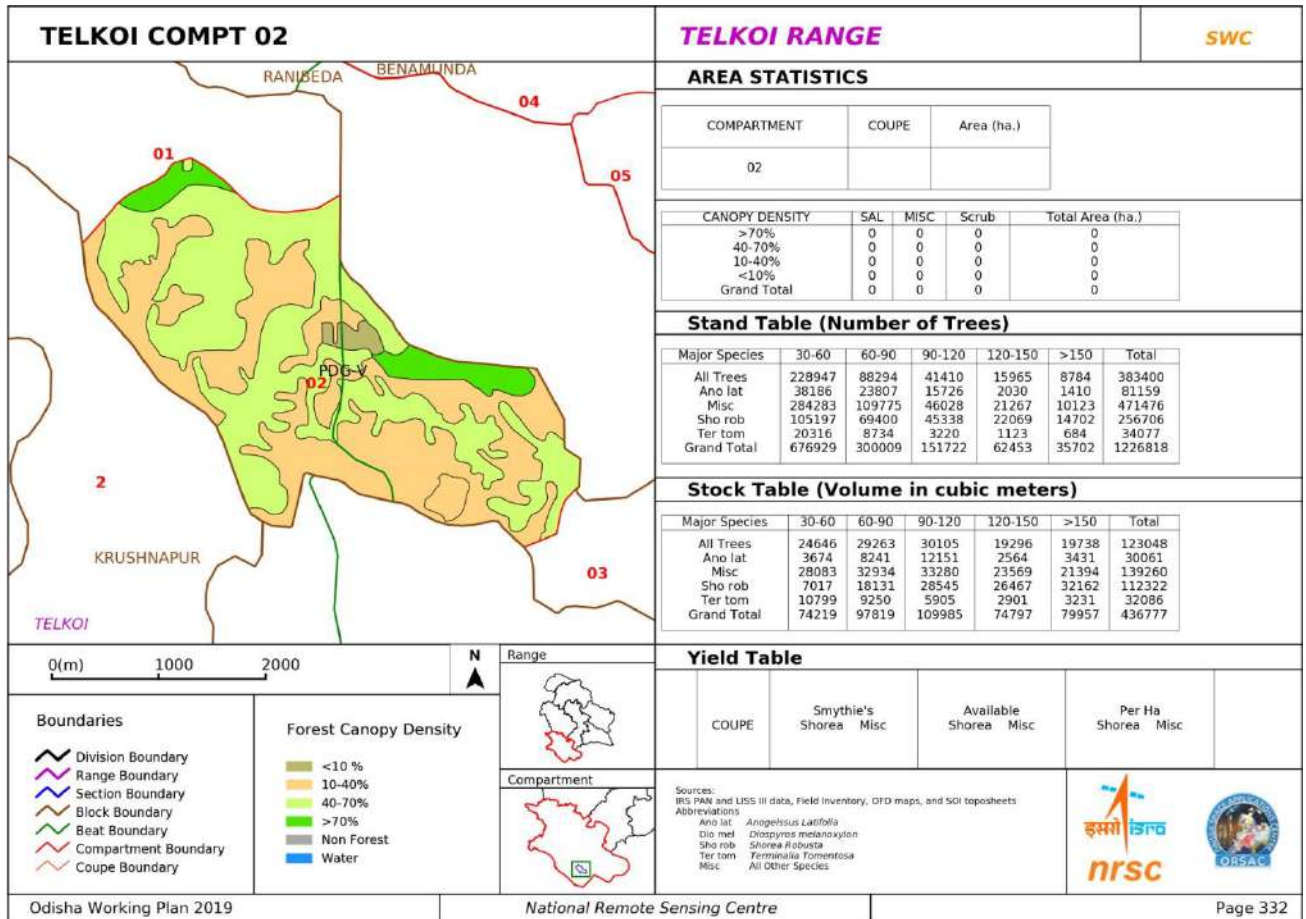


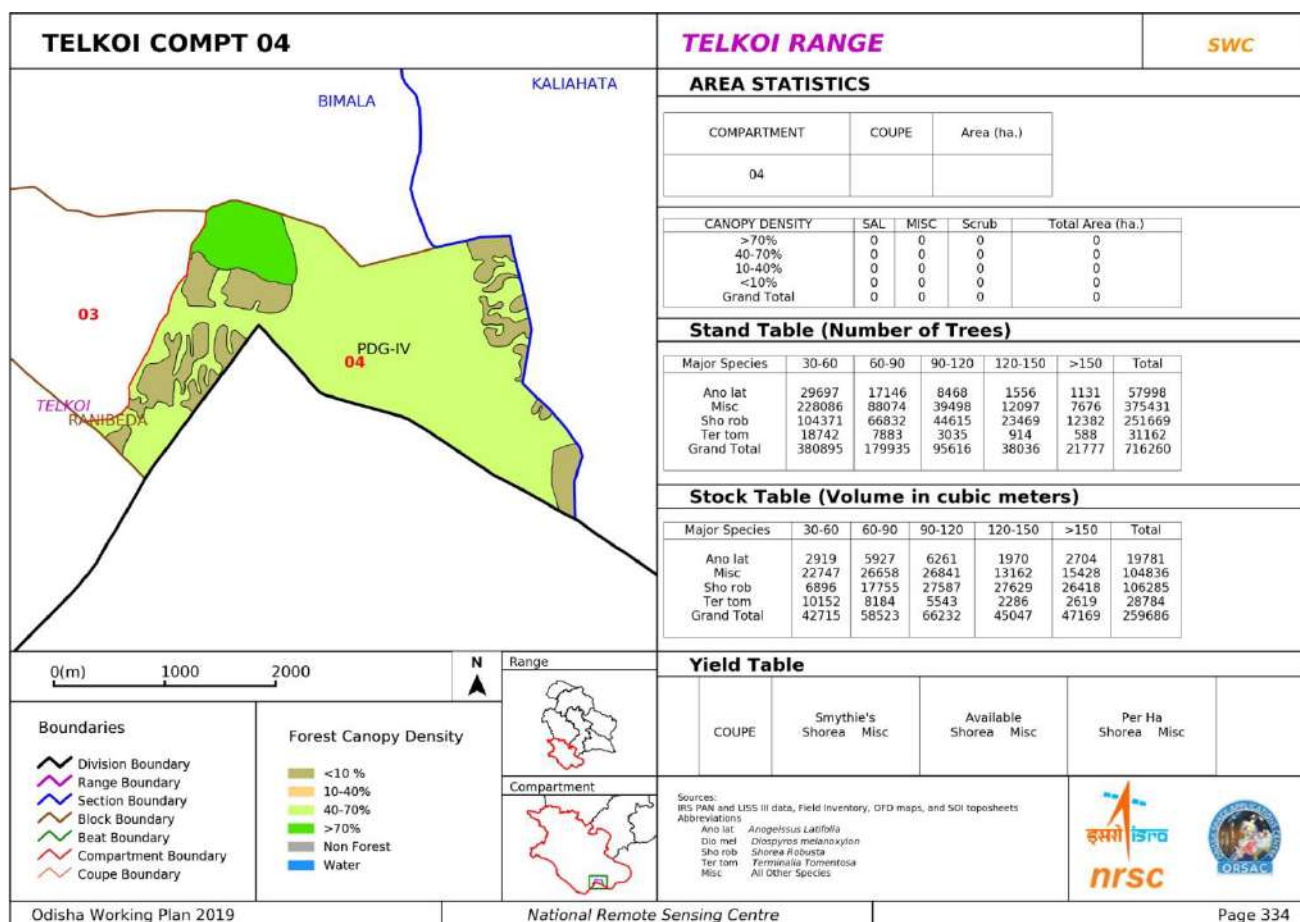
From the above distribution of trees (as reported by NRSC after sample point data analysis) indicates a normal distribution. In case of forest blocks taken for harvesting purpose the trees in 150cm and above constitutes about 3.3%.





TELKOI COMPT 01		TELKOI RANGE		SWC			
		AREA STATISTICS					
		COMPARTMENT		COUPE	Area (ha.)		
		01					
		CANOPY DENSITY		SAL	MISC	Scrub	Total Area (ha.)
		>70%		0	0	0	0
40-70%		0	0	0	0		
10-40%		0	0	0	0		
<10%		0	0	0	0		
Grand Total		0	0	0	0		
Stand Table (Number of Trees)							
Major Species	30-60	60-90	90-120	120-150	>150	Total	
All Trees	131410	50366	24248	9258	5182	220464	
Ano lat	23745	18825	11971	1774	1476	57791	
Misc	224696	86688	39425	13175	7763	371747	
Sho rob	73646	51827	43313	19433	11592	199811	
Ter tom	13150	5448	2989	740	599	22926	
Grand Total	466647	213154	121946	44381	26612	872739	
Stock Table (Volume in cubic meters)							
Major Species	30-60	60-90	90-120	120-150	>150	Total	
All Trees	14087	16666	17766	11176	11727	71422	
Ano lat	2603	6789	9029	2236	3542	24199	
Misc	21477	25175	27191	14789	16806	105438	
Sho rob	5155	14069	27612	23121	24037	93994	
Ter tom	7199	5735	5543	1941	2702	23120	
Grand Total	50521	68434	87140	53262	58813	318173	
Yield Table							
COUPE	Smythie's Shorea Misc		Available Shorea Misc		Per Ha Shorea Misc		
Sources: IRS PAN and LRS III data, Field inventory, OFD maps, and SOI toposheets Abbreviations Ano lat Anogeissus Latifolia Dio mel Diospyros melanoxylon Sho rob Shorea Robusta Ter tom Terminalia tomentosa Misc All Other Species							
Odisha Working Plan 2019		National Remote Sensing Centre					
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14.4 Felling series, cutting sections and JFM areas:

14.4.1 Area allotted to Different Felling Series:

For convenience of working and distributed working all over the Range, the assigned area is allotted to various **Felling Series** and further sub divided to Sections (namely Annual Coupes). The Felling Series Constituted is as follows.



14.4.1(i) Constitution of Felling Series:

Table No 14.3 Constitution of Felling Series- Keonjhar Division					
Name of Felling Series	Range	Forest Block	Comp. No	Area in ha	Total
Kaliahata Felling Series (KLH)	Telkoi	Karlapat RF	17	955.5484	4484.2167
			22	1036.0643	
			25	432.6041	
			26	395.4647	
			28	491.6586	
			29	437.3879	
			30	239.1701	
			32	496.3186	
Bimala Felling Series (BML)	Telkoi	Karlapat RF	33	474.7783	4074.1542
			34	1029.9871	
			35	478.2234	
			36	829.3076	
			37	374.5966	
			38	354.6524	
			39	532.6088	
Padanga Felling Series (PDG)		Bandhanjhari RF	1	286.8948	5716.8110
			2	328.6551	
			3	400.7579	
			4	422.4213	
			5	1212.0894	
		Benamunda	1	528.4351	
			2	420.4424	
			3	329.3223	
			4	754.5780	
			5	677.9774	
		Kalapat	13	355.2373	



Sikheswari Felling Series (SSI)	Telkoi Range	Ranibeda	1	941.1202	5958.6100
			2	891.2982	
			3	424.6781	
			4	606.8135	
		Sikheswari		3094.7000	
Talapada F.S. (TPD)	Telkoi	Krushnapur	1	469.0400	3802.6457
		Krushnapur	2	150.9600	
		Karlapat RF	1	352.2428	
			2	487.4167	
			3	608.1869	
			4	315.2613	
			5	576.0822	
			6	473.7798	
Telkoi Felling Series (TLK)	Telkoi	Karlapat RF	7	369.6760	4527.0381
			8	517.9873	
			9	760.0637	
			10	418.3862	
			11	534.1609	
			12	547.0863	
			16	286.5535	
			19	857.0019	
			20	605.7983	
	Total	6 FS		28563.4757	28563.4757

14.4.1(ii) Abstract of Felling Series Constituted:

Table No 14.4 Abstract of Felling Series Constituted		
Sl No	Name of the Series	Area in Ha
1	Kaliahata F.S. (KLH)	4484.2167
2	Bimala Felling Series (BML)	4074.1542
3	Padanga F.S.(PDG)	5716.8110
4	Sikheswari Felling Series (SSI)	5958.6100
5	Talapada F.S. (TPD)	3802.6457
6	Telkoi Felling Series (TLK)	4527.0381
	Total	28563.4757

14.4.2 Cutting Series (Annual Coupe area)

For scientific management of forests and work distribution, each felling series is divided in to 10 sections (Annual Coupe). The sections are furnished below.

**14.4.2 (i) Cutting Sections of Kaliahata Felling Series****Table No 14.5 (i) Cutting Sections of Kaliahata Felling Series (KLH)**

Name of FS	Range	Year of Working	Section	Forest Block	Comp. no	Area in ha	Coupe Area in Ha
Kaliahata Felling Series (KLH)	Telkoi	2022-23	KLH-I	Kalapat	22 P	520.0	520.0
		2023-24	KLH-II	Kalapat	22(B)	516.0643	516.0643
		2024-25	KLH-III	Kalapat	32	496.3186	496.3186
		2025-26	KLH-IV	Kalapat	30	239.1701	239.1701
		2026-27	KLH-V	Kalapat	29	437.3879	437.3879
		2027-28	KLH- VI	Kalapat	28	491.6586	491.6586
		2028-29	KLH-VII	Kalapat	26	395.4647	395.4647
		2029-30	KLH-VIII	Kalapat	25	432.6041	432.6041
		2030-31	KLH-IX	Kalapat	17 (P)	475.00	475.00
		2031-32	KLH-X	Kalapat	17 (B)	480.5484	480.5484
			Total			4484.2167	4484.2167

14.4.2 (ii) Cutting Sections of Bimala Felling Series (BML)**Table No 14.5 (ii) Cutting Sections of Bimala Felling Series (BFS)**

Name of FS	Range	Year of Working	Section	Forest Block	Comp. no	Area in ha	Coupe Area in Ha
Bimala Felling Series (BML)	Telkoi	2022-23	BFS-I	Kalapat	38	354.6524	354.6524
		2023-24	BFS-II	Kalapat	37	374.5966	374.5966
		2024-25	BFS-III	Kalapat	36 (P)	415.0	415.0
		2025-26	BFS-IV	Kalapat	36(B)	414.3076	414.3076
		2026-27	BFS-V	Kalapat	35	478.2234	478.2234
		2027-28	BFS- VI	Kalapat	39	532.6088	532.6088
		2028-29	BFS-VII	Kalapat	34 (1stP)	350.0	350.0
		2029-30	BFS-VIII	Kalapat	34 (2d P)	350.0	350.0
		2030-31	BFS-IX	Kalapat	34(B)	329.9871	329.9871
		2031-32	BFS-X	Kalapat	33	474.7783	474.7783
			Total			4074.1542	4074.1542

**14.4.2 (iii) Cutting Sections of Padanga Felling Series (PDG)**

Table No 14.5 (iii) Cutting Sections of Padanga Felling Series (PDG)							
Name of FS	Range	Year of Working	Section	Forest Block	Comp. no	Area in ha	Coupe Area in Ha
Padanga Felling Series (PDG)	Telkoi	2022-23	PDG-I	Benamunda	3	329.3223	329.3223
		2023-24	PDG-II	Benamunda	2	420.4424	420.4424
		2024-25	PDG-III	Benamunda	1	528.4351	528.4351
		2025-26	PDG-IV	Kalapat	13	355.2373	355.2373
		2026-27	PDG-V	Benamunda	4	754.5780	754.5780
		2027-28	PDG- VI	Benamunda	5	677.9774	677.9774
		2028-29	PDG-VII	Bandhanjhari	3	400.7579	823.1792
				Bandhanjhari	4	422.4213	
		2029-30	PDG-VIII	Bandhanjhari	5 (P)	610.0	610.0
		2030-31	PDG-IX	Bandhanjhari	5(B)	602.0894	602.0894
		2031-32	PDG-X	Bandhanjhari	1	286.8948	615.5499
					2	328.6551	
			Total			5716.8110	5716.8110

14.4.2 (iv) Cutting Sections of Sikheswari Felling Series (SSI)

Table No 14.5 (iv) Cutting Sections of Sikheswari Felling Series (SFS)							
Name of FS	Range	Year of Working	Section	Forest Block	Comp. no	Area in ha	Coupe Area in Ha
Sikheswari Felling Series (SSI)	Telkoi	2022-23	SFS-I	Sikheswari	1 st P	620.0	620.0
		2023-24	SFS-II		2 nd P	620.0	620.0
		2024-25	SFS-III		3 rd P	620.0	620.0
		2025-26	SFS-IV		4 th P	620.0	620.0
		2026-27	SFS-V		Bal.	614.70	614.70
		2027-28	SFS- VI	Ranibeda	3	424.6781	424.6781
		2028-29	SFS-VII		4	606.8135	606.8135
		2029-30	SFS-VIII	Ranibeda	1 (P)	470.0	470.0
		2030-31	SFS-IX		1(B)	471.1202	471.1202
		2031-32	SFS-X	Ranibeda	2	891.2982	891.2982
			Total			5958.6100	5958.6100

**14.4.2 (v) Cutting Sections of Talpada Felling Series (TPD)**

Table No 14.5 (v) Cutting Sections of Talpada Felling Series (TPD)							
Name of FS	Range	Year of Working	Section	Forest Block	Comp. no	Area in ha	Coupe Area in Ha
Talpada Felling Series (TPD)	Telkoi	2022-23	TPD-I	Kalapat RF	4	315.2613	315.2613
		2023-24	TPD-II		3 (P)	305.0	305.0
		2024-25	TPD-III		3(B)	303.1869	303.1869
		2025-26	TPD-IV	Kalapat RF	1	352.2428	352.2428
		2026-27	TPD-V		2	487.4167	487.4167
		2027-28	TPD- VI		6	473.7798	473.7798
		2028-29	TPD-VII		7	369.6760	369.6760
		2029-30	TPD-VIII	Krushnapur	1	469.0400	469.0400
		2030-31	TPD-IX	Krushnapur	2	150.9600	150.9600
		2031-32	TPD-X	Kalapat RF	5	576.0822	576.0822
			Total			3802.6457	3802.6457

14.4.2 (vi) Cutting Sections of Telkoi Felling Series (TLK)

Table No 14.5 (vi) Cutting Sections of Telkoi Felling Series (TLS)							
Name of FS	Range	Year of Working	Section	Forest Block	Comp. no	Area in ha	Coupe Area in Ha
Telkoi Felling Series (TLK)	Telkoi	2022-23	TLS-I	Kalapat RF	11	534.1609	534.1609
		2023-24	TLS-II		12	547.0863	547.0863
		2024-25	TLS-III		19 (P)	430.0	430.0
		2025-26	TLS-IV		19(B)	427.0019	427.0019
		2026-27	TLS-V		20	605.7983	605.7983
		2027-28	TLS- VI		8	517.9873	517.9873
		2028-29	TLS-VII		9 (P)	380.0	380.0
		2029-30	TLS-VIII		9 (B)	380.0637	380.0637
		2030-31	TLS-IX		10	418.3862	418.3862
		2031-32	TLS-X		16	286.5535	286.5535
			Total			4527.0381	4527.0381

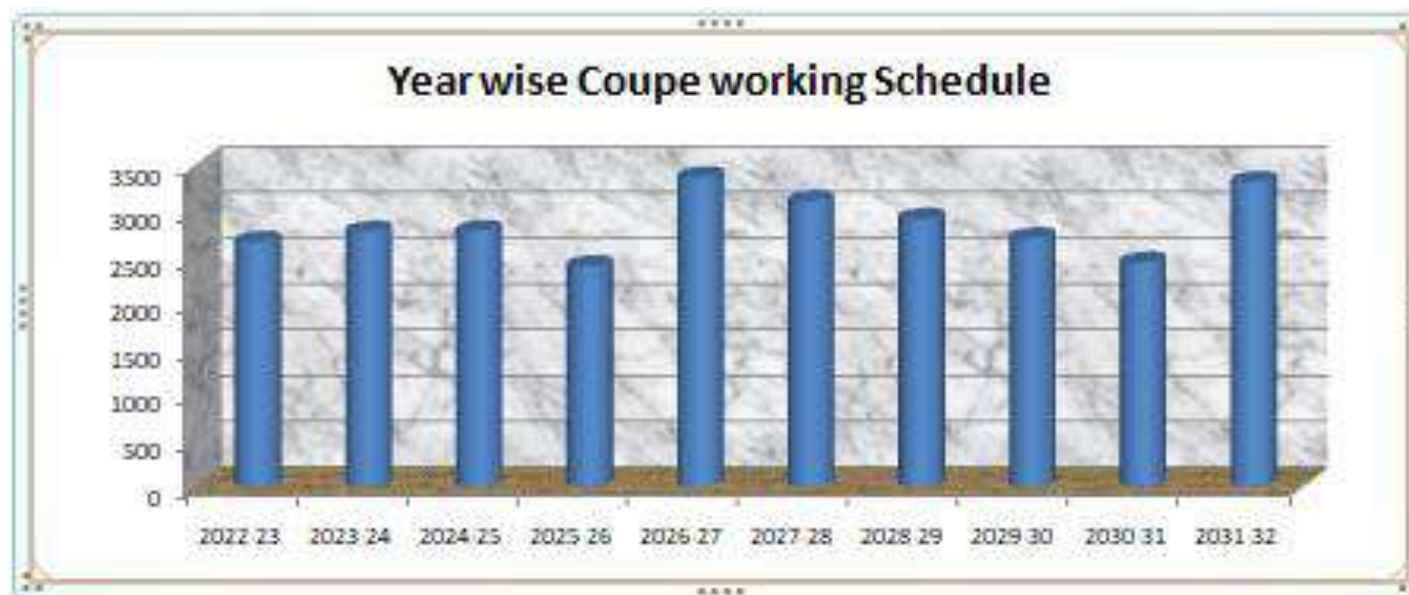
14.4.3 Cutting Section Abstract

The year wise area allotted to various working coupes are furnished at Table No 14.6



Table No 14.6 Area assigned for working (Year wise & Felling Series Wise) Keonjhar Division

Name of FS	Year of Working										Total
	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	
Kaliahata	520	516.0643	496.3186	239.1701	437.3879	491.6586	395.4647	432.6041	475	480.5484	4484.2167
Bimala	354.6524	374.5966	415	414.3076	478.2234	532.6088	350	350	329.9871	474.7783	4074.1542
Padanga	329.3223	420.4424	528.4351	355.2373	754.578	677.9774	823.1792	610	602.0894	615.5499	5716.8110
Sikheswari	620.00	620.00	620.00	620.00	614.70	424.6781	606.8135	470.0000	471.1202	891.2982	5958.6100
Talpada	315.2613	305	303.1869	352.2428	487.4167	473.7798	369.676	469.04	150.96	576.0822	3802.6457
Telkoi	534.1609	547.0863	430.0	427.0019	605.7983	517.9873	380.0	380.0637	418.3862	286.5535	4527.0381
Total	2673.3969	2783.1896	2792.9406	2407.9597	3378.1043	3118.69	2925.1334	2711.7078	2447.5429	3324.8105	28563.4757



**14.5 Blocks, compartments and JFM area:**

The area assigned to this Working Circle and allotted to JFM (VSS) has been indicated at Table No 14.1. The same is reproduced below for reference. (Table No 14.7)

Table No 14.7 Blocks, compartments and JFM area				
Block	Compt.	Area for management	SWC	JFM
Reserved Forest				
Telkoi Range				
Bandhanjhari	1	288.6363	286.8948	61.05
Bandhanjhari	2	328.6551	328.6551	275
Bandhanjhari	3	400.7579	400.7579	130.192
Bandhanjhari	4	422.4213	422.4213	296.12
Bandhanjhari	5	1226.0894	1212.0894	485.349
Total Bandhanjhari		2666.5600	2650.8185	1247.7110
Benamunda	1	536.1099	528.4351	215.6
Benamunda	2	420.4424	420.4424	
Benamunda	3	329.3223	329.3223	
Benamunda	4	754.5780	754.5780	
Benamunda	5	743.4774	677.9774	
Total Benamunda		2783.9300	2710.7552	215.6000
Kalapat	1	352.2428	352.2428	271.02
Kalapat	2	487.4167	487.4167	200
Kalapat	3	643.1869	608.1869	200
Kalapat	4	315.2613	315.2613	50
Kalapat	5	576.0822	576.0822	17.8
Kalapat	6	473.7798	473.7798	30.2
Kalapat	7	369.6760	369.6760	364.1
Kalapat	8	517.9873	517.9873	400
Kalapat	9	768.0637	760.0637	213.74
Kalapat	10	418.3862	418.3862	80.751
Kalapat	11	534.1609	534.1609	112.98
Kalapat	12	547.0863	547.0863	400
Kalapat	13	355.2373	355.2373	284.38
Kalapat	16	286.5535	286.5535	
Kalapat	17	955.5484	955.5484	
Kalapat	19	902.0019	857.0019	
Kalapat	20	605.7983	605.7983	
Kalapat	22	1036.0643	1036.0643	



Kalapat	25	432.6041	432.6041	
Kalapat	26	395.4647	395.4647	
Kalapat	28	491.6586	491.6586	
Kalapat	29	437.3879	437.3879	
Kalapat	30	239.1701	239.1701	
Kalapat	32	496.3186	496.3186	
Kalapat	33	474.7783	474.7783	
Kalapat	34	1029.9871	1029.9871	
Kalapat	35	478.2234	478.2234	
Kalapat	36	829.3076	829.3076	
Kalapat	37	374.5966	374.5966	
Kalapat	38	354.6524	354.6524	
Kalapat	39	532.6088	532.6088	
Total Kalapat		21488.3500	16623.2920	2624.9710
Krushnapur	1	469.0400	469.0400	
Krushnapur	2	150.9600	150.9600	
Total Krushnapur		620.0000	620.0000	
Ranibeda	1	941.1202	941.1202	13
Ranibeda	2	891.2982	891.2982	72.75
Ranibeda	3	424.6781	424.6781	125
Ranibeda	4	611.8135	606.8135	400
Total Ranibeda		2868.9100	2863.9100	610.7500
S.Total		30427.7500	25468.7757	4699.0320
PRF				
Telkoi Range				
Sikheswari		3101.7000	3094.7000	339.429
S.Total		3101.7000	3094.7000	339.429
G.Total		33529.4500	28563.4757	5038.4610
Percentage				17.64



14.6 Special objectives of Management:

Special objectives of management of this working Circle is within the general objectives of the Working Plan. The special objectives are outlines below.

- i) To remove mature and silviculturally available trees before they become unsound.
- ii) To create openings in the canopy to allow adequate light so as to allow establishment of light demanding species i.e. principally Sal.
- iii) To thin out the congested pole crop to allow diameter growth and also have interim harvest through which the VSS looking after the area will be benefited.
- iv) To allow natural regeneration and cover the entire area with vegetation of climatic species.
- v) To improve the density of the forest crop as well as stand structure by suitable silvicultural operations.
- vi) To remove dead and unsound trees for creating hygienic condition in the forest.
- vii) To carryout subsidiary silvicultural operations so that conducive situation can be created for better growth of existing crop and natural regeneration.
- viii) To manage the forest to maintain it at this Climatic Stage so as to keep this composition of Forest with majority of Sal.

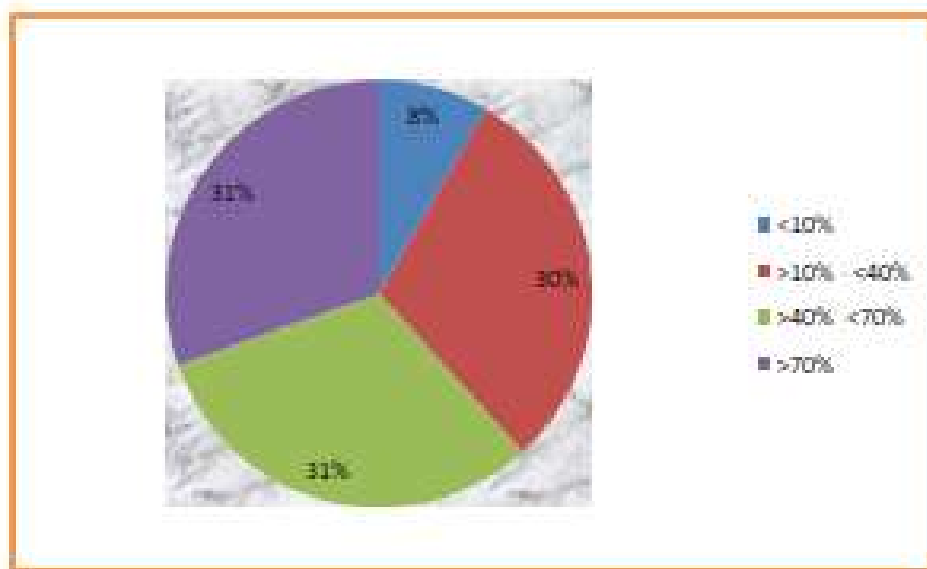
14.6.1 Analysis of the crop:

The growing Stock of the assigned Blocks/ Compartments is estimated through Sample Point enumeration & subsequent analysis. The crop density (Density Map) has been annexed to this Working Plan for ready reference. From the Satellite data it is observed that most of the blocks / compartments assigned to this working Circle are Sal Forest i.e. Sal constitutes above 40% The other species seen are associates of Sal i.e. Asan, Arjun, Piasal (Bija), Kuruma (Haldu), Kasi. Crop Density wise forest area as related to Selection Working Circle as reported in the Stock map is furnished at Table No 14. 8



Table No 14.8 Distribution of Area Density Class wise in Forest blocks assigned to SWC of keonjhar RANGE

Name of Forest Block	Comp. No	Canopy Density Class					Total
		NF	<10%	>10% - <40%	>40% - <70%	>70%	
Kalapat	10	0	34.32	56.38	22.07	10.36	123.13
	13	0	29.83	163.62	142.86	26.87	363.18
	19	0	57.48	119.54	111.54	29.41	317.97
	30	0	16.53	160.63	170.69	202.76	550.61
	32	0	77.16	220.43	132.56	447.63	877.78
	33	0	18.59	86.91	289.59	277.38	672.47
	37	0	0	92.79	130.06	161.1	383.95
	38	0	33.29	154.18	59.46	275.18	522.11
	39	0	17.82	234.04	103.83	285.37	641.06
Ranibeda	4	0	188.11	396.42	605.58	0	1190.11
Total		0	473.13	1684.94	1768.24	1716.06	5642.37
Percentage			8.39	29.86	31.34	30.41	100.00



From the above data, it is observed that, about 61.7 of the area is under good forest cover of Density >40% and bears good harvestable trees. Besides the about 8.39 % of the area became scrub forest which need immediate attention of the management. 30% of the area are under degradation. It is in scattered patches and need to be treated under “**High Forest System**”, mainly seed sowing and dispersal of desired seeds.



14.6.2 Silvicultural system:

The Silvicultural System proposed to be adopted is **“Selection System with adequate improvement measures to restock the area in High Forest System”**. Under this adopted system the matured and dead trees will be selectively removed leaving adequate mother trees to have good seed dispersal and natural regeneration. After removal of selected trees, the remaining trees will be treated so as to obtain good established regeneration.

14.6.3 Rotation period:

The crop is mostly Sal to reach an exploitable girth above 150cm or so, considering present soil productivity and soil moisture regime, the Rotation Period of 120 years. During field visit and growth statistics available it is felt that Except Teak for all other species, the Rotation Period of 120 years is accepted and followed. In case of teak which has been introduced in Block Plantation in blank areas under Economic Plantation, the growth is very encouraging. Due to its high timber value it is in much demand in the locality, in the State and outside. Selective removal by illicit felling is a perceptible threat. Considering all its aspect i.e. Growth Status and Market demand, rotation age of 100 years for teak in this division is suggested.

14.6.4 Harvestable diameters:

Harvestable diameter is being prescribed in different plans for different species from time to time. The criteria considered for recommended “Harvestable Diameter / Girth” are as follows.

- i) The Annual Increment of the Species,
- ii) Development of unsoundness due to climatic and biotic factors,
- iii) Marketability & Demand,
- iv) Site Quality and productivity of Soil

Considering all aspect in the outgoing plan the exploitable Girth (GBH) for Sal was fixed at 150cm and above. Considering the present scenario GBH for exploitation is prescribed as follows. Prescription of previous plan is followed except in case of other species where the Exploitable Girth is prescribed at 135 cm and above.

The exploitable girth of different species is provided in **Table No: 14.9**



Table No 14.9 Exploitable Girth At Breast Height- Keonjhar Division.			
Sl. No.	Species		Girth
	Common name	Botanical name	
1	Sissoo	<i>Dalbergia latifolia</i>	135 cm & above
2	Dhaura	<i>Anogeissus latifolia</i>	
3	Sal (Sargi, Rengal)	<i>Shorea robusta</i>	150 cm & above
4	Siris (Sersuan)	<i>Albizia lebek</i>	
5	Senha (Sidha)	<i>Lagerstroemia parviflora</i>	
6	Piasal (Bija)	<i>Pterocarpus marsupium</i>	150 cm & above
7	Gambhar	<i>Gmelina arborea</i>	
8	Kurum (Haldu)	<i>Adina cordifolia</i>	
9	Kasi	<i>Bridelia retusa</i>	
10	Mundi	<i>Mitragyna parviflora</i>	
11	Asan (Sahaj)	<i>Terminalia tomentosa</i>	
12	Moi	<i>Lannea coromandelica</i>	
13	Semul (Simal)	<i>Bombax ceiba</i>	
14	All other species		135 cm & above

This will be applicable for all Felling Series and all other situation and Plantations.

14.6.5 Reducing factors and reduced areas:

The yield will be regulated by equi-productive area. No reduction factor has been prescribed.

14.6.6 Felling cycle:

The Plan period is 10 years i.e. from 2022-23 to 2031-32. The area assigned to this working circle will be covered within the Plan Period i.e. 10 years. Therefore a felling Cycle of 10 years is prescribed and followed.

14.6.7 Division into Annual Coupes (Cutting Sections):

The area assigned to this Working Circle has been divided to 6 Felling Series. Each felling Series has been sub divided to ten (10) Annual Coupes and numbered as I,II, III --- X prefixed with Felling Series abbreviation. The annual Coupe and area assigned has been out lined at Table No 14.5 above.

14.6.8 Calculation of the yield:

Basing on Sample enumeration data number of trees in different girth class available in the assigned compartments has been furnished at Table No 14.2. For Sal exploitable Class is 150cm and above. For all other species the harvestable GBH is also 150cm /135 cm as stated above . As Sal is the principal Species which constitutes about 85% of marked trees, for calculation of yield Approach class is taken from 120-150 cm and harvestable class 150 cm and above.



Smythies' Safeguarding Formula:- The yield shall be regulated by area with a percentage check on the removal of exploitable trees as per **"Smythies' Safeguarding Formula"**. As per this Formula the yield available during the felling Cycle is regulated by the number of trees of the lower girth class that may pass into next Girth Class (Exploitable Girth Class) during the felling cycle. The Increment is expressed by the following formula.

$$X = (F/T)x (II-Z\% \text{ of } II) \text{ --- equation No 1}$$

Where

F- is the felling Cycle i.e. 10

T - is the time taken by a II Class tree to reach to exploitable class i.e. Class –I

II – No of Trees in approach Class (120-150cm)

Z – Percentage of class-II trees that do not pass in to Class I in T years due to mortality or removal in between

From the growth data observed in Chapter 6 of this Plan the value of T and Z have been taken as 40 years and 50% respectively. Taking in to account the above value of parameters and considering a felling cycle of 10 years the annual yield y percentage of trees available for removal is computed as follows.

$$Y = \{ x / (1 + x/2) \} * 100 + A$$

Where, x is defined in equation no-1. Using this formula the availability of trees during the plan period in each compartment assigned to this Working Circle is furnished at table no 14. 12 & 14.13

Approach Class (Class-II) is (120-150cm) and harvestable class (Class-I) is 150cm and above.

Girth Class -wise trees available in different Girth Class Forest block wise is furnished at table no 14.10. The trees available in Desired Class i.e. II & I are as follows.



Table No 14.10 Trees available in Desired class

Sl No	Name of Block	Comp. No	Area in ha	Approach Class-II	Harvestable class -I	Valur of x as per above equation
1	Bandhanjhari	1	288.6363	4,748	2,656	594
		2	328.6551	3,213	1,749	402
		3	400.7579	8,458	3,873	1057
		4	422.4213	8,593	4,181	1074
		5	1226.0894	16,529	7,165	2066
2	Benamunda	1	536.1099	10,169	5,323	1271
		2	420.4424	7,234	3,926	904
		3	329.3223	2,596	1,436	325
		4	754.5780	14,399	8,871	1800
		5	743.4774	7,122	3,953	890
3	Kalapat	1	352.2428	9,438	4,453	1180
		2	487.4167	11,129	4,680	1391
		3	643.1869	14,351	6,928	1794
		4	315.2613	6,373	3,384	797
		5	576.0822	17,502	9,571	2188
		6	473.7798	11,261	5,830	1408
		7	369.6760	9,679	4,531	1210
		8	517.9873	14,215	6,387	1777
		9	768.0637	17,620	8,918	2203
		10	418.3862	11,604	4,826	1451
	Kalapat	11	534.1609	11,304	6,120	1413
		12	547.0863	11,062	6,122	1383
		13	355.2373	6,839	3,871	855
		16	286.5535	6,286	3,340	786
		17	955.5484	13,959	6,700	1745
		19	902.0019	18,100	10,644	2263
		20	605.7983	11,140	5,648	1393
	Kalapat	22	1036.0643	25,051	9,797	3131
		25	432.6041	8,595	6,533	1074
		26	395.4647	9,240	4,603	1155
		28	491.6586	8,827	3,115	1103
		29	437.3879	9,358	3,654	1170
		30	239.1701	5,894	2,176	737
	Kalapat	32	496.3186	11,768	5,666	1471
		33	474.7783	12,169	5,248	1521
		34	1029.9871	24,797	11,633	3100
		35	478.2234	11,343	5,256	1418
		36	829.3076	20,535	9,359	2567
		37	374.5966	9,279	4,206	1160



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		38	354.6524	12,673	3,646	1584
		39	532.6088	14,475	5,456	1809
4	R a n i b e d a	1	941.1202	18,400	15,022	2300
		2	891.2982	19,725	13,560	2466
		3	424.6781	8,435	4,608	1054
		4	611.8135	14,061	5,690	1758
5	Krushnapur	1 & 2	620.0000	9,938	5,616	1242
6	Sikheswari		3101.7000	18,732	10,855	2342
	Total					



Calculation of Y of Smith's Safeguard formula.

Table No 14.11 Calculation of Y of Smith's Safeguard formula.									
Sl No	Name of Block	Comp. No	Area in ha	Harvestable class -I	Value of x as per above equation	Value of y %	No of trees harvestable	To be harvested 25% i.e. 1 from 4 trees	Trees / ha
1	Bandhanjhari	1	288.6363	2,656	594	20.1	534	134	0.46
		2	328.6551	1,749	402	20.6	361	90	0.27
		3	400.7579	3,873	1057	24.0	930	233	0.58
		4	422.4213	4,181	1074	22.8	952	238	0.56
		5	1226.0894	7,165	2066	25.2	1806	451	0.37
2	Benamunda	1	536.1099	5,323	1271	21.3	1135	284	0.53
		2	420.4424	3,926	904	20.6	811	203	0.48
		3	329.3223	1,436	325	20.3	292	73	0.22
		4	754.5780	8,871	1800	18.4	1634	409	0.54
		5	743.4774	3,953	890	20.2	800	200	0.27
3	Kalapat	1	352.2428	4,453	1180	23.4	1042	260	0.74
		2	487.4167	4,680	1391	25.9	1211	303	0.62
		3	643.1869	6,928	1794	22.9	1588	397	0.62
		4	315.2613	3,384	797	21.1	713	178	0.57
		5	576.0822	9,571	2188	20.5	1964	491	0.85
		6	473.7798	5,830	1408	21.5	1256	314	0.66
		7	369.6760	4,531	1210	23.6	1067	267	0.72
		8	517.9873	6,387	1777	24.4	1560	390	0.75
		9	768.0637	8,918	2203	22.0	1961	490	0.64
		10	418.3862	4,826	1451	26.1	1261	315	0.75
	Kalapat	11	534.1609	6,120	1413	20.7	1267	317	0.59
		12	547.0863	6,122	1383	20.3	1243	311	0.57
		13	355.2373	3,871	855	19.9	770	192	0.54



Revised Working Plan of Keonjhar Division for the period 2022-23 to 2031-32

		16	286.5535	3,340	786	21.1	703	176	0.61
		17	955.5484	6,700	1745	23.0	1544	386	0.40
		19	902.0019	10,644	2263	19.2	2046	511	0.57
		20	605.7983	5,648	1393	22.0	1240	310	0.51
	Kalapat	22	1036.0643	9,797	3131	27.6	2700	675	0.65
		25	432.6041	6,533	1074	15.2	992	248	0.57
		26	395.4647	4,603	1155	22.3	1026	257	0.65
		28	491.6586	3,115	1103	30.1	937	234	0.48
		29	437.3879	3,654	1170	27.6	1009	252	0.58
		30	239.1701	2,176	737	29.0	630	158	0.66
	Kalapat	32	496.3186	5,666	1471	23.0	1302	325	0.66
		33	474.7783	5,248	1521	25.3	1328	332	0.70
		34	1029.9871	11,633	3100	23.5	2736	684	0.66
		35	478.2234	5,256	1418	23.8	1249	312	0.65
		36	829.3076	9,359	2567	24.1	2257	564	0.68
		37	374.5966	4,206	1160	24.2	1019	255	0.68
		38	354.6524	3,646	1584	35.7	1301	325	0.92
		39	532.6088	5,456	1809	28.4	1552	388	0.73
4	R a n i b e d a	1	941.1202	15,022	2300	14.2	2136	534	0.57
		2	891.2982	13,560	2466	16.7	2260	565	0.63
		3	424.6781	4,608	1054	20.5	946	236	0.56
		4	611.8135	5,690	1758	26.8	1523	381	0.62
5	Krushnapur	1 & 2	620.0	5,616	1242	19.9	1118	280	0.45
6	Sikheswari		3101.7000	10,855	2342	19.5	2114	528	0.17
	Total						61828	15457	



14.6.8.1 Yield Felling Series wise.

i) Kalapat FS:

Table No 14.12 (i) Cutting Sections of Kaliahata Felling Series (KLH)									
Name of FS	Range	Year of Working	Section	Forest Block	Comp. no	Area in ha	Coupe Area in Ha	No of Trees / ha	Trees can be marked
Kaliahata Felling Series (KLH)	Telkoi	2022-23	KLH-I	Kalapat	22 P	520.0	520.0	0.65	338
		2023-24	KLH-II	Kalapat	22(B)	516.0643	516.0643	0.65	335
		2024-25	KLH-III	Kalapat	32	496.3186	496.3186	0.66	328
		2025-26	KLH-IV	Kalapat	30	239.1701	239.1701	0.66	158
		2026-27	KLH-V	Kalapat	29	437.3879	437.3879	0.58	254
		2027-28	KLH- VI	Kalapat	28	491.6586	491.6586	0.48	236
		2028-29	KLH-VII	Kalapat	26	395.4647	395.4647	0.65	257
		2029-30	KLH-VIII	Kalapat	25	432.6041	432.6041	0.57	247
		2030-31	KLH-IX	Kalapat	17 (P)	475.00	475.00	0.40	190
		2031-32	KLH-X	Kalapat	17 (B)	480.5484	480.5484	0.40	192
				Total		4484.2167	4484.2167		2535



ii) **Bimala Felling Series (BFS)**

Table No 14.12 (ii) Cutting Sections of Bimala Felling Series (BML)									
Name of FS	Range	Year of Working	Section	Forest Block	Comp. no	Area in ha	Coupe Area in Ha	No of Trees / ha	Trees can be marked
Bimala Felling Series (BML)	Telkoi	2022-23	BML-I	Kalapat	38	354.6524	354.6524	0.92	326
		2023-24	BML-II	Kalapat	37	374.5966	374.5966	0.68	255
		2024-25	BML-III	Kalapat	36 (P)	415.0	415.0	0.68	282
		2025-26	BML-IV	Kalapat	36(B)	414.3076	414.3076	0.68	282
		2026-27	BML-V	Kalapat	35	478.2234	478.2234	0.65	311
		2027-28	BML- VI	Kalapat	39	532.6088	532.6088	0.73	389
		2028-29	BML-VII	Kalapat	34 (1stP)	350.0	350.0	0.66	231
		2029-30	BML-VIII	Kalapat	34 (2d P)	350.0	350.0	0.66	231
		2030-31	BML-IX	Kalapat	34(B)	329.9871	329.9871	0.66	218
		2031-32	BML-X	Kalapat	33	474.7783	474.7783	0.70	332
			Total			4074.1542	4074.1542		2857



iii) Padanga Felling Series (PDG)

Table No 14.12 (iii) Cutting Sections of Padanga Felling Series (PDG)									
Name of FS	Range	Year of Working	Section	Forest Block	Comp. no	Area in ha	Coupe Area in Ha	No of Trees / ha	Trees can be marked
Padanga Felling Series (PDG)	Telkoi	2022-23	PDG-I	Benamunda	3	329.3223	329.3223	0.22	72
		2023-24	PDG-II	Benamunda	2	420.4424	420.4424	0.48	202
		2024-25	PDG-III	Benamunda	1	528.4351	528.4351	0.53	280
		2025-26	PDG-IV	Kalapat	13	355.2373	355.2373	0.54	192
		2026-27	PDG-V	Benamunda	4	754.5780	754.5780	0.54	407
		2027-28	PDG- VI	Benamunda	5	677.9774	677.9774	0.27	183
		2028-29	PDG-VII	Bandhanjhari	3	400.7579	823.1792	0.58	232
				Bandhanjhari	4	422.4213		0.56	237
		2029-30	PDG-VIII	Bandhanjhari	5 (P)	610.0	610.0	0.37	226
		2030-31	PDG-IX	Bandhanjhari	5(B)	602.0894	602.0894	0.37	223
		2031-32	PDG-X	Bandhanjhari	1	286.8948	615.5499	0.46	132
					2	328.6551		0.27	89
			Total			5716.8110	5716.8110		2475



iv) Sikheswari Felling Series (SFS)

Table No 14.12 (iv) Cutting Sections of Sikheswari Felling Series (SFS)									
Name of FS	Range	Year of Working	Section	Forest Block	Comp. no	Area in ha	Coupe Area in Ha	No of Trees / ha	Trees can be marked
Sikheswari Felling Series (SSI)	Telkoi	2022-23	SSI-I	Sikheswari	1 st P	620.0	620.0	0.17	105
		2023-24	SSI-II		2 nd P	620.0	620.0	0.17	105
		2024-25	SSI-III		3 rd P	620.0	620.0	0.17	105
		2025-26	SSI-IV		4 th P	620.0	620.0	0.17	105
		2026-27	SSI-V		Bal.	614.70	614.70	0.17	104
		2027-28	SSI- VI	Ranibeda	3	424.6781	424.6781	0.56	238
		2028-29	SSI-VII		4	606.8135	606.8135	0.62	376
		2029-30	SSI-VIII	Ranibeda	1 (P)	470.0	470.0	0.57	268
		2030-31	SSI-IX		1(B)	471.1202	471.1202	0.57	269
		2031-32	SSI-X	Ranibeda	2	891.2982	891.2982	0.63	562
			Total			5958.6100	5958.6100		2237



v) Talpada Felling Series (TPD)

Table No 14.12 (v) Cutting Sections of Talpada Felling Series (TPD)									
Name of FS	Range	Year of Working	Section	Forest Block	Comp. no	Area in ha	Coupe Area in Ha	No of Trees / ha	Trees can be marked
Talpada Felling Series (TPD)	Telkoi	2022-23	TPD-I	Kalapat RF	4	315.2613	315.2613	0.57	180
		2023-24	TPD-II		3 (P)	305.0	305.0	0.62	189
		2024-25	TPD-III		3(B)	303.1869	303.1869	0.62	188
		2025-26	TPD-IV	Kalapat RF	1	352.2428	352.2428	0.74	261
		2026-27	TPD-V		2	487.4167	487.4167	0.62	302
		2027-28	TPD- VI		6	473.7798	473.7798	0.66	313
		2028-29	TPD-VII		7	369.6760	369.6760	0.72	266
		2029-30	TPD-VIII	Krushnapur	1	469.0400	469.0400	0.45	211
		2030-31	TPD-IX	Krushnapur	2	150.9600	150.9600	0.45	68
		2031-32	TPD-X	Kalapat RF	5	576.0822	576.0822	0.85	490
			Total			3802.6457	3802.6457		2468



vi) Telkoi Felling Series (TLS)

Table No 14.12(vi) Cutting Sections of Telkoi Felling Series (TLK)									
Name of FS	Range	Year of Working	Section	Forest Block	Comp. no	Area in ha	Coupe Area in Ha	No of Trees / ha	Trees can be marked
Telkoi Felling Series (TLK)	Telkoi	2022-23	TLK-I	Kalapat RF	11	534.1609	534.1609	0.59	315
		2023-24	TLK-II		12	547.0863	547.0863	0.57	312
		2024-25	TLK-III		19 (P)	430.0	430.0	0.57	245
		2025-26	TLK-IV		19(B)	427.0019	427.0019	0.57	243
		2026-27	TLK-V		20	605.7983	605.7983	0.51	309
		2027-28	TLK- VI		8	517.9873	517.9873	0.75	388
		2028-29	TLK-VII		9 (P)	380.0	380.0	0.64	243
		2029-30	TLK-VIII		9 (B)	380.0637	380.0637	0.64	243
		2030-31	TLK-IX		10	418.3862	418.3862	0.75	314
		2031-32	TLK-X		16	286.5535	286.5535	0.61	175
			Total			4527.0381	4527.0381		2787



14.6.8.2 Abstract of Yield Felling Series wise.

Table No 14.13 Area assigned for working (Year wise & Felling Series Wise) Keonjhar Division

Name of FS	Year of Working & No of trees to be Marked										Total
	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	
Kaliahata	520	516.0643	496.3186	239.1701	437.3879	491.6586	395.4647	432.6041	475	480.5484	4484.2167
Trees to be marked	338	335	328	158	254	236	257	247	190	192	2535
Bimala	354.6524	374.5966	415	414.3076	478.2234	532.6088	350	350	329.9871	474.7783	4074.1542
Trees to be marked	326	255	282	282	311	389	231	231	218	332	2857
Padanga	329.3223	420.4424	528.4351	355.2373	754.578	677.9774	823.1792	610	602.0894	615.5499	5716.8110
Trees to be marked	72	202	280	192	407	183	226	223	132	89	2475
Sikheswari	620.00	620.00	620.00	620.00	614.70	424.6781	606.8135	470.0000	471.1202	891.2982	5958.6100
Trees to be marked	105	105	105	105	104	238	376	268	269	562	2237
Talpada	315.2613	305	303.1869	352.2428	487.4167	473.7798	369.676	469.04	150.96	576.0822	3802.6457
Trees to be marked	180	189	188	261	302	313	266	211	68	490	2468
Telkoi	534.1609	547.0863	430.0	427.0019	605.7983	517.9873	380.0	380.0637	418.3862	286.5535	4527.0381
Trees to be marked	315	312	245	243	309	388	243	243	314	175	2787
Total Area	2673.3969	2783.1896	2792.9406	2407.9597	3378.1043	3118.69	2925.1334	2711.7078	2447.5429	3324.8105	28563.4757
Trees to be marked	1336	1398	1428	1241	1687	1747	1599	1423	1191	1840	15359
Timber Likely to be obtained @0.45 cum/ tree	601.2	629.1	642.6	558.45	759.15	786.15	719.55	640.35	535.95	828	6911.55
FW @ 1.5 Ton per 5 trees	400.8	419.4	428.4	372.3	506.1	524.1	479.7	426.9	357.3	552	4607.7



On analysis of Marking List for last three years it is observed that in a year the Sal and Non sal marking is in a ratio of 2:1. Hence out of trees to be marked $1/3^{\text{rd}}$ is expected to be Non- sal species and $2/3^{\text{rd}}$ will be Sal. In brief, as a thumb rule One non-Sal tree may be marked in total three trees marked in coupe

14.6.9 Table of felling;

Year wise area and number of trees likely to be removed has been furnished at table no 14. 14 and 14.15 above.

14.6.10 Method of executing the Felling:

a) Demarcation of Annual Coupe:

The annual coupes as outlines above shall be demarcated in the preceding year season or working on the ground by clearing 3-meter width. Stone cairns of (75cm +45cm)/2 x 60cm are to be placed at a visible distance and important turning points. The coupe line clearance shall be restricted to clear visibility only without removing the trees (30cm GBH and above) coming within the coupe line. A double coal tar ring shall be put on the breast height or the standing trees on the line at visible distance. In case of line coinciding with that of compartment line, the compartment line will be maintained by marking with double band of white paint at breast height of the trees standing on boundary at visible distance. In case of overlapping with two or more compartments/forests blocks, each compartment shall be treated as separate unit and such unit shall be demarcated with single coal tar ring on the trees standing on the boundary of compartment/forest blocks. After demarcation of Coupe line a sign board indicating Name of the Range, Felling Series, Coupe No, Area in ha, Year of Working is / are to be placed at entrance of the coupe, Roads adjacent to the coupe line for ease identification.

b) Marking Rules:

The forests to be worked out in this working circle are Sal and Non Sal forests. The crop is of irregular age class and pole crops are generally encountered. Marking should be taken up preferably by Forest Ranger and in no case it shall be below the rank of Forester. It shall be checked by Assistant Conservator of Forests up to 40% of the marking. The Divisional Forest Officer shall also ensure test check of required percentage at least 10% of the marked trees to ensure the application of Marking Rules. The marking should be in a conservative basis not on “Enhanced Production Approach”



- i. All trees to be marked for felling shall be blazed at two places, one at breast height and the other at just above ground level.
- ii. The blaze should be of size 15 cm x 15 cm and marked with departmental marking hammer and numbered serially.
- iii. If a tree is forked below the breast height, then it should be treated as separate tree but if forked above breast height, then it should be treated as one tree.
- iv. During marking, the trees shall be classified as sound and unsound basing on the external appearance.
- v. The trees standing on open/blank areas without established natural regeneration shall be excluded from marking.
- vi. The trees standing on the hilly terrain of 30° slopes or more should not be marked for felling except dead, uprooted trees.
- vii. Trees which cannot be dragged out from the stump site should not be marked.
- viii. Trees standing on nalla banks or eroded areas also should not be marked as this will lead to further soil erosion and gaps.
- ix. Marking also should not be made within 50 meters of public road on both sides, key habitat of wildlife such as game tank, water holes, salt licks and den etc. Area near to spring origin should be left without marking.
- x. Maring should be restricted to 1 trees out of 4 trees available for harvesting.
- xi. The marking of trees shall be restricted to those trees whose removal will not create permanent gap in the canopy and will not affect in the regeneration of the principal species.
- xii. In case of a tree is marked for felling, no other tree shall be marked within 30 meters Radius of that tree subject to further restriction on removal of trees as per limit stipulated.
- xiii. Marking should be done with all the dead, diseased, hollow and even uprooted trees except in case of requirement on the wild life point of view. The tree is reckoned as dead if its crown is completely leafless and the bark is peeled of partly or completely. Similarly, a tree is treated as diseased, if its main truck is affected with borer and powdery deposit on the stem or base and/or Sambar Akhia or there is visual evidence of affected bole. So also, a tree is considered as hollow, when the hollowness is established through naked eye.
- xiv. The overall limit of number of trees in a compartment / Coupe is to be regulated as per **Table**.
- xv. The fruit yielding trees like Mango, Kendu, Char, Mahula, Tamarind, Kusum, Bela etc. shall not be marked during its productive age.
- xvi. Trees removed illegally within preceding three years are to be adjusted against the trees to be marked.



- xvii. The trees actually available in the field are only to be marked. The number of trees indicated for marking is the guiding factor and not a binding to achieve the number.

c) Improvement marking:

The improvement marking shall be carried out mainly to improve the crop composition and enhance diameter growth without aiming at any yield from it. The following rules are prescribed for the circle.

All dead, diseased and defective trees will be marked for felling. However some dead standing trees as prescribed in the Wildlife Overlapping Working Circle will be retained in the interest of wild life purpose.

The marking and removal shall be subject to the following conditions:

- The marked trees shall form part of congested crop and principle of thinning warrants its removal.
- There shall be established seedlings, sapling or poles to replace the removal. No marking of fruit bearing trees such as Mango, Tamarind, Mahula, Kendu, Bela, Char, Kusum etc shall be done for its removal. The marking of trees shall be always of inferior species interfering or likely to hinder growth of principal species. The principle of thinning as described below to be followed.

d) Execution of Marking & Thinning:

The objectives of taking of thinning are

- i) To improve the hygienic condition.
- ii) To create best conditions of growth & obtain diameter growth of remaining trees.
- iii) Salvage the anticipated losses of the merchantable volume.
- iv) To obtain a desirable composition of crops.
- v) Retaining seed bearers.
- vi) Improvement in wood quality.
- vii) To obtain intermediate yield and increase net yield and financial out-turn.
- viii) Decomposition of raw hummus.
- ix) To reduce the risk of diseases and pests.

After thinning, the results expected are

- **Reduced competition in root and crown,**
- **Reduced weed growth,**
- **Improved quality of wood,**



- Regulation of rate of growth,
- Increase seed production,
- Reduction in the net cost of growing,
- Reducing the risk of fire and diseases,
- Encouraging the advanced growth,
- Fulfilling the market demands.

For undertaking thinning the following aspects are to be kept in mind.

- I. Before planning the nature and intensity of thinning preference between the intensity of thinning and quality of thinning should be decided.
- II. The trees remaining after the thinning should be able to compensate for the loss in increment by trees removed in thinning.
- III. There will be an optimum stocking for a given site and species.
- IV. For this individual trees are classified by height and size of crown and thinning is decided on the basis of which classes of trees are fit to be removed for maintaining the desired qualitative and quantitative nature of the thinning.
- V. The main purpose of the thinning is to release more space for future development of trees; the freedom of crown is the guiding factor for thinning purpose.
- VI. The retention of trees per unit should be decided first and then the number of trees to be removed should be marked accordingly.
- VII. The development of crown and stem are the deciding factor for sub-classification of the dominance classes of trees for the given site and species.
- VIII. Tree classification in regular forests are done as under

1. Classification based on height:

I) Dominant trees (D or D1)

It includes the trees that form the uppermost leaf canopy. They are the tallest trees that determine the top level of canopy they are also called pre-dominant trees.

ii) Co-dominant trees (CD or D2)

These are shorter than dominant. About 5/6th of the height of the dominant.

iii) Sub-dominant trees (SD or D3)

They do not form part of the uppermost leaf canopy. Their height is about 3/4th that of the tallest trees. They are also called dominated trees.



iv) Suppressed trees (S)

The height of the suppressed trees is about $\frac{1}{2}$ to $\frac{5}{8}$ th of the height of the best trees. Suppressed trees grown below the crowns of the other trees in the stand. The leading shoots are over-topped by their neighboring trees or at least shaded on all sides by them.

v) Wolf trees (W)

The wolf trees are large, coarse and misshapen trees.

vi) Whips (Wh)

This class comprises bent over and badly leaning trees. Whips have tall, thin stems which are unstable and may cause damage to other trees when they sway.

vii) Dead, dying and moribund trees (m)

This category consists of trees that are dead or at the point of death.

viii) Disease trees (k)

It includes trees that are infected with parasites and their growth is seriously affected due to infection.

ix) Reproduction or Regeneration (r)

It consists of recruits or regeneration.

x) Over mature or veterans.

Classification on the Basis of Crown

The crown spread may be taken as better indication than canopy position to understand growth potentialities of a tree. For this tree may be classification on the basis of the crown with average stem spacing as shown below:-

I. Spaced

Trees with free crown spreading having less than or equal to $\frac{3}{4}$ th that of spacing

II. Co-spaced

Trees with a free crown spread having $\frac{3}{4}$ th to $\frac{1}{2}$ (50-75%) that of the available spacing



III. Sub-spaced

Trees with the spread of free crown less than half but more than one-fourth $1/4^{\text{th}}$ of the space.

IV. Mal-spaced

Trees with a very small spread of trees crown which is less than a quarter of the spaced.

V. De-spaced

Trees will no free crown with little vigor.

VI. Dead, dying and low yielding trees

In the present situation, it is recommended to follow an ordinary thinning as described below.

This is known as “THINNING FROM THE BLOW” and consists of the removal of inferior individuals starting from the suppressed class, and then taking the dominated class and ultimately some of the dominant class.

It is a very common form of selective thinning in regular crops. It has been devised to be in line with nature because only those trees which have been unsuccessful in the struggle for growth are removed first.

i) Grade of Ordinary Thinning

The thinning grades are defined by the spacing class removed so that a check may be made by comparing yield table numbers for the mean diameter in question. There are various grades of thinning e.g. A, B, C, D, E, grades.

I. A-Grade

Light thinning- removal of dead, dying, diseased and suppressed trees.

II. B-Grade:

Moderate thinning - In addition to trees in A-grade further removal of defective dominated stems and whips. Advance growth which cannot be pruned or lopped may also be removed.



III. C- Grade (Heavy thinning):

This includes trees in grade A and B and all remaining dominated defective, co-dominants that may be removed without making lasting gaps in canopy. The C grade thinning is the standard grade in vogue for yield table compilation.

IV. D-Grade (Very Heavy Thinning):

This includes trees of all above grades and some good dominants so that no lasting or permanent gap develops in canopy. The left over trees are with good boles and crowns, well spaced and evenly distributed over the site for future development.

V. E-Grade (Extremely Heavy Thinning):

This type of thinning is adopted mainly for research purposes. This is the heaviest thinning that can be made in the crop without creating permanent gaps in the canopy. Many dominant stems are also removed.

It is always better to make C-grade or D-grade thinning in a dense crop in which thinning has been unduly delayed. The removal of trees should be Economic or Hygienic value. In addition to above classes the intermediate grades of thinning such as C/D may be carried out.

Precautions in First Thinning

The first thinning is very important for any crop. The following factors should be considered at the time of first thinning.

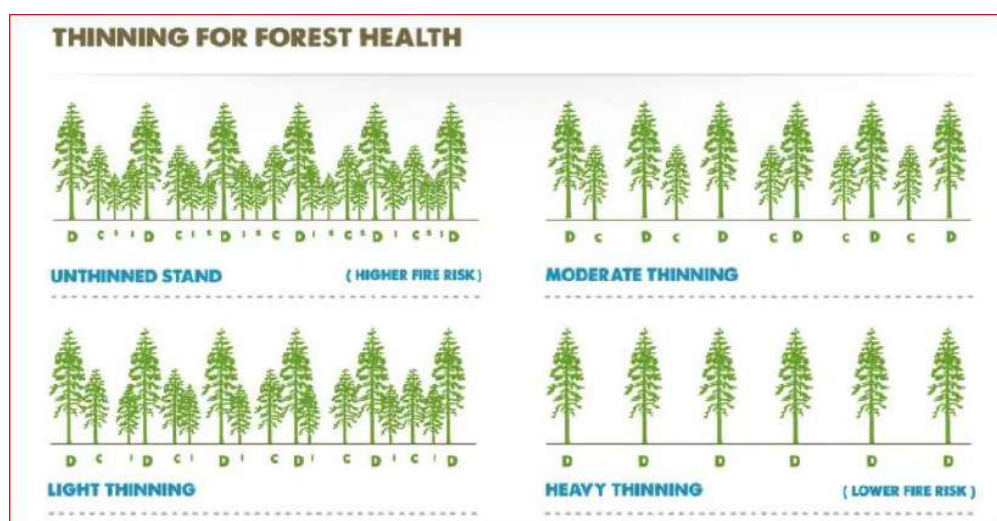
- The thinning should take place before adjoining trees check one another's growth.
- The thinning should not be postponed on the ground that the poles obtained will be non-saleable or uneconomic.
- The age of first thinning should be taken on the basis of height or size attained.
- The heavy thinning should not be carried on poorer sites, drier areas and steeper slopes, because the gaps may not fill up due to poor growth of trees.
- All thinning should be done on the silvicultural lines.
- The light demander species may require heavier thinning as compared to the shade bearer species.
- It is best to carry out silvicultural thinning. Some admixture of secondary species may be retained where this is desired on silvicultural or protection grounds.

ii) Thinning In Irregular Crops:

It is difficult to classify tree in an irregular crop. The general classifications which are used for the research purposes are THREE crown positions. It is suggested that in regular crops the degree of crown freedom and their further classification into large, medium and small crown sizes, should be taken in account.

Crown Freedom	Free	Restricted	Confine
Crown development or crown size	Well developed or large	Average or medium	Poor or small

- The crown freedom is judged irrespective of the size of the tree and its position in the stratification.
- The thinning in an irregular crop is done by selection method.
- The trees to be cut are that which restrict the growth of their neighbors on all sides and should be more valuable than their neighbors.
- The aim should be to maintain a crop of all diameter classes in a sufficient number of maximum sustained yield.
- The valuable species are retained whereas inferior trees of all diameter classes are removed.
- The removal of trees is carried out in diameter classes.
- It aims at continuous improvement by repeated removal of inferior stems in all diameter classes so that basal area or standing volume becomes more or less equal to theoretical ideal value.





iii) Factors Affecting Thinning Practice:

The following factors may be considered before the thinning practice:

1. Site Factors
2. Nature of species
3. Age

1. Site Factors

The site quality influence on thinning practice is that a relatively close canopy on the poorer sites should be maintained. On low quality sites heavy openings should not be made. The spacing out widely in earlier stages should not be carried out on hot, dry, slopes, on poor soils and on all sites where grass and other weed invasion is likely to occur. A poor site will usually support less stems per hectare than a good one.

2. Nature of Species

The shade-bearers are more tolerant of crown than the light demanders therefore more frequent thinning is needed for light demander species. Light demanders usually show good response to ordinary thinning where as shade-bearers to crown thinning. Sal, Sisoo, Asan, Teak, being light demanders require heavier grades of ordinary thinning.

3. Age

The crown formation depends on age and in young ages when the crown formation is not completed mechanical thinning or sticks thinning may be done with succession. The light demander species require heavier grade of thinning at frequent intervals in younger crops. On the other hand some species in middle age or maturity require crown thinning.

14.6.11 Subsidiary silvicultural operations (Cleaning & Thinning):

After Coupe working, the coupe area is required to be improved through Subsidiary Silvicultural Operation. The following works are required to be taken up under Subsidiary Silvicultural Operation (SSO)

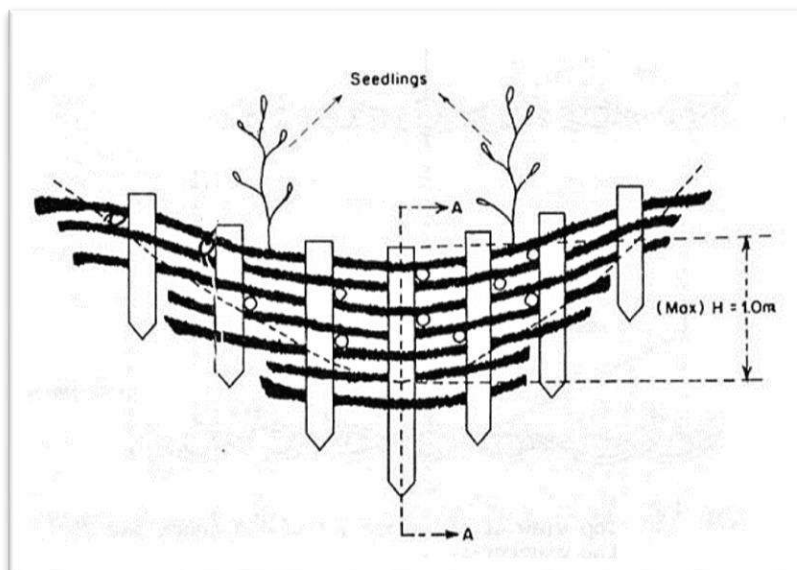
- (i) All marked trees those have not been removed by the OFDC Ltd during coupe working are required to be removed without considering its economic value.
- (ii) All debris, barks etc are to be removed from the coupe area and may be dumped in pits for natural decay and formation of humus.
- (iii) All diseased tree parts should be removed from the coupe and preferable burnt in order to check it's out break.



- (iv) High stumps of living trees if found, it should be cut back at a height 30-40cm above the ground level.
- (v) Silvicultural Cleaning and thinning are two major subsidiary silvicultural operations being prescribed. Cleaning is being taken up in Sapling Crops where as thinning is prescribed in Pole Crops. If such crop is available within the coupe cleaning / thinning if required to be taken up.
- (vi) Soil & Moisture Conservation work is required to be taken up. The forests assigned to this working circle are mostly matured with advance growth in pole stage. Hence thinning as required is prescribed. The details of thinning have been described under Para- 14.6.10.4 above.
- (vii) Soil & Moisture Conservation: Moisture regime of a forest block greatly influences the crop composition, quality class and productivity of the forests. The dryer the tract – poorer is the vegetation. The forests included in this working circle are the best available forest blocks of the division. It is recommended to improve soil moisture regime in forests to improve the vigour of the crop, allow the species towards a climatic climax with increased biodiversity. It is recommended to treat all the available seasonal nallas to enhance period of water flow, check soil erosion in slopes, increase the humus layer in forest floor. The following activities are prescribed
 - a) Vegetative / brushwood Check dams on nalla bed.
 - b) Loose boulder Check dams (LBCD)
 - c) Percolation Pits.
 - d) Create & Maintain Humus layers to reduce run off and enhance time of collection.

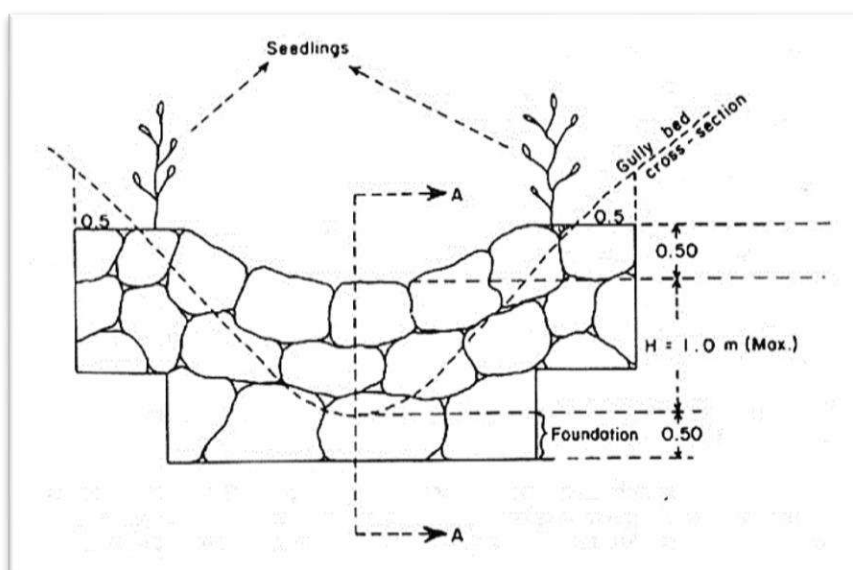
(A) Vegetative / Brushwood check dams:

Brushwood check dams made of posts and brush are placed across the gully / Nalla bed. The main objective of brushwood check dams is to hold fine material carried by flowing water in the gully / nalla. Small gully heads, no deeper than one meter, can also be stabilized by brushwood check dams. Brushwood check dams are temporary structures.



They can be employed in connection with land use changes such as improved range management until vegetative and slope treatment measures become effective

This type of check dams can be constructed by using fallen materials on forest floor.



(B) Loose Boulder Check Dams (LBCD):

Loose stone check dams made of relatively small rocks are placed across the gully. The main objectives for these dams are to control channel erosion along the gully bed and to stop waterfall erosion by stabilizing gully heads. Loose stone check dams are used to stabilize the incipient and small gullies and the branch gullies of a continuous gully or gully netwo



(C) Percolation Pits / trench:

A percolation trench, also called an infiltration trench, is a type of Best Management Practice (BMP) that is used to manage storm water runoff, prevent flooding and downstream erosion, and improve water quality in an adjacent river, stream. It is a shallow excavated trench filled with gravel or crushed stone that is designed to infiltrate storm water through permeable soils into the groundwater aquifer.

A percolation trench is similar to a dry well, which is typically an excavated hole filled with gravel.

(D) Create & Maintain Humus layers:

The forest floor, also called detritus, duff and the O horizon, is one of the most distinctive features of a forest ecosystem. It mainly consists of shed vegetative parts, such as leaves, branches, bark, and stems, existing in various stages of decomposition above the soil surface. Although principally composed of non-living organic material, the forest floor also teems with a wide variety of fauna and flora. It is one of the richest components of the ecosystem from the standpoint of biodiversity because of the large number of decomposers and predators present, mostly belonging to invertebrates, fungi, algae, bacteria. Certain (adapted) plants may be more apparent in tropical forests, where rates of metabolism and species diversity are much higher than in colder climates.

The major compartments for the storage of organic matter and nutrients within systems are the living vegetation, forest floor, and soil. The forest floor serves as a bridge between the above ground living vegetation and the soil, and it is a crucial component in nutrient transfer through the biogeochemical cycle. Much of the energy and carbon fixed by forests is periodically added to the forest floor through litter fall, and a substantial portion of the nutrient requirements of forest ecosystems is supplied by decomposition of organic matter in the forest floor and soil surface. The sustained productivity of forests is closely linked with the decomposition of shed plant parts, particularly the nutrient-rich foliage.

The amount of material in the forest floor depends on the balance between inputs from litter production and outputs from decomposition, and amounts also reflect the site's disturbance history. Both litter production and decomposition are functions of the site (e.g., wet versus dry; cold versus warm; nutrient rich versus nutrient poor) and the vegetation that occupies the site (e.g., conifer versus broadleaf). A site's forest floor is determined by its areal weight, depth, and nutrient content. Typically, forest floors are heaviest and deepest in boreal forests and mountain forests where decomposition rates



are slow. In contrast, the lightest and thinnest forest floors usually occur in tropical forests where decomposition rates are rapid.

Key soil functions SOM provide for include:

Nutrient Supply

Upon decomposition, nutrients are released in a plant-available form while maintaining current levels.

Water-Holding Capacity

Organic matter behaves somewhat like a sponge. It has the ability to absorb and hold up to 90 percent of its weight in water. Another great advantage of organic matter is that it releases nearly all of the water it holds for use by plants. In contrast, clay holds great quantities of water, but much of it is unavailable to plants.

Soil Aggregation

Organic matter improves soil aggregation, which improves soil structure. With better soil structure, water infiltration through the soil improves, which improves soil's ability to take up and hold water.

Erosion Prevention

Because of increased water infiltration and stable soil aggregates erosion is reduced with increased organic matter. Estimating Organic Material Needed to Increase Soil Organic Matter.

In Sal forests heavy leaf fall during January / February covers the entire forest floor. Frequent forest fire break the nutrition cycle in forest resulting poor forest growth. In order to enhance decomposition of leaf litters it is recommended to check burning of leaf litters, allow moderate grazing in February/ March for trampling and breaking of curacious leaf.

14.6.12 Regeneration:

a) Sowing of Seeds:

In the assigned forest blocks there are blank areas. It is recommended to cover the blank areas more than 0.50Ac to be covered under sowing of seeds. Seeds of Sal, Piasal, Sisoo, Asan, Arjun, Jamu, Kusum are to be sown on line or thali in June 1st / 2nd week just after few pre-monsoon shower. This arrangement will allow recruits to come up. Subsequently little care in form of weeding may fill up the gaps.

The silvicultural system adopted for this working circle is a **“High Forest System”**. For regeneration, the seed bearers are to be well maintained and covering of blank areas by



sowing of seeds with after care is prescribed. Collection of genetically good seeds is to be stressed. The standard guideline for selecting a mother tree is furnished below.

- Collect seed lots from between 15 and 25 individuals that are spaced at least 100 meters distance from any other collection tree of the same species.
- Choose trees in vigorous health and avoid any that are diseased, suppressed, deformed, environmentally stressed, or in otherwise poor health.
- Collect from trees that are well formed and either dominant or co-dominant in the canopy.
- Avoid individuals that are isolated from others of the same species.
- Harvest only mature seed from ripened fruits.
- To ensure genetic variation, collect fruits equally from all parts of the crown--top, sides, and bottom--as these parts may have been pollinated at varying times from different sources.
- Collect throughout a species' normal habitat, noting variations in site.
- Man-made stands, including live fencing, plantations, or windbreaks, should be carefully reviewed as to their establishment before being selected as a seed source.

b) Closing to Grazing:

The area assigned to a particular year is required to be closed to grazing for three to protect the natural regeneration to attain a sapling stage. This should be strictly adhering to. **A formal “Close to Grazing” order is to be issued and circulated to local offices / villages and VS**

Table no. 14.22 Closing to Grazing										
Year										
Coupe	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32
I	Closed									
II		Closed								
III			Closed							
IV				Closed						
V					Closed					
VI						Closed				
VII							Closed			
VIII								Closed		
IX									Closed	
X										Closed

c) Fire Protection Measure:

Strict Fire Protection measures are required to be taken up / ensured for 1st three years. All possible measures at hand are required to be utilized to enforce Fire Protection. The



following methods may be adopted depending upon extent of fire / time/ resource at hand.

- Control burning of debris,
- Fire line maintenance,
- Counter Firing,
- Beating out of Fire and use of blower machines,
- Use of Chemical extinguishers to control large in assessable fires.

As many forest blocks / large area have been assigned to VSS for protection etc, their assistance to be availed for fighting against fire. A Standard Operating Procedure (SOP) is required to be drawn up to meet any eventuality on Fire.

14.6.13 Associated regulations and measures:

Fire, grazing though two important site degraders, it can be judiciously use in high forest system to initiate a good regeneration. This aspect is to be seriously thought up and implemented to have a better stand.

Villagers / VSS are to be actively involved in all operations in assigned area. Their contribution will have a better result at a long run.

14.6.13.1 Annual Control Form:

The forest blocks assigned to a particular year for operation shall be taken up in the assigned year. After execution of prescribed work, an annual Report to be furnished in the form prescribed below. In case any deviation, the reason for such deviation is to be recorded. In case of spill over to next year for taking up the assigned operation, necessary approval of deviation is required to be obtained from PCCF, Odisha / CCF (P&SM) before executing the work. A copy of approved deviation shall find place in the Compartment History File.

Working circle- periodic block-		Felling- series cutting section	Localities prescribed localities suggested				Coupe control form		
							Coupe No.		Page
			As carried out				Excess(+) or deficit (-)		
Prescription in brief	W.P. para	Year due	Year	Block/ Compt.	Area	Volum e	Area	Volume	Remarks and Sanction
1	2	3	4	5	6	7	8	9	10

**FELLING CONTROL FORM**

128. The format of felling control form is as under:

Working circle- periodic block		Felling series- cutting section		Localities prescribed localities suggested (with areas)				Coupe control form	
								Coupe No.	Page
Range wise	Area	Species	Diameter class	Trees marked	Unit factor	Volume marked	Trees retained	% Trees retained	Remarks
1	2	3	4	5	6	7	8	9	10

14.6.13.2 Deviation Statement:

Any large and unusual operation from yield and target for plantation/ regeneration/ and or other activities provided in control forms of the working plan constitutes a deviation. These should also be spelt out. The check is through control forms and reporting is through deviation statements. Deviation beyond 20% of the target is considered a major deviation.

Statement showing deviations from working plan prescriptions

Year.....

Division.....

Serial No. of deviation	Control book name, form no. page	Reference to working plan		Nature of deviation requiring sanction
		Paragraph	Nature of prescription	





CHAPTER 15

IMPROVEMENT WORKING CIRCLE (I.W.C)

15.1 Name of working circle:

The Forest blocks having good crop with crop density above 40% and trees in harvestable diameter / Girth at Breast Height and in approach class are not sufficiently available. Previously these blocks were managed under Improvement Working Circle are also proposed to be managed under the same Working Circle. Some blocks which have been degraded due to biotic interference and other reasons are excluded from this Working Circle. Similarly, forest blocks which have developed and stabilized are proposed to include in this Working Circle. There are patches in the compartment / block where congested pole crops are available and diameter growth is hampered due to non availability of adequate space to grow. There are forest blocks in mining ravaged areas and a part of wildlife movement areas, within Elephant corridors. These areas need to be protected, improved to bear good vegetation and sustain the available wildlife. Silvicultural operations are also required to retain or improve the stand through silvicultural operations. Hence **“Improvement”** working circle is constituted for better management. The total Area assigned to this Working Circle is **71156.9206ha** which is about 53.55% of the total forest area under management.

15.2 General constitution of working circle:

Crops are mostly Sal and miscellaneous forests. The Sal constitutes about 40% and rest of miscellaneous forests. The following Forest blocks are included in this working Circle. The total area is **71156.9206ha** as detailed below **(Table No 14.1)**

**Table No 15.1 Area allotted to Improve Working Circle: Keonjhar division.**

Sl No	Block	Compt.	Area for management	IWC	JFM
	ReserveForest				
	Badbil Range				
1	Kandara-B		107.642	107.642	18
2	Kandara-C		81.34	81.34	
3	Karo	6	207.6606	207.6606	
	Karo	7	213.0557	201.5457	
	Karo	8	253.5588	241.7948	
	Karo	9	121.5139	110.7609	
	Karo	10	60.7159	20.2134	
	Karo	11	79.7934	59.7934	
	Karo	12	95.0992	95.0992	
	Karo	13	292.004	252.004	
	Karo	14	104.1279	104.1279	
	Karo	15	135.8676	135.8676	
	Karo	16	73.0508	73.0508	
	Karo	17	93.2023	93.2023	
	Karo	18	79.8511	79.8511	
	Karo	19	212.3228	212.3228	
	Karo	20	240.9238	240.9238	
	Karo	21	550.9151	550.9151	
	Karo	22	83.6114	83.6114	
4	Siddhamatha	3	163.4125	163.4125	51
	Siddhamatha	4	118.5854	118.5854	41
	Siddhamatha	9	72.5169	72.5169	
	Siddhamatha	10	48.7864	48.7864	
	Siddhamatha	11	198.2547	198.2547	
	Siddhamatha	12	298.3894	298.3894	
	Siddhamatha	13	121.2498	121.2498	
	Siddhamatha	14	114.7614	114.7614	
	Siddhamatha	15	374.9207	374.9207	
	Siddhamatha	16	94.5786	94.5786	
	Siddhamatha	17	240.3127	240.3127	
	Siddhamatha	18	223.103	223.103	
	Siddhamatha	19	501.2417	501.2417	
	Siddhamatha	20	105.1268	105.1268	
	Siddhamatha	21	205.1073	205.1073	
5	Uliburu		1482.727	1482.727	50
	Total Barbil		7449.3306	7314.8011	160
	BJP RANGE				



6	Anjar		196.4941	196.0891	
7	Mundala		432.0270	432.0270	194.7000
	Total BJP		628.5211	628.1161	194.7000
	CHAMPUA RANGE(T)				
8	Baitarani-A		1445.641	1439.161	
9	Baitarani - B		633.773	633.773	64.6
10	Balibandha		915.54	845.54	571.2
11	Bardhana		942.56	930.3897	313.23
12	Jyotipur		882.24	881.43	391.68
13	Kalikaprasad		1410.466	1280.3809	1410.466
14	Lakshmiposi ©		866.86	866.86	710
15	Mooney		89.03	89.03	50
16	Naibuga		293.7811	293.7811	
17	Pedipokhari		1486.35	1485.135	
18	Ukhunda		946.59	885.78	220
	Total Champua		9912.8311	9631.2607	3731.176
	GATGAON RANGE				
19	Atai	15	349.0257	349.0257	280
	Atai	16	435.259	435.259	359.507
	Atai	17	380.7564	370.7564	124
	Atai	18	362.5317	362.5317	
	Atai	19	715.6719	715.6719	
	Atai	20	521.9792	521.9792	
	Atai	21	818.5801	808.5801	
	Atai	22	469.1674	469.1674	
	Atai	23	198.2388	198.2388	
	Atai	24	476.8597	476.8597	
	Atai	25	452.4763	452.4763	
	Atai	26	520.4199	520.4199	
	Atai	27	308.1595	308.1595	
	Atai	28	563.8569	563.8569	
	Atai	29	517.0846	517.0846	
	Atai	30	342.4076	342.4076	
	Atai	31	567.2393	567.2393	
20	Badmasinabila		66.22	66.22	
21	Balipokhari		1011.75	967.75	469.688
22	Barabanka	4	486.1999	486.1999	432.1
	Barabanka	5	630.7777	580.7777	500
	Barabanka	6	314.2193	289.2193	202.2
	Barabanka	7	453.2338	418.2338	341.3
	Barabanka	8	420.1626	395.1626	292
	Barabanka	9	843.4398	821.4398	753.15



	Barabanka	10	479.1197	469.1197	
	Barabanka	11	635.6119	605.6119	
	Barabanka	12	518.7778	510.7778	
	Barabanka	13	476.4392	476.4392	
	Barabanka	14	436.6983	435.8883	
23	Ghatagaon		809.8465	809.8465	809.8
24	Kalimati		834.86	734.86	381.872
25	Masinabila		467.336	455.0875	120
	Total Ghatgaon		16884.4065	16502.348	5065.617
	KEONJHAR RANGE				
26	Balabhadrapur		746.67	706.67	378.233
	Barabanka	1	440.4002	440.4002	361.907
	Barabanka	2	462.7707	462.7707	388.692
	Barabanka	3	342.1732	342.1732	
	Barabanka	15	236.8039	170.9689	
	Barabanka	16	248.2354	228.2354	
	Barabanka	17	566.8606	533.8606	
27	Basantapur		1187.79	1137.3475	391
28	Belda		1058.94	972.948	432.88
29	Jadipada		1329.24	1197.8275	782
30	Maidankel		872.53	871.315	498.58
31	Nalapanga	2	834.1	829.645	193.15
32	Narayanpur		1631.637	1620.3565	1048.46
33	Nayagarh		2842.61	2800.61	838.146
34	Nelung		624.04	619.0423	369.476
35	Raghunathpur		1221.38	1181.38	1221.38
36	Raikala		690.01	653.5847	368.093
37	Sarupat		317.68	317.68	
38	Tangarani		409.1615	387.9387	338
	Total Keonjhar		16063.033	15474.754	7609.997
	PATNA RANGE				
	Atai	6	555.9434	555.9434	
	Atai	7	231.2487	231.2487	
	Atai	8	512.9323	477.9323	
	Atai	9	501.0262	501.0262	
39	Baunsuli		629.3	532.3	482
40	Belapasi		46.1	41.1	42
41	Billa-A		43.08	33.08	43.08
42	Budhikapudi 'II'		21.71	21.71	
43	Chadheibhol		48.88	48.88	48
44	Chemena-A		26.89	26.89	26.89
45	Lakshmiposi (P)		16.09	16.09	16.09



46	Ninua		60.58	60.58	50
47	Padmapur		795.64	655.64	370.62
48	Patna		1193.86	1064.86	726.742
49	Poipani		533.79	518.79	552.91
50	Pradhanpada		21.06	11.06	21.06
51	Purunapani		180.52	156.0542	180.52
52	Rasapada		9.95	9.95	9.5
53	Sarasposi		13.48	13.48	13.48
54	Tando		15.54	15.54	15
	Total Patna		5457.6206	4992.1548	2597.892
	TELKOI RANGE				
55	Dhanurjaypur		85.27	85.27	85.27
56	C. Golabandha		41.5	36.5	41.5
57	Jharbeda	1	360.0643	345.0643	
58	Jharbeda	2	914.7357	902.7357	249.944
59	Kalapat	14	601.7675	506.6575	
	Kalapat	15	491.6894	491.6894	
	Kalapat	18	625.2245	625.2245	
	Kalapat	21	912.4849	852.4849	
	Kalapat	23	650.7507	650.7507	
	Kalapat	24	311.6974	311.6974	
	Kalapat	27	543.103	543.103	
	Kalapat	31	640.3406	640.3406	
60	Kodbil	1	466.7712	466.7712	259.22
61	Kodbil	2	529.774	523.774	340
	Kodbil	3	561.5448	537.5448	
62	Mankadchua	1	184.2127	181.2127	80.961
	Mankadchua	2	140.424	140.424	57.1
	Mankadchua	3	357.6833	357.6833	298.5
63	Salaikena Siriabahal		89.4599	75.4599	75
64	Samakoi		620.37	610.37	620.37
65	Tamanga		1362.6424	1359.6424	377.1
	Total Telkoi		10491.5103	10244.4003	2484.9650
	Total RF		66887.2527	64787.8352	21844.3470
	PRF				
	BJP RANGE				
66	Gouda champei		447.3693	447.3693	
	Total BJP		447.3693	447.3693	
	CHAMPUA RANGE				
67	Baitarani East 'A'		154.140	154.140	147.400
68	Baitarani East 'B'		309.200	309.200	151.000



	Total Champua		463.340	463.340	298.400
	Keonjhar Range				
69	Khajuribani		3575.4201	3569.4201	535.33
	Patna Range				
70	Budhikapudi 'I'		31.0200	31.02	31.02
	TELKOI RANGE				
71	Dublapal		88.2300	88.23	
72	Godhihudi		78.8700	78.87	
73	Rekuti		275.3000	273.1251	54.48
74	Renda		1282.4329	1279.4329	258.823
75	Syamanali Koilisuta		148.2780	138.2780	148.278
	Total Telkoi		1873.1109	1857.9360	461.5810
	Total PRF		6390.2603	6369.0854	1326.3310
	G.Total		73277.5130	71156.9206	23170.6780

15.3 General characteristics of vegetation:

The forest included in this working circle bears a good forests and having trees in different Girth Classes well distributed as detailed in the following Table no 15.2

Table No 15.2 Girth Class wise distribution of Trees in Blocks / Compartments assigned to IWC

Sl No	Block	Com p. No	Girth Class in cm						Remark
			30- 60	60 - 90	90-120	120-150	>150	Total	
1	Kandara-B		23165	6950	3319	1288	847	35570	
2	Kandara-C		36577	12611	5801	2019	1410	58418	
3	Karo	6--- 22	803,588	322,990	157,799	65,262	38,055	1,387,694	
4	Sldhamath	3,4,9 -21	506,452	197,320	96,749	36,125	21,628	858,274	
5	Thakurani		770703	279118	128641	51044	32722	1262228	
6	Ulibaru		187778	60213	29736	11363	7172	296263	
7	Anjar		50304	20316	6761	2338	1469	81188	
8	Mundala RF		81767	29992	10744	4100	2262	128865	
9	Gouda Champei PRF		63583	23662	8725	3182	2072	101225	
10	Baitarani -A		521592	255619	64696	19279	12305	873492	
11	Baitarani -B		203361	95922	21825	5988	4012	331107	
12	Balibandh		173378	90334	16720	4037	2678	287148	
13	Bardhana		125458	52556	14166	4494	2934	199607	
14	Jyotipur		99309	47305	10562	2683	1822	161681	
15	Kalikaprasad		301033	148902	32975	9353	5673	497935	
16	Laxmiposi		157661	72893	16756	4749	3095	255154	
17	Naibuga		66542	27662	7811	2719	1747	106480	
18	Pedipokhari		274131	124502	33987	11392	6777	450790	
19	Ukhunda		115716	41329	13619	4738	2988	178390	

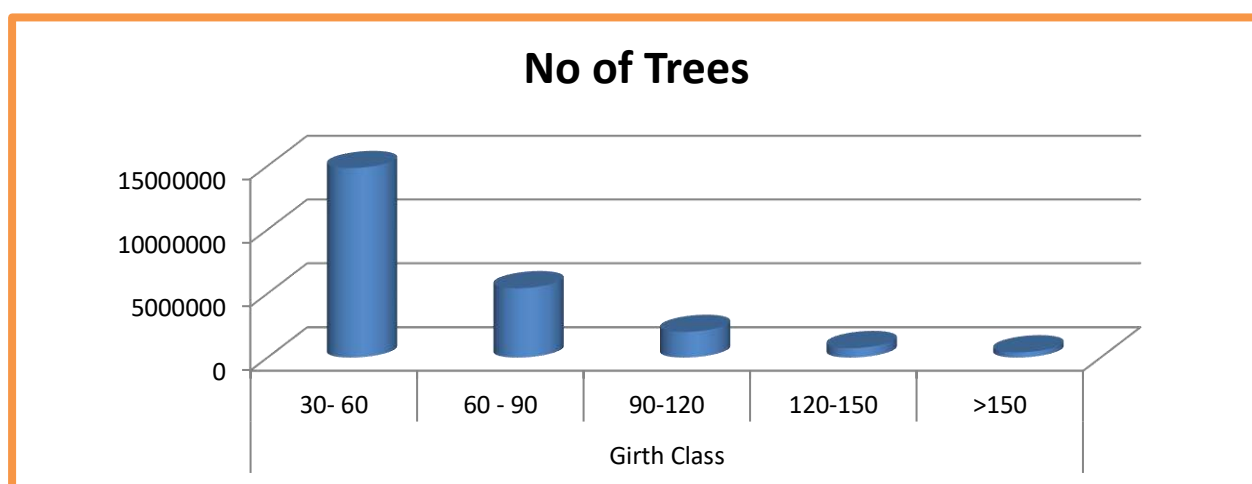


Revised Working Plan of Keonjhar Division for the period 2022-23 to 2031-32

20	Baitarani East-A PRF		44489	19420	5052	1541	901	71492	
21	Baitarani East-B PRF		67167	32220	6962	1674	1063	109085	
22	Atei RF	15-31	2,089,289	671,066	227,987	85,931	40,957	3,115,230	
23	Badamasinabila		11307	2865	732	276	171	15350	
24	Balipokhari		94420	25878	7159	2420	1384	131261	
25	Barabanka	4-14	1053146	314074	98514	37306	20293	1523333	
26	Ghatagaon		132980	34446	9259	3643	2195	182522	
27	Kalimati		88742	26104	8369	3625	2093	128933	
28	Masinabila		13167	3294	835	329	206	17830	
29	Balabhadrapur		155344	41642	12466	2282	1104	212837	
30	Barabank	1-3,15-17	686060	214595	68109	15885	9345	993994	
31	Basantpur		97822	30537	8507	1141	647	138654	
32	Belda		174775	27439	10580	3267	917	216977	
33	Jadipada		192089	52811	16294	3399	1768	266361	
34	Maidankhel		126650	34131	11817	3481	1961	178040	
35	Nalapanga		108215	29311	9401	2263	1197	150387	
36	Narayanpur		339438	87691	28153	6611	3327	465220	
37	Nayagarh		425474	124808	40885	10693	6166	608116	
38	Nelung		70412	20500	6754	1820	1056	100541	
39	Raghunathpur		273883	73145	24853	6998	3847	382726	
40	Raikela		130538	30710	10019	2323	1059	174649	
41	Sarupat		48672	26183	15571	7845	3135	101406	
42	Tangrani RF		84132	19257	6974	2170	1044	113576	
43	Khajuribani PRF		746217	238543	82207	23528	12979	1103474	
44	Atei RF	6-9	555,514	218,438	65,454	22,583	11,053	873,042	
45	Baunsli		64139	22872	7231	2700	1435	98377	
46	Belaposi		5972	2040	572	201	104	8890	
47	Billa-A		4308	1825	294	93	29	6548	
48	Chadheibhol		8434	3304	971	332	158	13198	
49	Chemna-A		5214	1706	524	187	101	7733	
50	Lakshmiposi		4272	1045	548	206	129	6200	
51	Ninua		11697	4791	975	326	152	17942	
52	Padampur		56431	14414	4647	1080	546	77118	
53	Patna		172183	64466	18479	6612	3360	265101	
54	Poipani		86331	32425	8482	2872	1365	131475	
55	Pradhanpada		11078	4290	980	335	166	16849	
56	Purunapani		50879	20504	4462	1519	689	78054	
57	Tando		10486	4219	1651	580	293	17429	
58	Dhanurjaypur		22306	9322	4527	1931	1073	39159	
59	C. Golabandha		5360	2332	1037	446	254	9429	
60	Jharbeda	1,2	264414	107982	53629	22780	12686	461491	



61	Kalapath	14,15 ,18,2 1,23, 24,27 , 31	628845	352351	191925	93683	42942	1309746	
62	Kobil		51230	20630	10707	4552	2561	89681	
63	Madhuchua		131550	58365	31249	13826	7373	242363	
64	Salaikena Siriabahal		30,670	14,436	7,918	3,392	1,928	58,344	
65	Samakoi		186,420	73,958	37,431	16,040	8,702	322,551	
66	Tamanga		249,480	114,520	59,357	26,226	13,992	463,575	
67	Dublupal PRF		16,436	6478	3,180	1,342	754	28191	
68	Godihudi PRF		6,253	3,023	1,750	740	419	12,186	
69	Renda PRF		292,537	126,281	65,452	28,302	15,247	527,819	
70	Syamanali Koilisuta PRF		89,621	36,271	19,138	8,306	4,620	157,956	
	Total		14838586	5413154	2001421	737796	402614	23393950	
	Percentage		63.43	23.14	8.56	3.15	1.72	100.00	



15.4 Felling series, cutting sections and JFM areas:

For administrative convenience and distributed working the forests allotted to this Working Circle, the forests are distributed to different Imp. Series as follows. (Table No 15.3)

15.4.1 Area allotted to Different Imp. Series:

The area assigned to this Working Circle is sub divided in to twenty Imp. Series. The area allotted to different Imp. Series is as follows (Table No 15.3)



Table No 15.3 Constitution of Imp. Series and area allotted

Sl No	Name of FS	Range	Name of Block	Comp. No	Area allotted in Ha	FS Total
1	Harmath Imp. Series (HRT)	Barbil	Karo	6	207.6606	2762.7448
			Karo	7	201.5457	
			Karo	8	241.7948	
			Karo	9	110.7609	
			Karo	10	20.2134	
			Karo	11	59.7934	
			Karo	12	95.0992	
			Karo	13	252.0040	
			Karo	14	104.1279	
			Karo	15	135.8676	
			Karo	16	73.0508	
			Karo	17	93.2023	
			Karo	18	79.8511	
			Karo	19	212.3228	
			Karo	20	240.9238	
			Karo	21	550.9151	
			Karo	22	83.6114	
2	Sidhamath Imp. series (SMT)	Barbil	Siddhamatha	3	163.4125	4552.0563
			Siddhamatha	4	118.5854	
			Siddhamatha	9	72.5169	
			Siddhamatha	10	48.7864	
			Siddhamatha	11	198.2547	
			Siddhamatha	12	298.3894	
			Siddhamatha	13	121.2498	
			Siddhamatha	14	114.7614	
			Siddhamatha	15	374.9207	
			Siddhamatha	16	94.5786	
			Siddhamatha	17	240.3127	
			Siddhamatha	18	223.1030	
			Siddhamatha	19	501.2417	
			Siddhamatha	20	105.1268	
			Siddhamatha	21	205.1073	
			Kandara-B		107.6420	
			Kandara-C		81.3400	
			Uliburu		1482.7270	



3	Kalika prasad Imp. series (KPS)	Champua	Kalikaprasad		1280.3809	3611.6670
			Baitarani East-A		154.140	
			Baitarani East-A		309.200	
			Naibuga		293.7811	
			Pedipokhari		1485.135	
			Mooney		89.03	
4	Champua Imp. series CMS)	Champua	Baitarani-A		1439.161	3003.3237
			Baitarani - B		633.7730	
			Bardhana		930.3897	
5	Balibandh Imp. series (BLB)	Champua	Balibandha		845.5400	3479.6100
			Lakshmiposi		866.8600	
			Jyotipur		881.4300	
			Ukhunda		885.78	
6	Gouda champe Imp. series	BJP	Anjar		196.0891	1075.4854
			Mundala		432.0270	
			Gouda champei		447.3693	

7	Baiganpal Imp. Series	Ghatgaon	Atai	15	349.0257	3762.0428
			Atai	16	435.2590	
			Atai	17	370.7564	
			Atai	18	362.5317	
			Atai	19	715.6719	
			Atai	20	521.9792	
			Atai	21	808.5801	
			Atai	23	198.2388	
8	Ghatimangal a Imp. series	Ghatagaon	Barabanka	4	486.1999	3981.4603
			Barabanka	5	580.7777	
			Barabanka	6	289.2193	
			Barabanka	7	418.2338	
			Barabanka	8	395.1626	
			Barabanka	9	821.4398	
			Barabanka	10	469.1197	
			Masinabila		455.0875	
			Badmasinabila		66.2200	
9	Melan Imp. series	Ghatagaon	Atai	22	469.1674	4217.6712
			Atai	24	476.8597	
			Atai	25	452.4763	
			Atai	26	520.4199	
			Atai	27	308.1595	
			Atai	28	563.8569	



			Atai	29	517.0846	
			Atai	30	342.4076	
			Atai	31	567.2393	
10	Nilakantheswar Imp. series	Ghatgaon	Balipokhari		967.7500	4541.1737
			Barabanka	11	605.6119	
			Barabanka	12	510.7778	
			Barabanka	13	476.4392	
			Barabanka	14	435.8883	
			Ghatagaon		809.8465	
			Kalimati		734.8600	
11	Kanjhari Imp. series	Keonjhar	Barabanka	1	440.4002	5502.1081
			Barabanka	2	462.7707	
			Barabanka	3	342.1732	
			Basantapur		1137.3475	
			Narayanpur		1620.3565	
			Raghunathpur		1181.3800	
			Sarupat		317.6800	
12	Nayagarh Imp. series	Keonjhar	Nayagarh		2800.6100	4386.3762
			Jadipada		1197.8275	
			Tangarani		387.9387	
13	Belda Imp. Series	Keonjhar	Belda		972.948	2463.3053
			Maidankel		871.315	
			Nelung		619.0423	
14	Sapua Imp. series	Keonjhar	Barabanka	15	170.9689	4502.4850
			Barabanka	16	228.2354	
			Barabanka	17	533.8606	
			Khajuribani		3569.4201	
15	Nalapanga Imp. series	Keonjhar	Balabhadrapur		706.6700	2189.8997
			Nalapanga	2	829.645	
			Raikala		653.5847	
16	Padampur Imp. Series	Patna	Atai	6	555.9434	3202.4206
			Atai	7	231.2487	
			Atai	8	477.9323	
			Atai	9	501.0262	
			Baunsuli		532.3000	
			Belapasi		41.1000	
			Billa-A		33.0800	
			Budhikapudi 'II'		21.7100	
			Chadheibhol		48.8800	
			Chemena-A		26.8900	
			Lakshmiposi (P)		16.0900	
			Ninua		60.5800	



			Padmapur		655.6400	
17	Patna Imp. series	Patna	Patna		1064.8600	1820.7542
			Poipani		518.7900	
			Pradhanpada		11.0600	
			Purunapani		156.0542	
			Rasapada		9.9500	
			Sarasposi		13.4800	
			Tando		15.5400	
			Budhikapudi 'I'		31.02	
18	Samakio Imp. Series	Telkoi	Dhanurjaypur		85.2700	4841.3130
			C. Golabandha		36.5	
			Jharbeda	1	345.0643	
			Jharbeda	2	902.7357	
			Kodbil	1	466.7712	
			Kodbil	2	523.774	
			Kodbil	3	537.5448	
			Mankadchua	1	181.2127	
			Mankadchua	2	140.4240	
			Mankadchua	3	357.6833	
			Salaikena Siriabahal		75.4599	
			Samakoi		610.3700	
			Dublupal		88.23	
			Godhihudi		78.87	
			Rekuti		273.1251	
			Syamanali Koilisuta		138.2780	
19	Kalapat Imp. Series	Telkoi	Kalapat	14	506.6575	3438.5044
			Kalapat	15	491.6894	
			Kalapat	18	625.2245	
			Kalapat	21	852.4849	
			Kalapat	23	650.7507	
			Kalapat	24	311.6974	
20	Tamanga Imp. Series	Telkoi	Kalapat	27	543.1030	3822.5189
			Kalapat	31	640.3406	
			Tamanga		1359.6424	
			Renda		1279.4329	
	Total 20 Imo. Series (IS)				71156.9206	71156.9206

**15.4.1(i) Abstract of Imp. Series:**

Table No 15.4 Abstract of Improvement series			
Sl No	Range	Name of Imp. Series	Area allotted in Ha
1	Barbil	Harmath, Imp. Series (HRT)	2762.7448
2	Barbil	Sidhamath Imp. series (SMT)	4552.0563
3	Champua	Kalika prasad Imp. series (KPS)	3611.6670
4	Champua	Champua Imp. series CMS)	3003.3237
5	Champua	Balibandh Imp. series (BLB)	3479.6100
6	BJP	Gouda champei Imp. Series(GCS)	1075.4854
7	Ghatgaon	Baiganpal Imp. Series(BGP)	3762.0428
8	Ghatgaon	Ghatimangala Imp. Series(GH)	3981.4603
9	Ghatgaon	Melan Imp. Series (MLN)	4217.6712
10	Ghatgaon	Nilakantheswar Imp. series	4541.1737
11	Keonjhar	Kanjhari Imp. series	5502.1081
12	Keonjhar	Nayagarh Imp. series	4386.3762
13	Keonjhar	Belda Imp. Series	2463.3053
14	Keonjhar	Sapua Imp. series	4502.4850
15	Keonjhar	Nalapanga Imp. series	2189.8997
16	Patna	Padampur Imp. Series	3202.4206
17	Patna	Patna Imp. series	1820.7542
18	Telkoi	Samakoi Imp. Series (SKI)	4841.3130
19	Telkoi	Kalapat Imp. Series	3438.5044
20	Telkoi	Tamanga Imp. Series	3822.5189
20 Imp. Series			71156.9206

Table No 15.5 Range wise abstract of Imp. Series. Keonjhar Division.

Range	No of Imp. Series	Area in ha
Barbil	2	7314.8011
Champua	3	10094.6007
BJP	1	1075.4854
Ghatgaon	4	16502.3480
Keonjhar	5	19044.1743
Patna	2	5023.1748
Telkoi	3	12102.3363
7 Range	20	71156.9206

**15.4.2 Improvement Series (Annual Coupe area)**

Each Improvement series is divided in to 10 Annual coupes for ease working and ensure flow of Forest Produce in a sustainable manner. The annual Coupe area in (Imp. Series wise) is furnished at Table No 15.4(i) to 15.4 (xx)

Harmath Imp. Series (HRT)

Table No 15.6(i) Harmath Imp. Series (HRT)						
Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Harmath Imp. Series (HRT)	2022-23	HRT-I	Karo	13	252.004	252.004
	2023-24	HRT-II	Karo	6	207.6606	409.2063
			Karo	7	201.5457	
	2024-25	HRT-III	Karo	8	241.7948	241.7948
	2025-26	HRT-IV	Karo	9	110.7609	130.9743
			Karo	10	20.2134	
	2026-27	HRT-V	Karo	11	59.7934	154.8926
			Karo	12	95.0992	
	2027-28	HRT-VI	Karo	14	104.1279	313.0463
				15	135.8676	
				16	73.0508	
	2028-29	HRT-VII	Karo	21	550.9151	550.9151
	2029-30	HRT-VIII	Karo	20	240.9238	324.5352
				22	83.6114	
	2030-31	HRT-IX	Karo	19	212.3228	212.3228
	2031-32	HRT-X	Karo	17	93.2023	173.0534
				18	79.8511	
Total IS					2762.7448	2762.7448



Siddhamath Imp. Series (SMT)

Table No 15.6 (ii) Siddhamath Imp. Series (SMT)						
Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Siddhamath Imp. Series (SMT)	2022-23	SMT-I	Kandara-B		107.6420	188.9820
			Kandara-C		81.3400	
	2023-24	SMT-II	Siddamatha	11	198.2547	601.5559
				3	163.4125	
				4	118.5854	
				9	72.5169	
				10	48.7864	
	2024-25	SMT-III	Siddamatha	13	121.2498	610.9319
				14	114.7614	
				15	374.9207	
	2025-26	SMT-IV	Siddamatha	12	298.3894	521.4924
				18	223.103	
	2026-27	SMT-V	Siddamatha	16	94.5786	440.0181
				17	240.3127	
				20	105.1268	
	2027-28	SMT-VI	Siddamatha	19	501.2417	501.2417
	2028-29	SMT-VII	Siddamatha	21	205.1073	205.1073
	2029-30	SMT-VIII	Uliburu		431.00440	431.00440
	2030-31	SMT-IX	Uliburu		706.71190	706.71190
	2031-32	SMT-X	Uliburu		345.01070	345.01070
	Total IS				4552.0563	4552.0563

**Kalikaprasad Imp. Series (KKP)**

Table No 15.6(iii) Kalikaprasad Imp. Series (KKP)						
Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Kalikaprasad Imp. Series (KKP)	2022-23	KKP-I	Pedipokhari		585.0550	585.0550
	2023-24	KKP-II	Baitarani East A		154.140	463.34
			Baitarani East B		309.200	
	2024-25	KKP-III	Kalikaprasad		176.6931	480.0382
					303.3451	
	2025-26	KKP-IV	Kalikaprasad	1 st P	250.0577	250.0577
	2026-27	KKP-V	Kalikaprasad	2 nd P	373.4745	373.4745
	2027-28	KKP-VI	Kalikaprasad	Balance	176.8105	265.8405
			Mooney		89.0300	
	2028-29	KKP-VII	Naibuga		293.7811	293.7811
	2029-30	KKP-VIII	Pedipokhari	1 st P	340.6845	340.6845
	2030-31	KKP-IX	Pedipokhari	2 nd P	256.6773	256.6773
	2031-32	KKP-X	Pedipokhari	Balance	302.7182	302.7182
	Total IS				3611.6670	3611.6670

Champua Imp. Series (CMP)

Table No 15.6 (iv) Champua Imp. Series (CMP)						
Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Champua Imp. Series (CMP)	2022-23	CMP-I	Bardhana	Part	472.44	472.4420
	2023-24	CMP-II	Baitarani-A	1 st P	313.496	313.496
	2024-25	CMP-III	Baitarani-A	2 nd P	141.6445	141.6445
	2025-26	CMP-IV	Baitarani-A	3 rd P	176.5477	176.5477
	2026-27	CMP-V	Baitarani-A	4 th P	304.1553	304.1553
	2027-28	CMP-VI	Baitarani-A	5 th P	178.5983	178.5983
	2028-29	CMP-VII	Baitarani-A	Balance	324.7192	324.7192
	2029-30	CMP-VIII	Baitarani-B	Part	320.5434	320.5434
	2030-31	CMP-IX	Baitarani-B	Balance	313.2296	313.2296
	2031-32	CMP-X	Bardhana	Balance	457.9477	457.9477
	Total IS				3003.3217	3003.3237

**Balibandh Imp. Series (BLB)****Table No 15.6(v) Balibandh Imp. Series (BLB)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Balibandh Imp. Series (BLB)	2022-23	BLB-I	Ukhunda	1 st P	287.1961	287.1961
	2023-24	BLB-II	Balibandh	1 st P	387.7340	387.7340
	2024-25	BLB-III	Balibandh	2 nd P	305.6706	305.6706
	2025-26	BLB-IV	Balibandh	Balance	152.1354	152.1354
	2026-27	BLB-V	Lakshmiposi	Part	458.3737	458.3737
	2027-28	BLB-VI	Lakshmiposi	Balance	408.4863	408.4863
	2028-29	BLB-VII	Jyotipur	Part	338.8660	338.8660
	2029-30	BLB-VIII	Jyotipur	balance	542.564	542.564
	2030-31	BLB-IX	Ukhunda	2 nd P	323.4500	323.4500
	2031-32	BLB-X	Ukhunda	Balance	275.1339	275.1339
	Total IS				3479.6100	3479.6100

Gouda Champei Imp. series**Table No 15.6 (vi) Gouda Champei Imp. Series (GCI)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Gouda Champei Imp. Series (GCI)	2022-23	GCI-I	Anjar	Part	100.0	100.0
	2023-24	GCI-II		Balance	96.0891	96.0891
	2024-25	GCI-III	Mundala	1 st P	108.0	108.0
	2025-26	GCI-IV		2 nd P	108.0	108.0
	2026-27	GCI-V		3 rd P	108.0	108.0
	2027-28	GCI-VI		Balance	108.0270	108.0270
	2028-29	GCI-VII	Gouda champei PRF	1 st P	110.0	110.0
	2029-30	GCI-VIII		2 nd P	110.0	110.0
	2030-31	GCI-IX		3 rd P	110.0	110.0
	2031-32	GCI-X		Balance	117.3693	117.3693
	Total IS				1075.4854	1075.4854

**Baiganpal Imp. Series (BGP)****Table No 15.6 (vii) Baiganpal Imp. Series (BGP)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Baiganpal Imp. Series (BGP)	2022-23	BGP-I	Atai RF	21 (1 st P)	151.7224	349.9612
				23	198.2388	
	2023-24	BGP-II		15	349.0257	349.0257
	2024-25	BGP-III		16	435.259	435.259
	2025-26	BGP-IV		17	370.7564	370.7564
	2026-27	BGP-V		18	362.5317	362.5317
	2027-28	BGP-VI		19 Part	332.6139	332.6139
	2028-29	BGP-VII		19 bal.	383.058	383.058
	2029-30	BGP-VIII		20	521.9792	521.9792
	2030-31	BGP-IX		21 (2 nd P)	342.7843	342.7843
	2031-32	BGP-X		21(bal)	314.0734	314.0734
	Total IS				3762.0428	3762.0428

Ghatimangala Imp. Series (GML)**Table No 15.6(viii) Ghatimangala Imp. Series (GML)**

Name of FS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Ghatimangala Imp. Series (GML)	2022-23	GML-I	Barabank RF	10	469.1197	469.1197
	2023-24	GML-II	Badmasibabila		66.2200	66.2200
	2024-25	GML-III	Masinabila		455.0875	455.0875
	2025-26	GML-IV	Barabank RF	4(p)	200.00	200.00
	2026-27	GML-V		4(B)	286.1999	286.1999
	2027-28	GML-VI		5	580.7777	580.7777
	2028-29	GML-VII		6	289.2193	289.2193
	2029-30	GML-VIII		7	418.2338	418.2338
	2030-31	GML-IX		8	395.1626	395.1626
	2031-32	GML-X		9	821.4398	821.4398
	Total IS				3981.4603	3981.4603

**Melan Imp. Series (MLN)****Table No 15.6 (ix) Melan Imp. Series (MLN)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
MelanImp. Series (MLN)	2022-23	MLN-I	Atai RF	28	563.8569	563.8569
	2023-24	MLN-II		31	567.2393	567.2393
	2024-25	MLN-III		30	342.4076	342.4076
	2025-26	MLN-IV		29 (P)	300.000	300.000
	2026-27	MLN-V		29 (Bal)	217.0846	217.0846
	2027-28	MLN-VI		26	520.4199	520.4199
	2028-29	MLN-VII		25	452.4763	452.4763
	2029-30	MLN-VIII		24	476.8597	476.8597
	2030-31	MLN-IX		22	469.1674	469.1674
	2031-32	MLN-X		27	308.1595	308.1595
	Total IS				4217.6712	4217.6712

Nilakantheswar Imp. Series (NKS)**Table No 15.6(X) Nilakantheswar Imp. Series (NKS)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Nilakantheswar Imp. Series (NKS)	2022-23	NKS-I	Ghatagaon RF	Part	355.7851	355.7851
	2023-24	NKS-II	Barabank RF	14	435.8883	435.8883
	2024-25	NKS-III		13	476.4392	476.4392
	2025-26	NKS-IV		12	510.7778	510.7778
	2026-27	NKS-V		11	605.6119	605.6119
	2027-28	NKS-VI	Kalimati RF	Part	352.0533	352.0533
	2028-29	NKS-VII	Kalimati RF	Balance	382.8067	382.8067
	2029-30	NKS-VIII	Balipokhari RF	Part	445.7302	445.7302
	2030-31	NKS-IX		Balance	522.0198	522.0198
	2031-32	NKS-X	Ghatagaon RF	Balance	454.0614	454.0614
	Total IS				4541.1737	4541.1737

**Kanjhari Imp. Series****Table No 15.6(XI) Kanjhari Imp. Series (KNJ)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Kanjhari Impr. Series (KNJ)	2022-23	KNJ-I	Raghunathpur	Part	512.8400	512.8400
	2023-24	KNJ-II	Barabank RF	3	342.1732	342.1732
	2024-25	KNJ-III		2	462.7707	462.7707
	2025-26	KNJ-IV		1	440.4002	440.4002
	2026-27	KNJ-V	Sarupat		317.6800	317.6800
	2027-28	KNJ-VI	Basantpur	Part	726.1382	726.1382
	2028-29	KNJ-VII	Basantpur	Balance	411.2093	411.2093
	2029-30	KNJ-VIII	Narayanpur	Part	897.3875	897.3875
	2030-31	KNJ-IX	Narayanpur	Balance	722.9690	722.9690
	2031-32	KNJ-X	Raghunathpur	Balance	668.5400	668.5400
	Total IS				5502.1081	5502.1081

Nayagarh Impr. Series**Table No 15.6(XII) Nayagarh Imp. Series (NYG)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Nayagarh Impr. Series (NYG)	2022-23	NYG-I	Nayagarh	1 st p	490.595	490.595
	2023-24	NYG-II	Nayagarh	2 nd p	480.405	480.405
	2024-25	NYG-III	Nayagarh	3 rd p	470.305	470.305
	2025-26	NYG-IV	Nayagarh	4 th p	412.595	412.595
	2026-27	NYG-V	Nayagarh	5 th p	466.405	466.405
	2027-28	NYG-VI	Nayagarh	Balance	480.305	480.305
	2028-29	NYG-VII	Tangarani		387.9387	387.9387
	2029-30	NYG-VIII	Jadipada	1 st p	400.00	400.00
	2030-31	NYG-IX	Jadipada	2 nd p	479.6000	479.6000
	2031-32	NYG-X	Jadipada	Balance	318.2275	318.2275
	Total IS				4386.3762	4386.3762

**Belda Imp. Series****Table No 15.6(XIII)Beldalmp. Series (BLD)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Belda Impr. Series (BLD)	2022-23	BLD-I	Nelung	Part	324.0400	324.0400
	2023-24	BLD-II		Balance	295.0023	295.0023
	2024-25	BLD-III	Belda	1 st p	300.8400	300.8400
	2025-26	BLD-IV	Belda	2 nd p	263.1000	263.1000
	2026-27	BLD-V	Belda	3 rd p	265.01	265.01
	2027-28	BLD-VI	Belda	Balance	143.998	143.998
	2028-29	BLD-VII	Maidankel	1 st p	272.5300	272.5300
	2029-30	BLD-VIII	Maidankel	2 nd p	200.000	200.000
	2030-31	BLD-IX	Maidankel	3 rd p	200.000	200.00
	2031-32	BLD-X	Maidankel	Balance	198.785	198.785
	Total FS				2463.3053	2463.3053

Sapua Imp. Series**Table No 15.6(XIV) Sapua Impr Series (SAP)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Sapua Impr. Series (SAP)	2022-23	SAP-I	Khajuribani PRF	1 st p	508.5624	508.5624
	2023-24	SAP-II	Barabank	15	170.9689	170.9689
	2024-25	SAP-III	Barabank	16	228.2354	228.2354
	2025-26	SAP-IV	Barabank	17	533.8606	533.8606
	2026-27	SAP-V	Khajuribani PRF	2 nd p	452.3561	452.3561
	2027-28	SAP-VI	Khajuribani PRF	3 rd p	500.9293	500.9293
	2028-29	SAP-VII	Khajuribani PRF	4 th p	529.6621	529.6621
	2029-30	SAP-VIII	Khajuribani PRF	5 th p	573.8371	573.8371
	2030-31	SAP-IX	Khajuribani PRF	6 th p	503.9359	503.9359
	2031-32	SAP-X	Khajuribani PRF	Balance	500.1372	500.1372
	Total IS				4502.4850	4502.4850

**Nalapanga Imp. Series****Table No 15.6(XV) Nalapanga Impr. Series (NLP)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Nalapanga Impr. Series (NLP)	2022-23	NLP-I	Nalapanga	2 (1 st P)	280.1700	280.1700
	2023-24	NLP-II	Nalapanga	2(2 nd P)	200.0000	200.0000
	2024-25	NLP-III	Raikela	1 st P	126.1032	126.1032
	2025-26	NLP-IV	Raikela	2 nd P	239.7280	239.7280
	2026-27	NLP-V	Raikela	3 rd P	120.0008	120.0008
	2027-28	NLP-VI	Raikela	Balance	167.7527	167.7527
	2028-29	NLP-VII	Balabhadrapur	Part	340.5000	340.5000
	2029-30	NLP-VIII	Balabhadrapur	Balance	366.1700	366.1700
	2030-31	NLP-IX	Nalapanga	2(3 rd P)	220.9300	220.9300
	2031-32	NLP-X	Nalapanga	2(Balance)	128.545	128.545
	Total IS				2189.8997	2189.8997

Padampur Impr. Series**Table No 15.6 (XVI) Padampur Impr. (PDM)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Padampur Impr. (PDM)	2022-23	PDM-I	Belapasi		41.1000	232.2400
			Billa-A		33.08	
			Budhiakapudi'II'		21.71	
			Chadheibhol		48.88	
			Chemena-A		26.89	
			Ninua		60.58	
	2023-24	PDM-II	Atai	7	231.2487	231.2487
	2024-25	PDM-III		8	477.9323	477.9323
	2025-26	PDM-IV		9	501.0262	501.0262
	2026-27	PDM-V		6	555.9434	555.9434
	2027-28	PDM-VI	Padampur	Part	405.65	405.65
	2028-29	PDM-VII	Padampur	Balance	249.99	249.99
	2029-30	PDM-VIII	Lakshmiposi		16.09	16.09
	2030-31	PDM-IX	Baunsuli	Part	332.300	332.300
	2031-32	PDM-X	Baunsuli	Balance	200.00	200.00
	Total IS				3202.4206	3202.4206

**Patna Impr. Series****Table No 15.6(XVII) Patna Impr. Series (PTN)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Patna Impr. Series (PTN)	2022-23	PTN-I	Pradhanpada		11.06	190.5442
			Purunapani		156.0542	
			Rasapada		9.95	
			Sarasposi		13.48	
	2023-24	PTN-II	Patna	1 st P	16.5310	16.5310
	2024-25	PTN-III		2 nd P	373.9690	373.9690
	2025-26	PTN-IV		3 rd P	147.8980	147.8980
	2026-27	PTN-V		4 th P	326.4620	326.4620
	2027-28	PTN-VI		Balance	200.00	200.00
	2028-29	PTN-VII	Poipani	Part	202.32	202.32
	2029-30	PTN-VIII	Poipani	Balance	316.47	316.47
	2030-31	PTN-IX	Tando		15.54	15.54
	2031-32	PTN-X	Budhiakapudi'I' PRF		31.02	31.02
	Total IS				1820.7542	1820.7542

Samkoi Impr. Series**Table No 15.6 (XVIII) Samakoi Impr. Series (SMK)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Samakoi Impr. Series (SMK)	2022-23	SMK-I	Dhanurjaypur		85.2700	794.8951
			C.Golabandh		36.500	
			Rekuti PRF		273.1251	
			Jharbeda	2(part)	400.00	
	2023-24	SMK-II	Jharbeda	1	345.0643	345.0643
	2024-25	SMK-III	Jharbeda	2(Balance)	502.7357	502.7357
	2025-26	SMK-IV	Kodbil	1	466.7712	466.7712
	2026-27	SMK-V		2	523.774	523.774
	2027-28	SMK-VI		3(part)	300.5448	300.5448
	2028-29	SMK-VII	Mankadchua	1	181.2127	916.3200
				2	140.4240	
				3	357.6833	
			Kodbil	3(Balance)	237.00	
	2029-30	SMK-VIII	Samakoi	Part	400.37	475.8299
			Salaikena Siriabahal		75.4599	
	2030-31	SMK-IX	Samakoi	Balance	210.00	377.1000
Dublapal PRF				88.23		
Godhihudi PRF				78.87		
2031-32	SMK-X	Syamanali Koilisuta PRF		138.278	138.278	
Total IS					4841.3130	4841.3130

**Kalapat Impr. Series****Table No 15.6 (XIX) Kalapat Impr. Series (KPT)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Kalapat Impr. Series (KPT)	2022-23	KPT-I	Kalapat RF	14(part)	331.7675	331.7675
	2023-24	KPT-II		14(balance)	174.89	174.89
	2024-25	KPT-III		15	491.6894	491.6894
	2025-26	KPT-IV		18(part)	325.2245	325.2245
	2026-27	KPT-V		18(balance)	300.00	300.00
	2027-28	KPT-VI		21(part)	452.4849	452.4849
	2028-29	KPT-VII		21(Balance)	400.00	400.00
	2029-30	KPT-VIII		23(part)	350.7507	350.7507
	2030-31	KPT-IX		23(Balance)	300.00	300.00
	2031-32	KPT-X		24	311.6974	311.6974
	Total IS				3438.5044	3438.5044

Tamanga Impr. Series**Table No 15.6 (XX) Tamanga Impr. Series (TMG)**

Name of IS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Tamanga Impr. Series (TMG)	2022-23	TMG-I	Kalapat	27(part)	300.000	300.0000
	2023-24	TMG-II		27(Balance)	243.103	622.1030
			Renda	1 st P	379.0000	
	2024-25	TMG-III	Kalapat	31(part)	330.000	330.000
	2025-26	TMG-IV		31(balance)	310.3406	310.3406
	2026-27	TMG-V	Tamanga	1 st P	350.0000	350.0000
	2027-28	TMG-VI		2 nd p	320.0000	320.0000
	2028-29	TMG-VII		3 rd P	340.0000	340.0000
	2029-30	TMG-VIII		Balance	349.6424	349.6424
	2030-31	TMG-IX	Renda	2 nd p	450.0000	450.0000
	2031-32	TMG-X		Balance	450.4329	450.4329
	Total IS				3822.5189	3822.5189

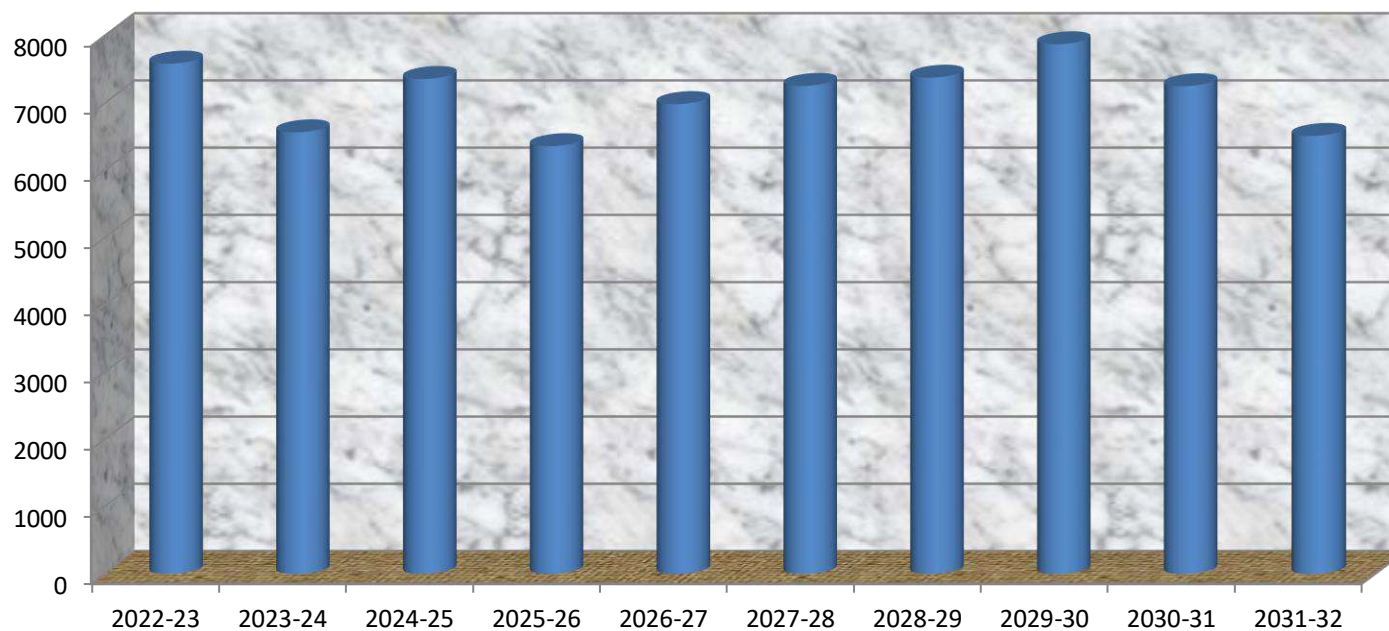


15.4.3 ImproventSeries Abstract

Impr. Series	Table No 15.7 Year of Working										Total
	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	
Harmath	252.0040	409.2063	241.7948	130.9743	154.8926	313.0463	550.9151	324.5352	212.3228	173.0534	2762.7448
Sidhamath	188.9820	601.5559	610.9319	521.4924	440.0181	501.2417	205.1073	431.0044	706.7119	345.0107	4552.0563
Kalika prasad	585.0550	463.3400	480.0382	250.0577	373.4745	265.8405	293.7811	340.6845	256.6773	302.7182	3611.6670
Champua	472.4420	313.4960	141.6445	176.5477	304.1553	178.5983	324.7192	320.5434	313.2296	457.9477	3003.3237
Balibandh	287.1961	387.7340	305.6706	152.1354	458.3737	408.4863	338.8660	542.5640	323.4500	275.1339	3479.6100
Gouda champei	100.0000	96.0891	108.0000	108.0000	108.0000	108.0270	110.0000	110.0000	110.0000	117.3693	1075.4854
Baiganpal	349.9612	349.0257	435.2590	370.7564	362.5317	332.6139	383.0580	521.9792	342.7843	314.0734	3762.0428
Ghatimangala	469.1197	66.2200	455.0875	200.0000	286.1999	580.7777	289.2193	418.2338	395.1626	821.4398	3981.4603
Melan	563.8569	567.2393	342.4076	300.0000	217.0846	520.4199	452.4763	476.8597	469.1674	308.1595	4217.6712
Nilakantheswar	355.7851	435.8883	476.4392	510.7778	605.6119	352.0533	382.8067	445.7302	522.0198	454.0614	4541.1737
Kanjhari	512.8400	342.1732	462.7707	440.4002	317.6800	726.1382	411.2093	897.3875	722.9690	668.5400	5502.1081
Nayagarh	490.5950	480.4050	470.3050	412.5950	466.4050	480.3050	387.9387	400.0000	479.6000	318.2275	4386.3762
Belda	324.0400	295.0023	300.8400	263.1000	265.0100	143.9980	272.5300	200.0000	200.0000	198.7850	2463.3053
Sapua	508.5624	170.9689	228.2354	533.8606	452.3561	500.9293	529.6621	573.8371	503.9359	500.1372	4502.4850
Nalapanga	280.1700	200.0000	126.1032	239.7280	120.0008	167.7527	340.5000	366.1700	220.9300	128.5450	2189.8997
Padampur	232.2400	231.2487	477.9323	501.0262	555.9434	405.6500	249.9900	16.0900	332.3000	200.0000	3202.4206
Patna	190.5442	16.5310	373.9690	147.8980	326.4620	200.0000	202.3200	316.4700	15.5400	31.0200	1820.7542
Samakoi	794.8951	345.0643	502.7357	466.7712	523.7740	300.5448	916.3200	475.8299	377.1000	138.2780	4841.3130
Kalapat	331.7675	174.8900	491.6894	325.2245	300.0000	452.4849	400.0000	350.7507	300.0000	311.6974	3438.5044
Tamanga	300.0000	622.1030	330.0000	310.3406	350.0000	320.0000	340.0000	349.6424	450.0000	450.4329	3822.5189
Total	7590.0562	6568.1810	7361.8540	6361.6860	6987.9736	7258.9078	7381.4191	7878.3120	7253.9006	6514.6303	71156.9206



Area allotted for Working (Year wise)



**15.5 Blocks, compartments and JFM area:**

The Blocks and Compartment assigned to VSS (JFM) has been indicated in Chapter 13 .It is reproduced here for ready reference (**Table No 15.8**)

Table No 15.8 Area allotted to Improvent Working Circle: Keonjhar division.					
Sl No	Block	Compt.	Area for management	IWC	JFM
	ReserveForest				
	Badbil Range				
1	Kandara-B		107.642	107.642	18
2	Kandara-C		81.34	81.34	
3	Karo	6	207.6606	207.6606	
	Karo	7	213.0557	201.5457	
	Karo	8	253.5588	241.7948	
	Karo	9	121.5139	110.7609	
	Karo	10	60.7159	20.2134	
	Karo	11	79.7934	59.7934	
	Karo	12	95.0992	95.0992	
	Karo	13	292.004	252.004	
	Karo	14	104.1279	104.1279	
	Karo	15	135.8676	135.8676	
	Karo	16	73.0508	73.0508	
	Karo	17	93.2023	93.2023	
	Karo	18	79.8511	79.8511	
	Karo	19	212.3228	212.3228	
	Karo	20	240.9238	240.9238	
	Karo	21	550.9151	550.9151	
	Karo	22	83.6114	83.6114	
4	Siddhamatha	3	163.4125	163.4125	51
	Siddhamatha	4	118.5854	118.5854	41
	Siddhamatha	9	72.5169	72.5169	
	Siddhamatha	10	48.7864	48.7864	
	Siddhamatha	11	198.2547	198.2547	
	Siddhamatha	12	298.3894	298.3894	



	Siddhamatha	13	121.2498	121.2498	
	Siddhamatha	14	114.7614	114.7614	
	Siddhamatha	15	374.9207	374.9207	
	Siddhamatha	16	94.5786	94.5786	
	Siddhamatha	17	240.3127	240.3127	
	Siddhamatha	18	223.103	223.103	
	Siddhamatha	19	501.2417	501.2417	
	Siddhamatha	20	105.1268	105.1268	
	Siddhamatha	21	205.1073	205.1073	
5	Uliburu		1482.727	1482.727	50
	Total Barbil		7449.3306	7314.8011	160
	BJP RANGE				
6	Anjar		196.4941	196.0891	
7	Mundala		432.0270	432.0270	194.7000
	Total BJP		628.5211	628.1161	194.7000
	CHAMPUA RANGE(T)				
8	Baitarani-A		1445.641	1439.161	
9	Baitarani - B		633.773	633.773	64.6
10	Balibandha		915.54	845.54	571.2
11	Bardhana		942.56	930.3897	313.23
12	Jyotipur		882.24	881.43	391.68
13	Kalikaprasad		1410.466	1280.3809	1410.466
14	Lakshmiposi ©		866.86	866.86	710
15	Mooney		89.03	89.03	50
16	Naibuga		293.7811	293.7811	
17	Pedipokhari		1486.35	1485.135	
18	Ukhunda		946.59	885.78	220
	Total Champua		9912.8311	9631.2607	3731.176
	GATGAON RANGE				
19	Atai	15	349.0257	349.0257	280
	Atai	16	435.259	435.259	359.507
	Atai	17	380.7564	370.7564	124
	Atai	18	362.5317	362.5317	
	Atai	19	715.6719	715.6719	



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	Atai	20	521.9792	521.9792	
	Atai	21	818.5801	808.5801	
	Atai	22	469.1674	469.1674	
	Atai	23	198.2388	198.2388	
	Atai	24	476.8597	476.8597	
	Atai	25	452.4763	452.4763	
	Atai	26	520.4199	520.4199	
	Atai	27	308.1595	308.1595	
	Atai	28	563.8569	563.8569	
	Atai	29	517.0846	517.0846	
	Atai	30	342.4076	342.4076	
	Atai	31	567.2393	567.2393	
20	Badmasinabila		66.22	66.22	
21	Balipokhari		1011.75	967.75	469.688
22	Barabanka	4	486.1999	486.1999	432.1
	Barabanka	5	630.7777	580.7777	500
	Barabanka	6	314.2193	289.2193	202.2
	Barabanka	7	453.2338	418.2338	341.3
	Barabanka	8	420.1626	395.1626	292
	Barabanka	9	843.4398	821.4398	753.15
	Barabanka	10	479.1197	469.1197	
	Barabanka	11	635.6119	605.6119	
	Barabanka	12	518.7778	510.7778	
	Barabanka	13	476.4392	476.4392	
	Barabanka	14	436.6983	435.8883	
23	Ghatagaon		809.8465	809.8465	809.8
24	Kalimati		834.86	734.86	381.872
25	Masinabila		467.336	455.0875	120
	Total Ghatgaon		16884.4065	16502.348	5065.617
	KEONJHAR RANGE				
26	Balabhadrapur		746.67	706.67	378.233
	Barabanka	1	440.4002	440.4002	361.907
	Barabanka	2	462.7707	462.7707	388.692
	Barabanka	3	342.1732	342.1732	



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	Barabanka	15	236.8039	170.9689	
	Barabanka	16	248.2354	228.2354	
	Barabanka	17	566.8606	533.8606	
27	Basantapur		1187.79	1137.3475	391
28	Belda		1058.94	972.948	432.88
29	Jadipada		1329.24	1197.8275	782
30	Maidankel		872.53	871.315	498.58
31	Nalapanga	2	834.1	829.645	193.15
32	Narayanpur		1631.637	1620.3565	1048.46
33	Nayagarh		2842.61	2800.61	838.146
34	Nelung		624.04	619.0423	369.476
35	Raghunathpur		1221.38	1181.38	1221.38
36	Raikala		690.01	653.5847	368.093
37	Sarupat		317.68	317.68	
38	Tangarani		409.1615	387.9387	338
	Total Keonjhar		16063.033	15474.754	7609.997
	PATNA RANGE				
	Atai	6	555.9434	555.9434	
	Atai	7	231.2487	231.2487	
	Atai	8	512.9323	477.9323	
	Atai	9	501.0262	501.0262	
39	Baunsuli		629.3	532.3	482
40	Belapasi		46.1	41.1	42
41	Billa-A		43.08	33.08	43.08
42	Budhikapudi 'II'		21.71	21.71	
43	Chadheibhol		48.88	48.88	48
44	Chemena-A		26.89	26.89	26.89
45	Lakshmiposi (P)		16.09	16.09	16.09
46	Ninua		60.58	60.58	50
47	Padmapur		795.64	655.64	370.62
48	Patna		1193.86	1064.86	726.742
49	Poipani		533.79	518.79	552.91
50	Pradhanpada		21.06	11.06	21.06
51	Purunapani		180.52	156.0542	180.52



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52	Rasapada		9.95	9.95	9.5
53	Sarasposi		13.48	13.48	13.48
54	Tando		15.54	15.54	15
	Total Patna		5457.6206	4992.1548	2597.892
	TELKOI RANGE				
55	Dhanurjaypur		85.27	85.27	85.27
56	C. Golabandha		41.5	36.5	41.5
57	Jharbeda	1	360.0643	345.0643	
58	Jharbeda	2	914.7357	902.7357	249.944
59	Kalapat	14	601.7675	506.6575	
	Kalapat	15	491.6894	491.6894	
	Kalapat	18	625.2245	625.2245	
	Kalapat	21	912.4849	852.4849	
	Kalapat	23	650.7507	650.7507	
	Kalapat	24	311.6974	311.6974	
	Kalapat	27	543.103	543.103	
	Kalapat	31	640.3406	640.3406	
60	Kodbil	1	466.7712	466.7712	259.22
61	Kodbil	2	529.774	523.774	340
	Kodbil	3	561.5448	537.5448	
62	Mankadchua	1	184.2127	181.2127	80.961
	Mankadchua	2	140.424	140.424	57.1
	Mankadchua	3	357.6833	357.6833	298.5
63	Salaikena Siriabahal		89.4599	75.4599	75
64	Samakoi		620.37	610.37	620.37
65	Tamanga		1362.6424	1359.6424	377.1
	Total Telkoi		10491.5103	10244.4003	2484.9650
	Total RF		66887.2527	64787.8352	21844.3470
	PRF				
	BJP RANGE				
66	Gouda champei		447.3693	447.3693	
	Total BJP		447.3693	447.3693	
	CHAMPUA RANGE				
67	Baitarani East 'A'		154.140	154.140	147.400



68	Baitarani East 'B'		309.200	309.200	151.000
	Total Champua		463.340	463.340	298.400
	Keonjhar Range				
69	Khajuribani		3575.4201	3569.4201	535.33
	Patna Range				
70	Budhikapudi 'I'		31.0200	31.02	31.02
	TELKOI RANGE				
71	Dublupal		88.2300	88.23	
72	Godhihudi		78.8700	78.87	
73	Rekuti		275.3000	273.1251	54.48
74	Renda		1282.4329	1279.4329	258.823
75	Syamanali Koilisuta		148.2780	138.2780	148.278
	Total Telkoi		1873.1109	1857.9360	461.5810
	Total PRF		6390.2603	6369.0854	1326.3310
	G.Total		73277.5130	71156.9206	23170.6780
	Percentage				32.56

The area assigned to VSS is only 32.56%.

15.6 Special objectives of Management:

Special objectives of management of this working Circle is within the general objectives of the Working Plan. The special objectives are outlines below.

- i) To remove dead trees before they become hazards to wildlife, forest fire.
- ii) To create openings in the canopy to allow adequate line so as to allow establishment of light demanding species i.e. principally Sal.
- iii) To thinning the congested pole crop to allow diameter growth and also have interim harvest through which the VSS looking after the area will be benefited.
- iv) To allow natural regeneration and cover the entire area with vegetation of climatic species.
- v) To improve the density of the forest crop as well as stand structure by suitable silvicultural operations.
- vi) To remove dead trees for creating hygienic condition in the forest.
- vii) To carryout subsidiary silvicultural operations so that conducive situation can be created for better growth of existing crop and natural regeneration.



15.6.1 Analysis of the crop:

The growing Stock of the assigned Compartments is estimated through Sample Point enumeration & subsequent analysis. The crop density (Density Map) has been annexed to this Working Plan for ready reference. From the Satellite data it is observed that most of the blocks / compartments assigned to this working Circle are Non Sal Forest i.e. Sal constitutes below 30%. The species seen are associates of Sal i.e. Asan, Arjun, Piasal (Bija), Kuruma (Haldu), Kasi, Dhaura, Kendu, Bahada, Saguean (Teak) – mostly planted. Crop Density wise Sal / Non Sal as reported in the Stockmap is furnished at Table No 15.9.



Table No 15.9 Area under different Density Class in the assigned Area to IWC. (area in Ha)

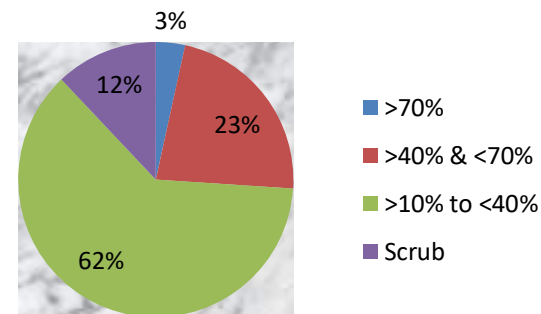
Block	Compt. No	Sal Forest				Non Sal Forest				Scrub	Total area
		>70%	40-70%	10-40%	<10	>70%	40-70%	10-40%	<10		
Karo	10	26.83	142.22	161.43	0	0.04	0.04	2.19	0	29.83	362.58
Sidhamatha	10	0	7.17	80.64	0	0	0.18	30.12	0	35.42	153.53
Jyotipur		7.39	21.82	126.0	0	0.18	0.42	89.28	0	34.91	280
Kalikaprasad		0	56.78	36.85	0	0	33.44	27.51	0	19.0	173.58
Nayagarh		0	7.27	57.56	0	0	3.16	139.25	0	3.32	210.56
Atei	10	8.3	15.61	45.82	0	2.06	6.46	10.56	0	34.32	123.13
Total		42.52	250.87	508.3	0	2.28	43.7	298.91	0	156.8	1303.38
		801.69 (61.5%)				344.89 (26.5%)				12%	100

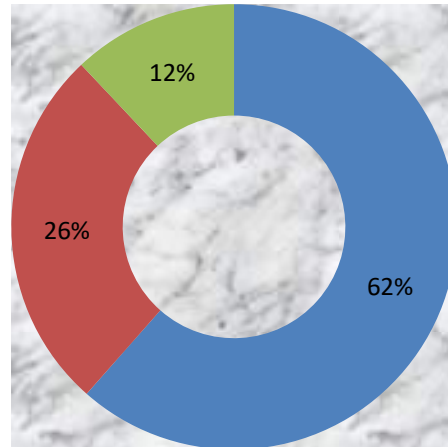
On analysis of Stock map furnished by NRSC it is reveled that the Sal / Non sal composition in forest taken for Imp. WC is Sal about 61.5 %, Non sal over 26.5% and Scrub forest over 12%

Density wise area for forest blocks included in the Imp. Series.

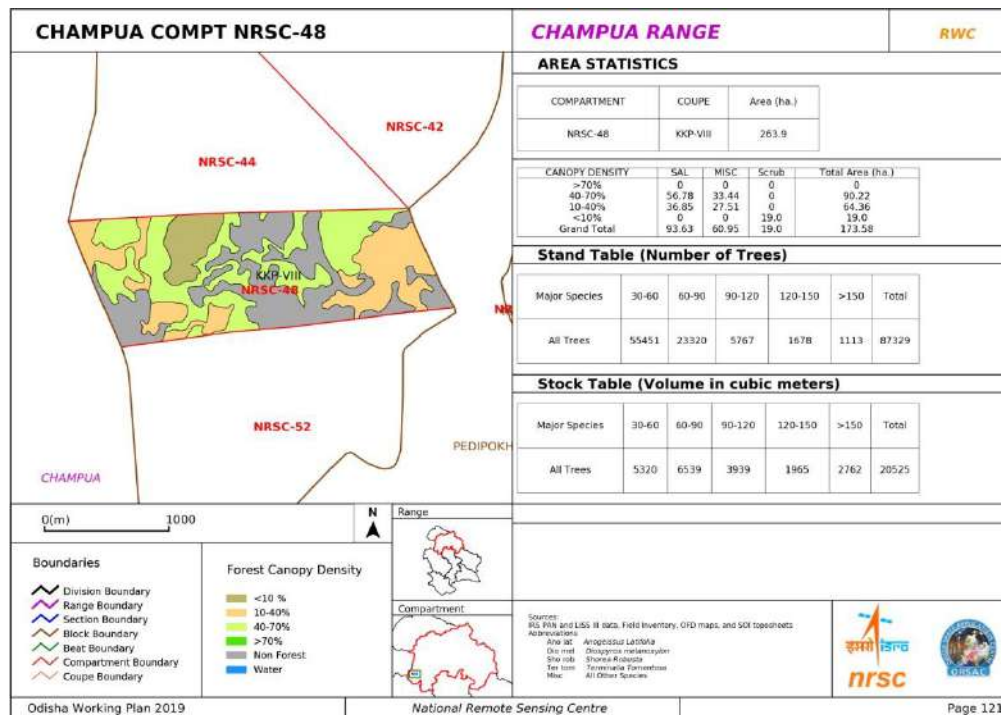
Table No 15.10 Distribution of area to different crop density.

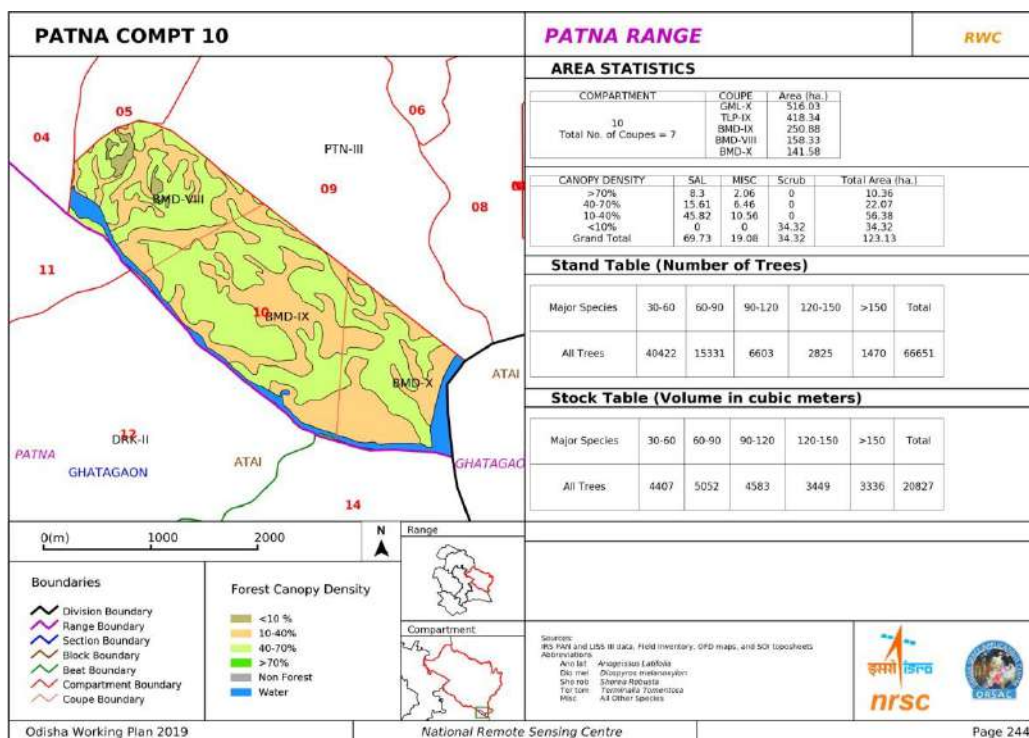
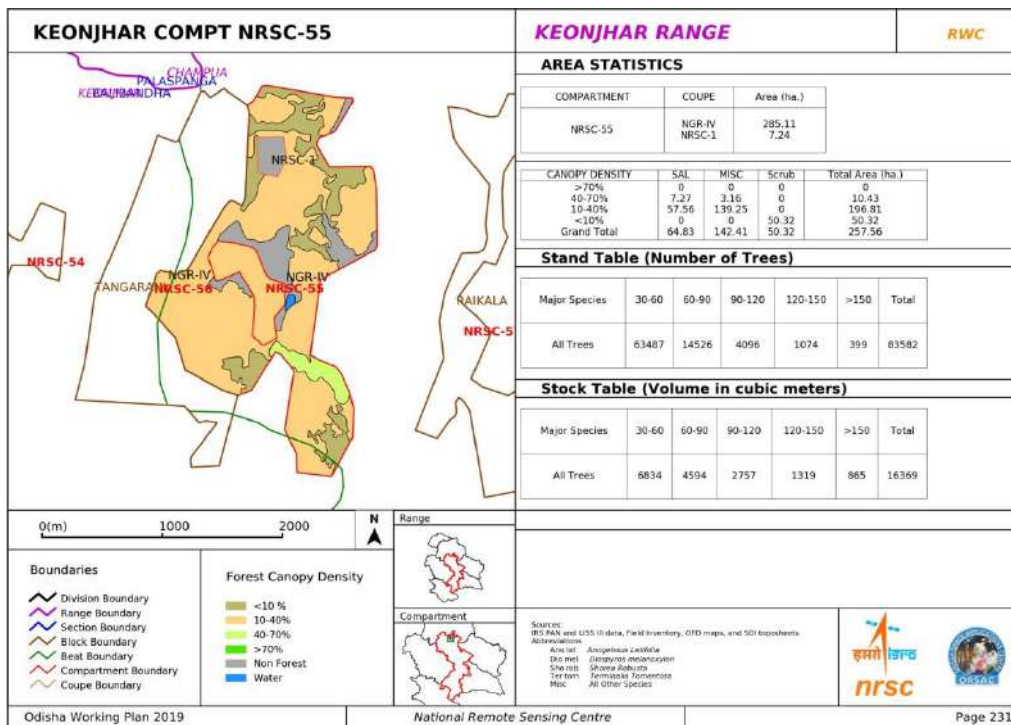
Crop category	>70%	>40% & <70%	>10% to <40%	Scrub
Sal	42.52	250.87	508.3	0
Non sal	2.28	43.7	298.91	0
Scrub				156.8
Total	44.8	294.57	807.21	156.8
%	3.4	22.5	61.7	12.0

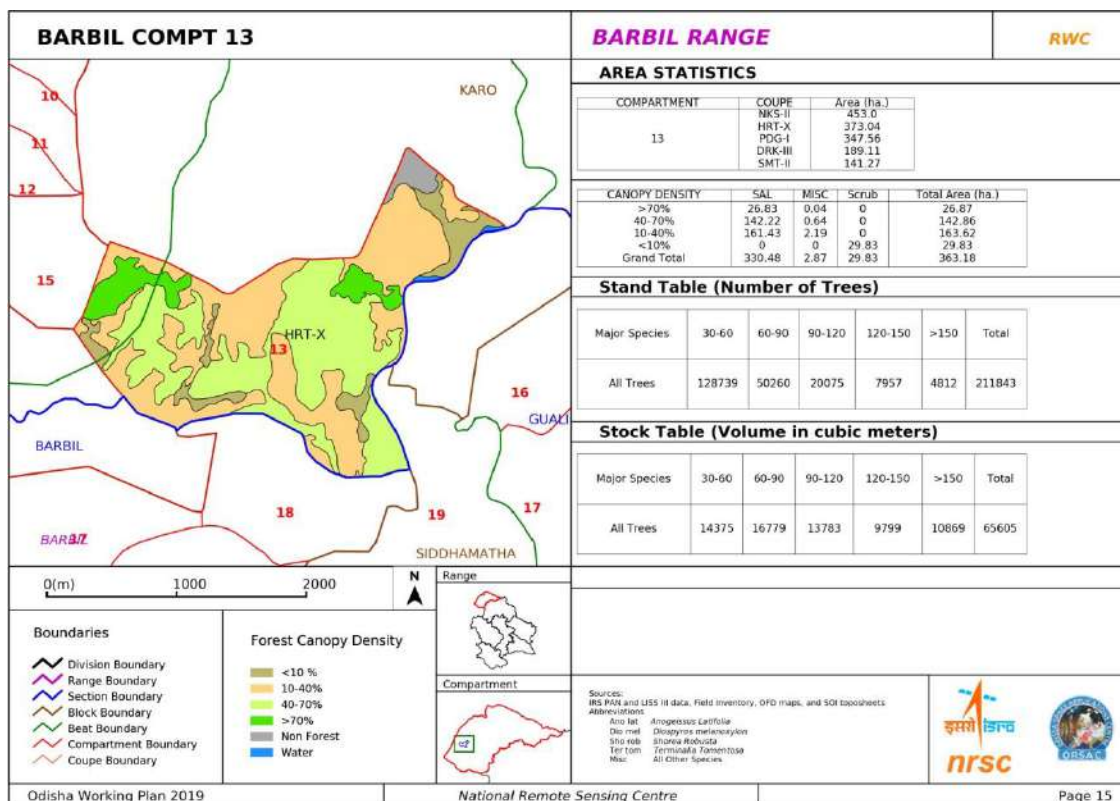
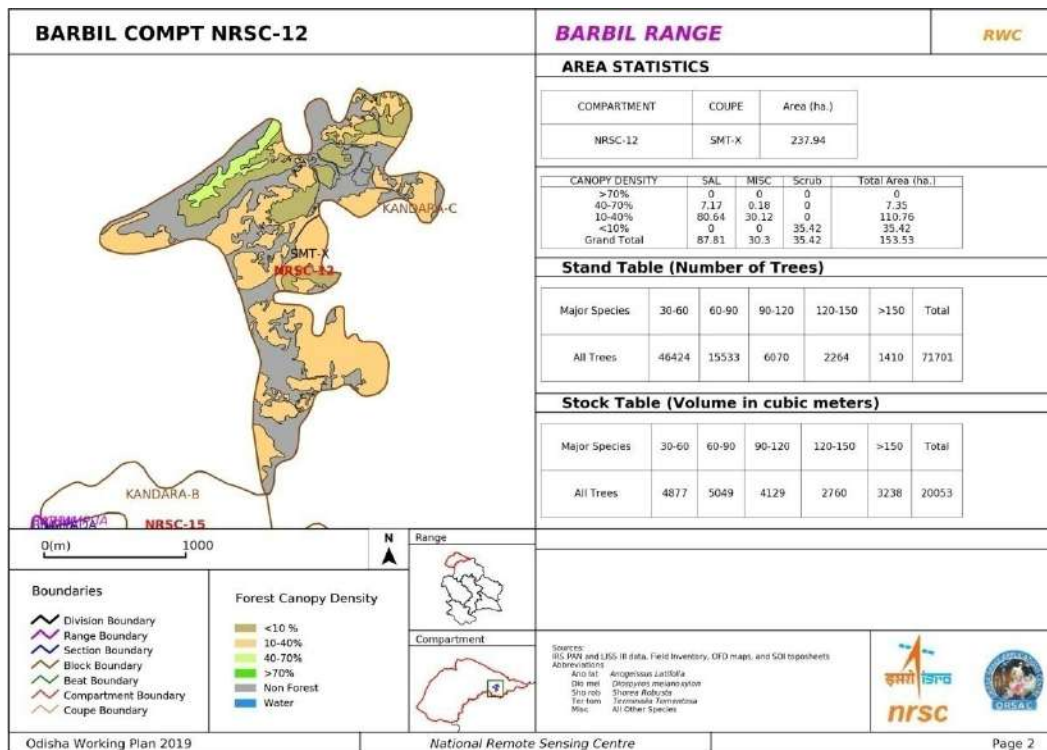


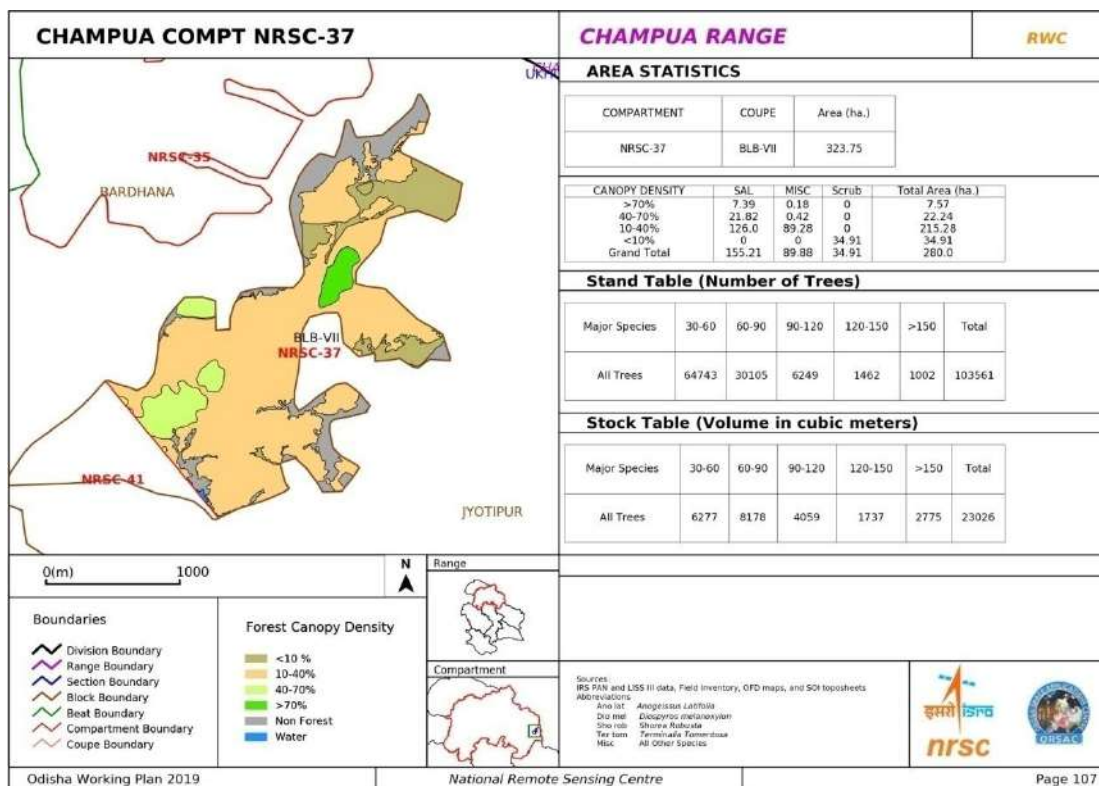


■ Sal
■ Non sal
■ Scrub









From the above data it is observed that the area assigned to this Working Circle consists of Medium Dense Forest up to 30% and rest under less than 40% crop density..it is also to mention that about 12% area is under scrub and needs imidiate attention. . The Crop Density wise area is furnished below.

15.6.2 Silvicultural system:

The Silvicultural System proposed to be adopted is **“Improvement measures to restock the area in High Forest System”**. Under this adopted system the congested and dead trees will be selectively removed leaving adequate mother trees to have good seed dispersal and natural regeneration. After removal of dead trees and thinning, the remaining trees will be treated so as to obtain good established regeneration and diameter growth.

15.6.3 Rotation period:

As there is no harvesting proposal, no Rotation period has been prescribed. As the crop is likely to respond the silvicultural treatment and put growth, it is expected that adequate trees will passen to higher girth class during plan period and in the nest plan period, it may pass to Selection Working system. Keeping this in mind the prescriptions



have been made. It is expected to meet the rotation standard of 120 years for Sal and for other species 100 years.

15.6.4 Harvestable diameters:

There is no prescription for harvest in this working circle. Hence harvestable diameters are not prescribed. Trees as required under thinning (C grade to D Grade) will be removed as per thinning requirement to be discussed below.

15.6.5 Reducing factors and reduced areas:

There is no yield. It is expected to obtain thinning materials (Poles) which may have market demand for Centering etc. Hence **no Reducing factor has been prescribed.**

15.6.6 Improvement cycle:

The Plan period is 10 years i.e. from 2022-23 to 2031-32. The area assigned to this working circle will be covered within the Plan Period i.e. 10 years. Therefore a improvement Cycle of 10 years is prescribed and followed.

15.6.7 Division into Annual Coupes (Improvement Sections):

The area assigned to this Working Circle has been divided to twenty Improvement Series. Each felling Series has been sub divided to ten (10) Annual Coupes and numbered as I, II, III --- X prefixed with Improvement Series abbreviation. The annual Coupe and area assigned has been outlined at Table No 15.4 (i) to 15.4(xx)-under **Para 15.4.2** above.

15.6.8 Calculation of the yield:

There is no prescription for felling of green / dying trees. Only dead trees, if available will be salvaged out. During thinning some poles from contested patches will be removed in the process depending upon the grade of thinning i.e. C or D grade. As forests of Badbil Range, Champua Range and BJP Range are affected seriously by Mining no thinning will be normally carried out. Thinning will be taken up in Keonjhar, Ghahtgaon, Patna and Telkoi Range. The corresponding Improvement Series are as follows.



Table No 15.11 List of Imp. Series (For Thinning Purpose)

Sl No	Range	Imp. Series	Area in ha
1	BJP	Gouda champei Imp. Series(GCS)	1075.4854
2	Ghatgaon	Baiganpal Imp. Series(BGP)	3762.0428
3	Ghatgaon	Ghatimangala Imp. Series(GH)	3981.4603
4	Ghatgaon	Melan Imp. Series (MLN)	4217.6712
5	Ghatgaon	Nilakantheswar Imp. series	4541.1737
6	Keonjhar	Kanjhari Imp. series	5502.1081
7	Keonjhar	Nayagarh Imp. series	4386.3762
8	Keonjhar	Belda Imp. Series	2463.3053
9	Keonjhar	Sapua Imp. series	4502.4850
10	Keonjhar	Nalapanga Imp. series	2189.8997
11	Patna	Padampur Imp. Series	3202.4206
12	Patna	Patna Imp. series	1820.7542
13	Telkoi	Samakoi Imp. Series (SKI)	4841.3130
14	Telkoi	Kalapat Imp. Series	3438.5044
15	Telkoi	Tamanga Imp. Series	3822.5189
	Total		53747.5188
Percentage to Total assigned area			75.53

Yield of poles per ha expected = 25 poles per ha

Improvement Area Allotted: 53747.5188 ha

Yield expected: $53747.5188 \times 25 = 13, 43,688$ number pole of Sal / Misc.

15.6.9 Table of felling;

The annual felling program has been furnished at Table No 15.5 under Para 15.4.2. it is reproduced below for ready referemnce.



Revised Working Plan of Keonjhar Division for the period 2022-23 to 2031-32

Impr. Series	Table No 15.12 Year of Working										Total
	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	
Harmath	252.0040	409.2063	241.7948	130.9743	154.8926	313.0463	550.9151	324.5352	212.3228	173.0534	2762.7448
Sidhamath	188.9820	601.5559	610.9319	521.4924	440.0181	501.2417	205.1073	431.0044	706.7119	345.0107	4552.0563
Kalika prasad	585.0550	463.3400	480.0382	250.0577	373.4745	265.8405	293.7811	340.6845	256.6773	302.7182	3611.6670
Champua	472.4420	313.4960	141.6445	176.5477	304.1553	178.5983	324.7192	320.5434	313.2296	457.9477	3003.3237
Balibandh	287.1961	387.7340	305.6706	152.1354	458.3737	408.4863	338.8660	542.5640	323.4500	275.1339	3479.6100
Gouda champei	100.0000	96.0891	108.0000	108.0000	108.0000	108.0270	110.0000	110.0000	110.0000	117.3693	1075.4854
Baiganpal	349.9612	349.0257	435.2590	370.7564	362.5317	332.6139	383.0580	521.9792	342.7843	314.0734	3762.0428
Ghatimangala	469.1197	66.2200	455.0875	200.0000	286.1999	580.7777	289.2193	418.2338	395.1626	821.4398	3981.4603
Melan	563.8569	567.2393	342.4076	300.0000	217.0846	520.4199	452.4763	476.8597	469.1674	308.1595	4217.6712
Nilakantheswar	355.7851	435.8883	476.4392	510.7778	605.6119	352.0533	382.8067	445.7302	522.0198	454.0614	4541.1737
Kanjhari	512.8400	342.1732	462.7707	440.4002	317.6800	726.1382	411.2093	897.3875	722.9690	668.5400	5502.1081
Nayagarh	490.5950	480.4050	470.3050	412.5950	466.4050	480.3050	387.9387	400.0000	479.6000	318.2275	4386.3762
Belda	324.0400	295.0023	300.8400	263.1000	265.0100	143.9980	272.5300	200.0000	200.0000	198.7850	2463.3053
Sapua	508.5624	170.9689	228.2354	533.8606	452.3561	500.9293	529.6621	573.8371	503.9359	500.1372	4502.4850
Nalapanga	280.1700	200.0000	126.1032	239.7280	120.0008	167.7527	340.5000	366.1700	220.9300	128.5450	2189.8997
Padampur	232.2400	231.2487	477.9323	501.0262	555.9434	405.6500	249.9900	16.0900	332.3000	200.0000	3202.4206
Patna	190.5442	16.5310	373.9690	147.8980	326.4620	200.0000	202.3200	316.4700	15.5400	31.0200	1820.7542
Samakoi	794.8951	345.0643	502.7357	466.7712	523.7740	300.5448	916.3200	475.8299	377.1000	138.2780	4841.3130
Kalapat	331.7675	174.8900	491.6894	325.2245	300.0000	452.4849	400.0000	350.7507	300.0000	311.6974	3438.5044
Tamanga	300.0000	622.1030	330.0000	310.3406	350.0000	320.0000	340.0000	349.6424	450.0000	450.4329	3822.5189
Total	7590.0562	6568.1810	7361.8540	6361.6860	6987.9736	7258.9078	7381.4191	7878.3120	7253.9006	6514.6303	71156.9206



15.6.10 Method of executing the Treatment:

The method of treatment and procedure is described as follows.

15.6.10.1 Demarcation of Annual Improvement Area:

The assigned area / coupe area is required to be demarcated in the field as per management map pertaining to this circle. The cardinal points of the coupe are to be marked on ground by stone cairns with help of GPS. The coupe boundary line is to be marked with black ring on existing trees along the line. If the boundary line coincides with RF/ PRF Boundary or Compartment boundary, then the Boundary line / compartment line is required to be maintained as per standard practices / instructions. This demarcation is to be completed by end of June of the assigned year.

15.6.10.2 Description of Operations:

The operations that will be taken up in all forest areas included in this working circle. The operation involves

- a) Removal of Dead trees those are having utility and operation is economically viable.
- b) Light grade thinning i.e. C' grade thinning to D' grade thinning as required.
- c) Soil & Moisture Conservation through treatment of dry seasonal nalla.
- d) Covering of large blank areas more than 0.5 ac in extent through sowing of seeds after preparing the soil bed to receive the seeds.
- e) Closing to Grazing,
- f) Fire Protection measures.

15.6.10.3 Removal of Dead Trees:

The forests assigned to this working circle are having less number of big sized trees (above 150 cm GBH). Most of the crop is in between 30-60 cm girth class i.e. in young stage. It is prescribed to remove any dead trees which has a market value and economically viable to harvest and transport to nearby truck able point. If such type of trees exists in the coupe area, then such trees are to be removed departmentally and delivered to OFDC Ltd or VSS as the case may be. Two / three defective dead trees per hectare are required to be left as such from Wildlife Management point of view.

15.6.10.4 Thinning:

The objectives of taking of thinning are

- i) To improve the hygienic condition.
- ii) To create best conditions of growth & obtain diameter growth of remaining trees.



- iii) Salvage the anticipated losses of the merchantable volume.
- iv) To obtain a desirable composition of crops.
- v) Retaining seed bearers.
- vi) Improvement in wood quality.
- vii) To obtain intermediate yield and increase net yield and financial out-turn.
- viii) Decomposition of raw hummus.
- ix) To reduce the risk of diseases and pests.

After thinning, the results expected are

- **Reduced competition in root and crown,**
- **Reduced weed growth,**
- **Improved quality of wood,**
- **Regulation of rate of growth,**
- **Increase seed production,**
- **Reduction in the net cost of growing,**
- **Reducing the risk of fire and diseases,**
- **Encouraging the advanced growth,**
- **Fulfilling the market demands.**

For undertaking thinning the following aspects are to be kept in mind.

- a) Before planning the nature and intensity of thinning preference between the intensity of thinning and quality of thinning should be decided.
- b) The trees remaining after the thinning should be able to compensate for the loss in increment by trees removed in thinning.
- c) There will be an optimum stocking for a given site and species.
- d) For this individual trees are classified by height and size of crown and thinning is decided on the basis of which classes of trees are fit to be removed for maintaining the desired qualitative and quantitative nature of the thinning.
- e) The main purpose of the thinning is to release more space for future development of trees; the freedom of crown is the guiding factor for thinning purpose.
- f) The retention of trees per unit should be decided first and then the number of trees to be removed should be marked accordingly.
- g) The development of crown and stem are the deciding factor for sub-classification of the dominance classes of trees for the given site and species.
- h) Tree classification in regular forests are done as under



2. Classification based on height:

i) Dominant trees (D or D1)

It includes the trees that form the uppermost leaf canopy. They are the tallest trees that determine the top level of canopy they are also called pre-dominant trees.

ii) Co-dominant trees (CD or D2)

These are shorter than dominant. About $5/6^{\text{th}}$ of the height of the dominant.

iii) Sub-dominant trees (SD or D3)

They do not form part of the uppermost leaf canopy. Their height is about $3/4^{\text{th}}$ that of the tallest trees. They are also called dominated trees.

iv) Suppressed trees (S)

The height of the suppressed trees is about $1/2$ to $5/8^{\text{th}}$ of the height of the best trees. Suppressed trees grown below the crowns of the other trees in the stand. The leading shoots are over-topped by their neighboring trees or at least shaded on all sides by them.

v) Wolf trees (W)

The wolf trees are large, coarse and misshapen trees.

vi) Whips (Wh)

This class comprises bent over and badly leaning trees. Whips have tall, thin stems which are unstable and may cause damage to other trees when they sway.

vii) Dead, dying and moribund trees (m)

This category consists of trees that are dead or at the point of death.

viii) Disease trees (k)

It includes trees that are infected with parasites and their growth is seriously affected due to infection.

ix) Reproduction or Regeneration (r)

It consists of recruits or regeneration.



x) Over mature or veterans.

Classification on the Basis of Crown

The crown spread may be taken as better indication than canopy position to understand growth potentialities of a tree. For this tree may be classification on the basis of the crown with average stem spacing as shown below:-

I) Spaced

Trees with free crown spreading having less than or equal to $3/4^{\text{th}}$ that of spacing.

II) Co-spaced

Trees with a free crown spread having $3/4^{\text{th}}$ to $1/2$ (50-75%) that of the available spacing.

III) Sub-spaced

Trees with the spread of free crown less than half but more than one-fourth $1/4^{\text{th}}$ of the spaced.

IV) Mal-spaced

Trees with a very small spread of trees crown which is less than a quarter of the spaced.

V) De-spaced

Trees will no free crown with little vigor.

VI) Dead, dying and low yielding trees

In the present situation, it is recommended to follow an ordinary thinning as described below.

This is known as “THINNING FROM THE BLOW” and consists of the removal of inferior individuals starting from the suppressed class, then taking the dominated class and ultimately some of the dominant class.

It is a very common form of selective thinning in regular crops. It has been devised to be in line with nature because only those trees which have been unsuccessful in the struggle for growth are removed first.



iv) Grade of Ordinary Thinning

The thinning grades are defined by the spacing class removed so that a check may be made by comparing yield table numbers for the mean diameter in question. There are various grades of thinning e.g. A, B, C, D, E, grades.

VI. A-Grade

Light thinning- removal of dead, dying, diseased and suppressed trees.

VII. B-Grade:

Moderate thinning - In addition to trees in A-grade further removal of defective dominated stems and whips. Advance growth which cannot be pruned or lopped may also be removed.

VIII. C- Grade (Heavy thinning):

This includes trees in grade A and B and all remaining dominated defective, co-dominants that may be removed without making lasting gaps in canopy. The C grade thinning is the standard grade in vogue for yield table compilation.

IX. D-Grade (Very Heavy Thinning):

This includes trees of all above grades and some good dominants so that no lasting or permanent gap develops in canopy. The left over trees are with good boles and crowns, well spaced and evenly distributed over the site for future development.

X. E-Grade (Extremely Heavy Thinning):

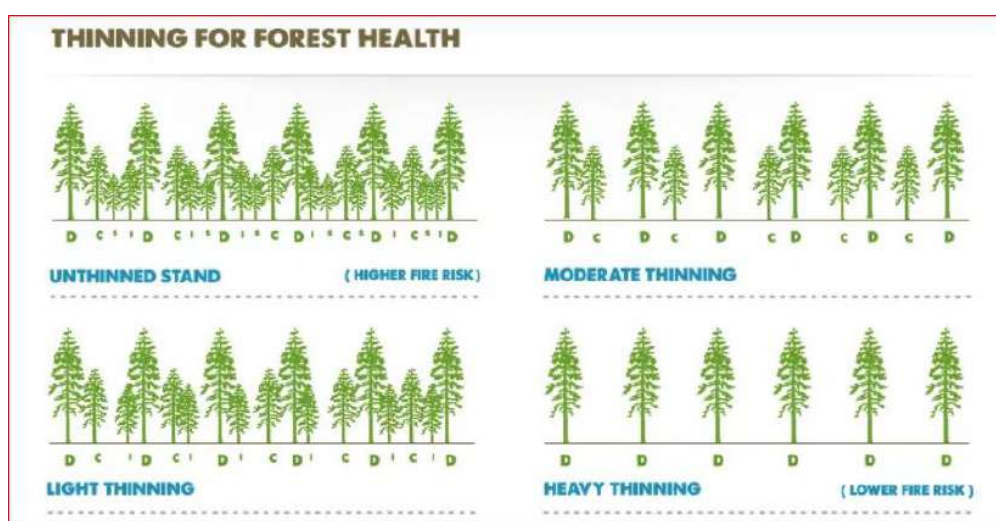
This type of thinning is adopted mainly for research purposes. This is the heaviest thinning that can be made in the crop without creating permanent gaps in the canopy. Many dominant stems are also removed.

It is always better to make C-grade or D-grade thinning in a dense crop in which thinning has been unduly delayed. The removal of trees should be Economic or Hygienic value. In addition to above classes the intermediate grades of thinning such as C/D may be carried out.

v) Precautions in First Thinning

The first thinning is very important for any crop. The following factors should be considered at the time of first thinning.

- The thinning should take place before adjoining trees check one another's growth.
- The thinning should not be postponed on the ground that the poles obtained will be non-saleable or uneconomic.
- The age of first thinning should be taken on the basis of height or size attained.
- The heavy thinning should not be carried on poorer sites, drier areas and steeper slopes, because the gaps may not fill up due to poor growth of trees.
- All thinning should be done on the silvicultural lines.
- The light demander species may require heavier thinning as compared to the shade bearer species.
- It is best to carry out silvicultural thinning. Some admixture of secondary species may be retained where this is desired on silvicultural or protection grounds.



vi) Thinning In Irregular Crops:

It is difficult to classify tree in an irregular crop. The general classifications which are used for the research purposes are THREE crown positions. It is suggested that in regular crops the degree of crown freedom and their further classification into large, medium and small crown sizes, should be taken in account.

CROWN FREEDOM	FREE	RESTRICTED	CONFINE
Crown development or crown size	Well developed or large	Average or medium	Poor or small

- The crown freedom is judged irrespective of the size of the tree and its position in the stratification.
- The thinning in an irregular crop is done by selection method.
- The trees to be cut are those which restrict the growth of their neighbours on all sides and should be more valuable than their neighbours.



- The aim should be to maintain a crop of all diameter classes in a sufficient number of maximum sustained yield.
- The valuable species are retained whereas inferior trees of all diameter classes are removed.
- The removal of trees is carried out in diameter classes.
- It aims at continuous improvement by repeated removal of inferior stems in all diameter classes so that basal area or standing volume becomes more or less equal to theoretical ideal value.

vii) Factors Affecting Thinning Practice:

The following factors may be considered before the thinning practice:

1. Site Factors
2. Nature of species
3. Age

1. Site Factors

The site quality influence on thinning practice is that a relatively close canopy on the poorer sites should be maintained. On low quality sites heavy openings should not be made. The spacing out widely in earlier stages should not be carried out on hot, dry, slopes, on poor soils and on all sites where grass and other weed invasion is likely to occur. A poor site will usually support less stems per hectare than a good one.

2. Nature of Species

The shade-bearers are more tolerant of crown than the light demanders therefore more frequent thinning is needed for light demander species. Light demanders usually show good response to ordinary thinning where as shade-bearers to crown thinning. Sal, Sisoo, Asan, Teak, being light demanders require heavier grades of ordinary thinning.

3. Age

The crown formation depends on age and in young ages when the crown formation is not completed mechanical thinning or sticks thinning may be done with succession. The light demander species require heavier grade of thinning at frequent intervals in younger crops. On the other hand some species in middle age or maturity require crown thinning.

15.6.10.5 Soil & Moisture Conservation:

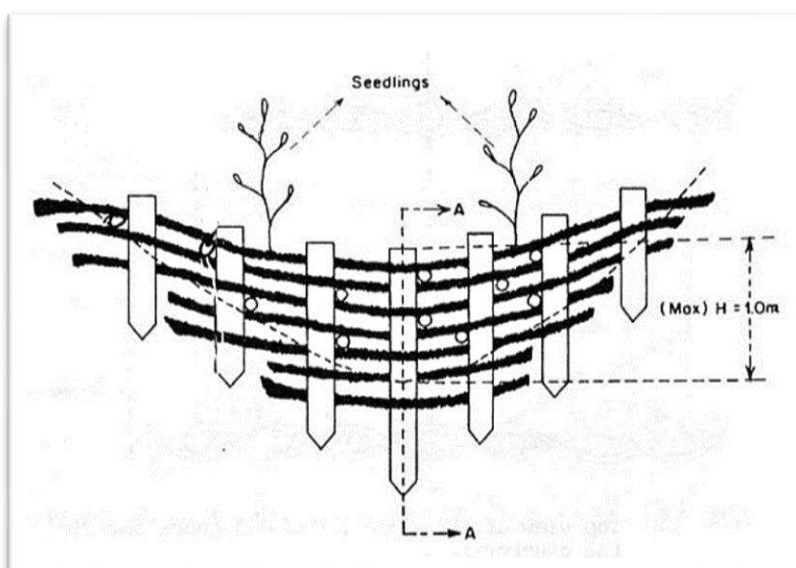
Moisture regime of a forest block greatly influences the crop composition, quality class and productivity of the forests. The dryer the tract – poorer is the vegetation. The forests included in this working circle are the best available forest blocks of the division. It is recommended to improve soil moisture regime in forests to improve the vigour of the crop, allow the species towards a climatic climax with increased biodiversity. It is recommended to treat all the available seasonal nallas to enhance period of water flow, check soil erosion in slopes, increase the humus layer in forest floor. The following activities are prescribed.

- a) Vegetative / brushwood Check dams on nalla bed.
- b) Loose boulder Check dams (LBCD)
- c) Percolation Pits.
- d) Create & Maintain Humus layers to reduce run off and enhance time of collection.

(E) Vegetative / Brushwood check dams:

Brushwood check dams made of posts and brush are placed across the gully / Nalla bed. The main objective of brushwood check dams is to hold fine material carried by flowing water in the gully / nalla. Small gully heads, no deeper than one meter, can also be stabilized by brushwood check dams. Brushwood check dams are temporary structures. They can be employed in connection with land use changes such as improved range management until vegetative and slope treatment measures become effective.

This type of check dams can be constructed by using fallen materials on forest floor.





(F) Loose Boulder Check Dams (LBCD):

Loose stone check dams made of relatively small rocks are placed across the gully. The main objectives for these dams are to control channel erosion along the gully bed and to stop waterfall erosion by stabilizing gully heads. Loose stone check dams are used to stabilize the incipient and small gullies and the branch gullies of a continuous gully or gully network.

(G) Percolation Pits / trench:

A percolation trench, also called an infiltration trench, is a type of best management practice (BMP) that is used to manage storm water runoff, prevent flooding and downstream erosion, and improve water quality in an adjacent river, stream. It is a shallow excavated trench filled with gravel or crushed stone that is designed to infiltrate storm water through permeable soils into the groundwater aquifer.

A percolation trench is similar to a dry well, which is typically an excavated hole filled with gravel.

(H) Create & Maintain Humus layers:

The forest floor, also called detritus, duff and the O horizon, is one of the most distinctive features of a forest ecosystem. It mainly consists of shed vegetative parts, such as leaves, branches, bark, and stems, existing in various stages of decomposition above the soil surface. Although principally composed of non-living organic material, the forest floor also teems with a wide variety of fauna and flora. It is one of the richest components of the ecosystem from the standpoint of biodiversity because of the large number of decomposers and predators present, mostly belonging to invertebrates, fungi, algae, bacteria. Certain (adapted) plants may be more apparent in tropical forests, where rates of metabolism and species diversity are much higher than in colder climates.

The major compartments for the storage of organic matter and nutrients within systems are the living vegetation, forest floor, and soil. The forest floor serves as a bridge between the above ground living vegetation and the soil, and it is a crucial component in nutrient transfer through the biogeochemical cycle. Much of the energy and carbon fixed by forests is periodically added to the forest floor through litterfall, and a substantial portion of the nutrient requirements of forest ecosystems is supplied by decomposition of organic matter in the forest floor and soil surface. The sustained productivity of forests is closely linked with the decomposition of shed plant parts, particularly the nutrient-rich foliage.



The amount of material in the forest floor depends on the balance between inputs from litter production and outputs from decomposition, and amounts also reflect the site's disturbance history. Both litter production and decomposition are functions of the site (e.g., wet versus dry; cold versus warm; nutrient rich versus nutrient poor) and the vegetation that occupies the site (e.g., conifer versus broadleaf). A site's forest floor is determined by its areal weight, depth, and nutrient content. Typically, forest floors are heaviest and deepest in boreal forests and mountain forests where decomposition rates are slow. In contrast, the lightest and thinnest forest floors usually occur in tropical forests where decomposition rates are rapid.

Key soil functions SOM provide for include:

Nutrient Supply.

Upon decomposition, nutrients are released in a plant-available form while maintaining current levels.

Water-Holding Capacity.

Organic matter behaves somewhat like a sponge. It has the ability to absorb and hold up to 90 percent of its weight in water. Another great advantage of organic matter is that it releases nearly all of the water it holds for use by plants. In contrast, clay holds great quantities of water, but much of it is unavailable to plants.

Soil Aggregation.

Organic matter improves soil aggregation, which improves soil structure. With better soil structure, water infiltration through the soil improves, which improves soil's ability to take up and hold water.

Erosion Prevention.

Because of increased water infiltration and stable soil aggregates erosion is reduced with increased organic matter. Estimating Organic Material Needed to Increase Soil Organic Matter.

In Sal forests heavy leaf fall during January / February covers the entire forest floor. Frequent forest fire break the nutrition cycle in forest resulting poor forest growth. In order to enhance decomposition of leaf litters it is recommended to check burning of leaf litters, allow moderate grazing in February/ March for trampling and breaking of curacaos leaf.

15.6.10.6 Sowing of Seeds:

In the assigned forest blocks there are blank areas indicated in table 14.2. The area is about 10% of the total area in this Working Circle. It is recommended to cover the blank



areas more than 0.50Ac to be covered under sowing of seeds. Seeds of Sal, Piasal, Sisoo, Asan, Arjun, Jamu, Kusum are to be sown on line or thali in June 1st / 2nd week just after few pre-monsoon shower. This arrangement will allow recruits to come up. Subsequently little care in form of weeding may fill up the gaps.

15.6.10.7 Closing to Grazing:

The area assigned to a particular year is required to be closed to grazing for three to protect the natural regeneration to attain a sapling stage. This should be strictly adhering to. **A formal “Close to Grazing” order is to be issued and circulated to local offices / villages and VSS.**

Table no. 15.13 Closing to Grazing

Table no. 15.13 Closing to Grazing										
Year										
Coupe	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32
I	Closed									
II		Closed								
III			Closed							
IV				Closed						
V					Closed					
VI						Closed				
VII							Closed			
VIII								Closed		
IX									Closed	
X										Closed

15.6.10.8 Fire Protection Measure:

Strict Fire Protection measures are required to be taken up / ensured for 1st three years. All possible measures at hand are required to be utilized to enforce Fire Protection. The following methods may be adopted depending upon extent of fire / time/ resource at hand.

- f) Control burning of debris,
- g) Fire line maintenance,
- h) Counter Firing,
- i) Beating out of Fire and use of blower machines,
- j) Use of Chemical extinguishers to control large in assessable fires.

As many forest blocks / large area have been assigned to VSS for protection etc, their assistance to be availed for fighting against fire.



15.6.10.9 General Strategy:

After demarcation of Coupe area, the area is to be thoroughly visited by the Range Officer. An improvement plan for the coupe is to be drawn up and submitted to the DFO for approval and order for implementation. The improvement plan must contain

- a) Map of the Coupe,
- b) Whether dead trees available for removal with its economic aspect.
- c) Area for thinning with grade of thinning.
- d) Soil & Moisture conservation plan indicating the nala position / Check dams etc.
- e) Area for sowing of seeds.
- f) Proposal for Closing to Grazing & Fire Protection strategy.
- g) Total Financial implication.

This improvement plan is required to be drawn up by Range Officer and checked by the Asst. Conservator of Forests. In approval marking for thinning / removal of dead trees is to be taken up. Thinning is to be implemented by the Range officer under supervision of Asst. Conservator of Forests.

15.6.10 Subsidiary Silvicultural Operation:

Silvicultural Cleaning and thinning are two major subsidiary silvicultural operations being prescribed. Cleaning is being taken up in Sapling crops where as thinning is prescribed in pole crops. The forests assigned to this working circle are mostly in pole stage. Hence thinning as required is prescribed. The details of thinning have been described under Para- 14.6.10.4 above.

15.6.11 Regeneration:

The silvicultural system adopted for this working circle is a “High Forest System”. For regeneration, the seed bearers are to be well maintained and covering of blank areas by sowing of seeds with after care is prescribed. Collection of genetically good seeds is to be stressed. The standard guideline for selecting a mother tree is furnished below.

- Collect seed lots from between 15 and 25 individuals that are spaced at least 100 meters distance from any other collection tree of the same species.
- Choose trees in vigorous health and avoid any that are diseased, suppressed, deformed, environmentally stressed, or in otherwise poor health.
- Collect from trees that are well formed and either dominant or co-dominant in the canopy.
- Avoid individuals that are isolated from others of the same species.
- Harvest only mature seed from ripened fruits.



- To ensure genetic variation, collect fruits equally from all parts of the crown--top, sides, and bottom--as these parts may have been pollinated at varying times from different sources.
- Collect throughout a species' normal habitat, noting variations in site.
- Man-made stands, including live fencing, plantations, or windbreaks, should be carefully reviewed as to their establishment before being selected as a seed source.

15.6.12 Associated regulations and measures:

Fire, grazing though two important site degraders, it can be judiciously use in high forest system to initiate a good regeneration. This aspect is to be seriously thought up and implemented to have a better stand.

Villagers / VSS are to be actively involved in all operations in assigned area. Their contribution will have a better result at a long run.

15.6.13. Annual Control Form:

The forest blocks assigned to a particular year for operation shall be taken up in the assigned year. After execution of prescribed work, an annual Report to be furnished in the form prescribed below. In case any deviation, the reason for such deviation is to be recorded. In case of spill over to next year for taking up the assigned operation, necessary approval of deviation is required to be obtained from PCCF, Odisha / CCF (P&SM) before executing the work. A copy of approved deviation shall find place in the Compartment History File.

Table no 15.13: Annual Control Form (Form-1)

Name of Improvement Series.	Coupe No	Assignment year	Area in Ha	Operation Prescribed in Working Plan	Operations executed	Year of Operation	Reason for Deviation	Deviation Approval Status.



CHAPTER-16

REHABILITATION WORKING CIRCLE (RWC)

16.1 Rehabilitation Working Circle:

The Forest Blocks those are managed within jurisdiction of Keonjhar Division are still in open forest category i.e. crop density is below 40%. Various treatments under working plan prescriptions have not yielded desired results. Observing the present crop condition, status of regeneration and over all juvenility of vegetation and soil moisture regime, it is felt to provide adequate silvicultural treatment to bring the crop to medium dense forest. So, it is recommended to treat such forest blocks under “**Rehabilitation Working Circle**”.

16.2 General Constitution:

The Forest area of the Division i.e. Reserved Forests, Proposed Reserved Forests (PRF), Demarcated Protected Forests having crop density less than 40% and heavily affected by biotic interference are included in this working Circle. The total area included in this working circle is **38113.4625** hectare (26.07%) of the total forest area under management prescriptions of this plan. The Forest Block assigned to this Working Circle and area allotted is furnished in **Table No 16.1**

Table No 16.1 Forests assigned to Rehabilitation Working Circle: Keonjhar Division.					
Sl No	Name of Forest Block	Compt.	Area for management	RWC	JFM
	Reserve Forst				
	Badbil Range				
1	Kandara-A		6.6300	6.6300	6.0000
2	Karo	1	196.2264	196.2264	50.0000
	Karo	2	186.5534	186.5534	50.0000
	Karo	3	289.4511	289.4511	
	Karo	4	158.9004	158.9004	
	Karo	5	127.7842	127.7842	
	Karo	7	213.0557	11.5100	
	Karo	8	253.5588	11.7640	
	Karo	9	121.5139	10.7530	
3	Siddhamatha	1	135.6073	135.6073	34.0000
	Siddhamatha	2	101.7452	97.7762	41.0000
	Siddhamatha	5	66.0095	66.0095	50.0000
	Siddhamatha	6	83.4478	83.4478	51.0000
	Siddhamatha	7	115.3415	115.3415	51.0000
	Siddhamatha	8	75.7612	75.7612	



	Siddhamatha	22	115.1284	115.1284	
	Siddhamatha	23	680.1153	680.1153	
	Siddhamatha	24	156.5907	156.5907	
	Siddhamatha	25	162.2515	162.2515	
	Siddhamatha	26	85.6742	85.6742	
	Siddhamatha	27	211.5879	211.5879	
	Siddhamatha	28	202.1652	202.1652	
	Siddhamatha	29	309.8240	309.8240	
4	Thakurani		2877.1293	2848.9218	93.0000
	Total Barbil		6932.0529	6345.7750	426.0000
	BJP Range				
5	Gadgadei		218.0103	218.0103	49.4600
6	Jagar		155.9472	155.9472	
7	Kanjipani		724.9460	724.9460	190.0000
8	Khajurimundi		180.6000	164.6000	180.5000
9	Saharpur		834.3484	670.0934	301.4500
	Total BJP		2113.8519	1933.5969	721.4100
	Gatgaon Range				
10	Atai	11	394.7855	394.7855	310.0000
	Atai	12	602.4653	526.6695	552.4000
	Atai	13	185.5263	185.5263	103.0000
	Atai	14	539.8147	539.8147	410.0000
	Atai	32	426.6912	426.6912	
	Atai	33	375.0607	365.0607	
	Atai	34	349.5217	339.5217	
	Atai	35	257.7466	257.7466	
	Atai	36	160.9435	160.9435	
	Atai	37	216.4438	216.4438	
	Atai	38	244.7985	244.7985	
	Atai	39	326.4856	326.4856	
	Atai	40	288.5376	288.5376	
	Atai	41	342.7302	342.7302	
	Atai	42	570.7267	570.7267	
	Atai	43	635.1144	635.1144	
	Atai	44	516.2266	516.2266	
	Atai	45	484.4328	484.4328	
	Atai	46	249.3127	249.3127	
	Atai	47	508.1466	508.1466	
	Atai	48	656.1133	656.1133	
	Atai	49	249.3177	225.3177	
12	Nalapanga	1	352.8800	344.5775	100.0000
13	Pipilia		770.5810	770.5810	166.4000



	Total Ghatgaon		9704.4030	9576.3047	1641.8000
	Patna Range				
	Atai	1	279.3762	279.3762	166.0000
	Atai	2	210.9156	170.9156	200.0000
	Atai	3	191.8487	147.0007	44.0000
	Atai	4	497.0775	497.0775	199.0000
	Atai	5	481.9294	481.9294	
	Atai	10	505.2520	430.5520	
14	Barbil		17.8600	17.8600	17.8600
15	Palaspada		14.7200	14.7200	
	Total Patna		2198.9794	2039.4314	626.8600
	Total RF		20949.2872	19895.1080	3416.0700
	PRF				
	BJP Range				
16	Amuni		50.5987	50.5987	
17	Champey		363.8651	303.8651	317
18	Danla		170.7029	170.7029	80
19	Digachampey		170.0146	120.0146	166.862
20	Dumuridiha		501.9573	501.9573	60
21	Gandhamardan		2171.3480	2171.3480	
22	Lunaghar-I		131.6830	120.2898	131.683
23	Lunaghar-II		360.9440	320.944	103.36
24	Raiguda		489.3750	489.375	71.6
25	Suakati-I		475.3921	475.3921	159
26	Suakati-II		134.9700	134.97	42.73
	Total BJP		5020.8507	4859.4575	1132.2350
	Total PRF		5020.8507	4859.4575	1132.2350
	DPF				
	Barbil Range				
27	Murgabeda		518.23	518.23	
	BJP Range				
28	Guptaganga		179.1081	179.1081	249.4830
29	Katira		483.7163	483.7163	211.0000
30	Pandadhar-Bayakumutia		259.4390	259.4390	30.0000
31	Sanaghagara(B)		792.8602	792.8602	
32	Sundurua		753.7537	753.7537	65.5000
33	Taramakanta		417.5775	417.5775	540.8200
34	Kalanda		1060.8620	1060.8620	40.0000



37	Kakharua		1240.0730	1240.0730	60.1700
38	Khandadhar		1956.4480	1956.4480	64.6800
39	Kuanr		2080.6917	2080.6917	272.7400
40	Kumundi(B)		88.6200	88.6200	88.0000
41	Sanghagara (A)		583.8400	583.8400	40.0000
42	Siddhamath		1112.6787	1112.6787	436.1000
	Bjp Range(Total)		11009.6682	11009.6682	2098.4930
	Champua Range				
43	Jamirta		313.6505	313.6505	
44	Kankana		170.2168	170.2168	50
	Champua Range		483.8673	483.8673	50
	Ghatgaon Range				
45	Kapaspada		80.3289	80.3289	
46	Khajurijuani		95.7075	95.7075	
47	Tara (B)		74.1329	74.1329	
	Ghatgaon(Total)		250.1693	250.1693	
	Patna Range				
48	Machhagarh		14.3668	14.3668	
49	Mushkhori (A)		50.8829	50.8829	50.8829
50	Mushakhori (B)		72.2146	72.2146	54.161
51	Chemena II		23.97	23.97	23.97
	Patna Total		161.4343	161.4343	129.0139
	Telkoi Range				
52	Binjabahal (A)		18.3531	18.3531	
53	Binjabahal (B)		19.8303	19.8303	
54	Madhyapur		101.5797	101.5797	
55	Oriya		161.0948	161.0948	159
56	Binjabahal (C)		140.83	140.83	125
57	Tangurubahal		493.84	493.84	114.68
	Telkoi Range Total		935.528	935.5279	398.680
	Total DPF		13358.8970	13358.8970	2676.1869
	G.total		39329.0349	38113.4625	7224.4919



16.3 General characteristics of Vegetation:

The Rehabilitation Working Circle encompasses about 25% of the Forest Blocks of the Division. The vegetation observed is of Northern Tropical Moist Deciduous Sal Forest, Dry Deciduous Sal Forests, Dry Mixed Forests, and plantations of mixed species. The vegetation is varied and can be described as follows.

16.3.1 Pure Sal Forests:

There are pure Sal forests in most of forest blocks in plain area but with Mixed Sal Forests (Proportion of Sal is about 40%) in gentle sloped area up to the middle of the hills. The stand is of middle aged. Due to repeated felling and fire incident the diametrical growth is restricted. The ground flora is almost absent. Very poor to no regeneration is noticed in the block / compartment.

16.3.2 Mixed Forests:

The Forest Blocks of this division are of mixed crop with Salas predominant both in composition and growth pattern. Due to opening of canopy, blank areas have been infested with weeds which have hindered the natural regeneration. Annual fire coupled with soil erosion and trampling by cattle has restricted regeneration. In most of the forest, trees / poles of all age classes are not available. Sal shoots of coppice origin are observed in many forest blocks but establishment of Sal from recruits / saplings is rare. This has resulted in irregular crop in most of the blocks. Regeneration of other important miscellaneous species is either absent or in poor stage.

16.3.3 Scrub Forests:

Peripheral area of some forest blocks are highly affected by biotic interference. The average crop height is below 5 (Five) meter. The area is heavily compacted, top soil is eroded and weeds have complexly invaded the area. Species of Sal, Kendu, Asan, Dhaura, Kasi, Salai, Mai, Veru are observed either in stunted form or matured trees standing here and there.

**16.4 Treatment Series / Treatment Section and JFM Area**

Considering the quantum of Forest area to be treated under RWC, effective treatment the forests of are to be treated under Separate Treatment Series. In each treatment series 2500 ha to 3800 ha forest area has been included so that in each treatment series every year 250 to 380 ha of forest depending on the accessibility will be treated. It will be more or less equal area and work load every year. The Range wise Treatment Series / Section and area allotted to each section is given in Table 16.2

Table No 16.2 Constitution of Rehabilitation Series and area allotted

Sl No	Name of FS	Range	Name of Block	Comp. No	Area allotted in Ha	FS Total
1	Karo Reh. Series (KAR)	Barbil	Karo	1	196.2264	3490.2232
			Karo	2	186.5534	
			Karo	3	289.4511	
			Karo	4	158.9004	
			Karo	5	127.7842	
			Karo	7	11.5100	
			Karo	8	11.7640	
			Karo	9	10.7530	
			Siddhamatha	1	135.6073	
			Siddhamatha	2	97.7762	
			Siddhamatha	5	66.0095	
			Siddhamatha	6	83.4478	
			Siddhamatha	7	115.3415	
			Siddhamatha	8	75.7612	
			Siddhamatha	22	115.1284	
			Siddhamatha	23	680.1153	
			Siddhamatha	24	156.5907	
			Siddhamatha	25	162.2515	
			Siddhamatha	26	85.6742	
			Siddhamatha	27	211.5879	
			Siddhamatha	28	202.1652	
			Siddhamatha	29	309.8240	
2	Thakurani Reh. series (TKN)	Barbil	Kandara-A		6.6300	3373.7818
			Thakurani		2848.9218	
			Murgabeda		518.23	
3	Kanjipani Reh. Series(KNP)	B&JP	Gadgadei		218.0103	2913.0645
			Kanjipani		724.9460	
			Digachampe PRF		120.0146	
			Suakati-II PRF		134.97	
			Guptaganga DPF		179.1081	



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			Katira DPF		483.7163	
			Pandadhar – Bayakumutia DPF		259.4390	
			Sanaghagara(B) DPF		792.8602	
4	Gandhamardan Reh. Series (GMD)	B&JP	Jagar		155.9472	3161.9886
			Khajurimundi		164.6000	
			Saharpur		670.0934	
			Gandhamardan PRF		2171.3480	
5	Kalanda Reh Series (KND)	B&JP	Amuni PRF		50.5987	3436.1723
			Raiguda PRF		489.375	
			Champey PRF		303.8651	
			Danla PRF		170.7029	
			Dumuridiha PRF		501.9573	
			Lunagar-I PRF		120.2898	
			Lunagar-II PRF		320.944	
			Taramakanta DPF		417.5775	
			Kalanda DPF		1060.8620	
6	Kuanr Reh Series (KNR)		Suakati-I PRF		475.3921	2644.7038
			Kuanr DPF		2080.6917	
			Kumundi(B) DPF		88.6200	
7	Kakharua Reh Series (KKR)		Kakharua DPF		1240.0730	2936.5917
			Siddhamath DPF		1112.6787	
			Sanghagara (A) DPF		583.8400	
8	Khandadhar Reh. Series (KDR)		Sunduria		753.7537	2710.2017
			Khandadhar		1956.4480	

9	Darkhola Reh. Series (DKL)	Ghatgaon	Atei	11	394.7855	3196.7597
				12	526.6695	
				13	185.5263	
				14	539.8147	
				32	426.6912	
				33	365.0607	
				34	339.5217	
				35	257.7466	
				36	160.9435	
10	Balijodi Reh. Series (BLJ)	Ghatgaon	Atei	37	216.4438	3295.5252
				38	244.7985	



				39	326.4856	
				40	288.5376	
				41	342.7302	
				42	570.7267	
				43	635.1144	
				44	516.2266	
			Tara (B) DPF		74.1329	
			Kapaspada DPF		80.3289	
11	Pipilia Reh Series (PPL)		Atei	45	484.4328	3334.1891
				46	249.3127	
				47	508.1466	
				48	656.1133	
				49	225.3177	
			Nalapanga	1	344.5775	
			Pipilia		770.5810	
			Khajurijuani DPF		95.7075	
12	Bhimkund Reh Series (BMD)	Patna	Atai	1	279.3762	2200.8657
			Atai	2	170.9156	
			Atai	3	147.0007	
			Atai	4	497.0775	
			Atai	5	481.9294	
			Atai	10	430.5520	
			Barbil		17.8600	
			Palaspada		14.7200	
			Machhagarh DPF		14.3668	
			Mushkhori (A) DPF		50.8829	
			Mushakhori (B) DPF		72.2146	
			Chemena II DPF		23.97	
13	Tangurubahal Reh Series (TGB)	Telkoi	Binjabahal (A) DPF		18.3531	935.5279
			Binjabahal (B) DPF		19.8303	
			Madhyapur DPF		101.5797	
			Oriya DPF		161.0948	
			Binjabahal (C) DPF		140.83	
			Tangurubahal DPF		493.84	



14	Jamirta Reh Series (JMR)	Champua	Jamirta DPF		313.6505	483.8673
			Kankana DPF		170.2168	
Total (14 Series)					38113.4625	38113.4625

16.4.1 Abstract of Treatment Series:

The abstract of all Treatment Series under RWC is furnished at Table No 16.3

Table No 16.3 Abstract of Treatment series			
Sl No	Range	Name of Imp. Series	Area allotted in Ha
1	Barbil	Karo Reh. Series (KAR)	3490.2232
2	Barbil	Thakurani Reh. series (TKN)	3373.7818
3	B&JP	Kanjipani Reh. Series(KNP)	2913.0645
4	B&JP	Gandhamardan Reh. Series (GMD)	3161.9886
5	B&JP	Kalanda Reh Series (KND)	3436.1723
6	B&JP	Kuanr Reh Series (KNR)	2644.7038
7	B&JP	Kakharua Reh Series (KKR)	2936.5917
8	B&JP	Khandadhar Reh. Series (KDR)	2710.2017
9	Champua	Jamirta Reh Series (JMR)	3196.7597
10	Ghatgaon	Darkhola Reh . Series (DKL)	3295.5252
11	Ghatgaon	Balijodi Reh. Series (BLJ)	3334.1891
12	Ghatgaon	Pipilia Reh Series (PPL)	2200.8657
13	Patna	Bhimkund Reh Series (BMD)	935.5279
14	Telkoi	Tangurubahal Reh Series (TGB)	483.8673
14 Reh. Series			38113.4625

16.4.2 Treatment series and Treatment Sections:

The Treatment series is proposed to be worked out within the Plan Period. Distribution of Forest Blocks to different years and area allotted for treatment is furnished below. (Table No 16.4 (i) to 16.4 (xvi))



Karo Reh. series (KAR)

Table No 16.4(i) Karo Reh. series (KAR)

Name of RS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Karo Reh. series (KAR)	2022-23	KARO-I	Siddhamatha	25	162.2515	173.0045
			Karo	9	10.7530	
	2023-24	KARO-II	Siddhamatha	1	135.6073	384.4417
			Siddhamatha	2	97.7762	
			Karo	5	127.7842	
			Karo	7	11.5100	
			Karo	8	11.7640	
	2024-25	KARO-III	Karo	4	158.9004	468.7244
			Siddhamatha	29	309.8240	
	2025-26	KARO-IV	Siddhamatha	7	115.3415	480.5538
			Siddhamatha	8	75.7612	
			Karo	3	289.4511	
	2026-27	KARO-V	Siddhamatha	6	83.4478	463.4478
			Siddhamatha	23(Part)	380	
	2027-28	KARO-VI	Siddhamatha	28	202.1652	202.1652
	2028-29	KARO-VII	Siddhamatha	22	115.1284	497.9082
			Karo	1	196.2264	
			Karo	2	186.5534	
	2029-30	KARO-VIII	Siddhamatha	26	85.6742	297.2621
			Siddhamatha	27	211.5879	
	2030-31	KARO-IX	Siddhamatha	23(Balance)	300.1153	300.1153
	2031-32	KARO-X	Siddhamatha	24	156.5907	222.6002
			Siddhamatha	5	66.0095	
	Total RS				3490.2232	3490.2232

**Thakurani Reh. series (TKN)**

Table No 16.4(ii) Thakurani Reh. series (TKN)						
Name of RS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Thakurani Reh. series (TKN)	2022-23	TKN - I	Thakurani RF	1 st P	355.0	355.0
	2023-24	TKN – II		2 nd P	355.0	355.0
	2024-25	TKN – III		3 rd P	355.0	355.0
	2025-26	TKN – IV		4 th P	355.0	355.0
	2026-27	TKN – V		5 th P	355.0	355.0
	2027-28	TKN – VI		6 th P	355.0	355.0
	2028-29	TKN –V II		7 th P	355.0	355.0
	2029-30	TKN – VIII		Bal.	363.9218	363.9218
	2030-31	TKN – IX	Murga beda	P	260.0	260.0
	2031-32	TKN – X	Kandara-A	B	258.23	264.8600
					6.6300	
	Total RS				3373.7818	3373.7818

Kanjipani Reh. Series (KNP)

Table No 16.4(iii) Kanjipani Reh. series (KNP)						
Name of RS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Kanjipani Reh. series (KNP)	2022-23	KNP - I	Gadgadei		218.0103	218.0103
	2023-24	KNP – II	Kanjipani	Part	400.00	400.00
	2024-25	KNP – III		Balance	324.9460	324.9460
	2025-26	KNP – IV	DigachampeipRF		120.0146	120.0146
	2026-27	KNP – V	Suakati-II PRF		134.97	134.97
	2027-28	KNP – VI	Guptaganga DPF		179.1081	179.1081
	2028-29	KNP –V II	Katira DPF		483.7163	483.7163
	2029-30	KNP – VIII	Pandadhar – Bayakumutia DPF		259.4390	259.4390
	2030-31	KNP – IX	Sanaghagara(B) DPF	Part	400.00	400.00
	2031-32	KNP – X		Balance	392.8602	392.8602
	Total RS				2913.0645	2913.0645

**Gandhamardan Reh. Series (GMD)**

Table No 16.4(iv) Gandhamardan Reh. series (GMD)						
Name of RS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Gandhamardan Reh. series (GMD)	2022-23	GMD - I	Jagar		155.9472	155.9472
	2023-24	GMD – II	Khajurimundi		164.6000	164.6000
	2024-25	GMD – III	Saharpur		300.00	300.00
	2025-26	GMD – IV			370.0934	370.0934
	2026-27	GMD – V	Gandhamardan PRF		391.000	391.000
	2027-28	GMD – VI			380.000	380.000
	2028-29	GMD –V II			350.3480	350.3480
	2029-30	GMD – VIII			350.00	350.00
	2030-31	GMD – IX			350.00	350.00
	2031-32	GMD – X			350.00	350.00
	Total RS				3161.9886	3161.9886

Kalanda Reh. series (KND)

Table No 16.4(v) Kalanda Reh. series (KND)						
Name of RS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Kalanda Reh. series (KND)	2022-23	KND - I	Amuni PRF		50.5987	354.4638
			Champey PRF		303.8651	
	2023-24	KND – II	Lunaghar-II PRF		320.944	320.944
	2024-25	KND – III	Raiguda PRF		489.375	489.375
	2025-26	KND – IV	Danla PRF		170.7029	170.7029
			Lunaghar-I PRF		120.2898	120.2898
	2026-27	KND – V	Taramakanta DPF		417.5775	417.5775
	2027-28	KND – VI	Dumuridiha PRF	P	250.0	250.0
	2028-29	KND –V II		B	251.9573	251.9573
	2029-30	KND – VIII	Kalanda DPF	1 st P	350.0	350.0
	2030-31	KND – IX		2 nd P	350.0	350.0
	2031-32	KND – X		B	360.8620	360.8620
	Total RS				3436.1723	3436.1723



Kuanr Reh. series (KNR)

Table No 16.4(vi) Kuanr Reh. series (KNR)

Name of RS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Kuanr Reh. series (KNR)	2022-23	KNR - I	Suakati-I DPF	Part	250.0000	250.0000
	2023-24	KNR - II		Balance	225.3921	225.3921
	2024-25	KNR - III	Kuanr DPF	1 st P	350.0000	350.0000
	2025-26	KNR - IV		2 nd P	270.0000	270.0000
	2026-27	KNR - V		3 rd P	300.0000	300.0000
	2027-28	KNR - VI		4 th P	250.0000	250.0000
	2028-29	KNR -V II		5 th P	360.0000	360.0000
	2029-30	KNR - VIII		6 th P	280.0000	280.0000
	2030-31	KNR - IX		Balance	270.6917	270.6917
	2031-32	KNR - X	Kumundi(B) DPF		88.6200	88.6200
	Total RS				2644.7038	2644.7038

Kakharua Reh. series (KKR)

Table No 16.4(vii) Kakharua Reh. series (KKR)

Name of RS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Kakharua Reh. series (KKR)	2022-23	KNR - I	Kakharua DPF	1st P	330.0000	330.0000
	2023-24	KNR - II		2nd P	300.0000	300.0000
	2024-25	KNR - III		3rd P	310.0000	310.0000
	2025-26	KNR - IV		Balance	300.0730	300.0730
	2026-27	KNR - V	Siddhamath DPF	1st P	280.0000	280.0000
	2027-28	KNR - VI		2nd P	320.0000	320.0000
	2028-29	KNR -V II		3rd P	312.0000	312.0000
	2029-30	KNR - VIII		Balance	200.6787	200.6787
	2030-31	KNR - IX	Sanghagara(A) DPF	Part	350.0000	350.0000
	2031-32	KNR - X		Balance	233.8400	233.8400
	Total RS				2936.5917	2936.5917

**Khandadhar Reh. Series (KDR)****Table No 16.4(viii) Khandadhar Reh. series (KDR)**

Name of RS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Khandadhar Reh. series (KDR)	2022-23	KDR - I	Sunduria DPF	1st P	253.0000	253.0000
	2023-24	KDR - II		2nd P	250.0000	250.0000
	2024-25	KDR - III		Balance	250.7537	250.7537
	2025-26	KDR - IV	Khandadhar DPF	1st P	300.0000	300.0000
	2026-27	KDR - V		2nd P	290.0000	290.0000
	2027-28	KDR - VI		3rd P	280.0000	280.0000
	2028-29	KDR -V II		4th P	275.0000	275.0000
	2029-30	KDR - VIII		5th P	250.0000	250.0000
	2030-31	KDR - IX		6th P	280.0000	280.0000
	2031-32	KDR - X		Balance	281.4480	281.4480
	Total RS				2710.2017	2710.2017

Jamirta Reh. series (JMR)**Table No 16.4(ix) Jamirta Reh. series (JMR)**

Name of RS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Jamirta Reh. series (JMR)	2022-23	JMR - I	Jamirta DPF	1st P	63.0000	63.0000
	2023-24	JMR - II		2nd P	50.0000	50.0000
	2024-25	JMR - III		3rd P	50.0000	50.0000
	2025-26	JMR - IV		4th P	50.0000	50.0000
	2026-27	JMR - V		5th P	50.0000	50.0000
	2027-28	JMR - VI		Balance	50.6505	50.6505
	2028-29	JMR -V II	Kankana DPF	1st P	50.0000	50.0000
	2029-30	JMR - VIII		2nd P	40.0000	40.0000
	2030-31	JMR - IX		3rd P	40.0000	40.0000
	2031-32	JMR - X		Balance	40.2168	40.2168
	Total RS				483.8673	483.8673



Darkhola Reh. series (DKL)

Table No 16.4(x) Darkhola Reh. series (DKL)						
Name of RS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Darkhola Reh. series (DKL)	2022-23	DKL - I	Atei	11	394.7855	394.7855
	2023-24	DKL – II		12(p)	302.0000	302.0000
	2024-25	DKL – III		12(Balance)	224.6695	224.6695
	2025-26	DKL – IV		13	185.5263	185.5263
	2026-27	DKL – V		14(p)	339.0000	339.0000
	2027-28	DKL – VI		14(B)	200.8147	426.8147
				32(P)	226.0000	
	2028-29	DKL –V II		32(Balance)	200.6912	200.6912
	2029-30	DKL – VIII		33	365.0607	365.0607
	2030-31	DKL – IX		34	339.5217	339.5217
	2031-32	DKL – X		35	257.7466	418.6901
				36	160.9435	
	Total RS				3196.7597	3196.7597

Balijodi Reh. series (BLJ)

Table No 16.4(xi) Balijodi Reh. series (BLJ)						
Name of RS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Balijodi Reh. series (BLJ)	2022-23	BLJ - I	Atei	37	216.4438	290.5767
			Tara (B) DPF		74.1329	
	2023-24	BLJ – II	Atei	38	244.7985	325.1274
			Kapaspada DPF		80.3289	
	2024-25	BLJ – III	Atei	39	326.4856	326.4856
	2025-26	BLJ – IV		40	288.5376	288.5376
	2026-27	BLJ – V		41	342.7302	342.7302
	2027-28	BLJ – VI		42(P)	280.0	280.0
	2028-29	BLJ –V II		42 (B)	290.7267	290.7267
	2029-30	BLJ – VIII		43 (P)	320.0	320.0
	2030-31	BLJ – IX		43(B)	315.1144	315.1144
	2031-32	BLJ – X		44	516.2266	516.2266
Total RS					3295.5252	3295.5252

**Piplia Reh. Series (PPL)****Table No 16.4(xii)Piplia Reh. series (PPL)**

Name of RS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Piplia Reh. series (PPL)	2022-23	PPL - I	Atei	45	484.4328	484.4328
	2023-24	PPL – II		46	249.3127	249.3127
	2024-25	PPL – III		47 (P)	250.0	250.0
	2025-26	PPL – IV		47(B)	258.1466	258.1466
	2026-27	PPL – V		48 (P)	330.0	330.0
	2027-28	PPL – VI		48(B)	326.1133	326.1133
	2028-29	PPL –V II		49	225.3177	321.0252
			Khajurijuani DPF		95.7075	
	2029-30	PPL – VIII	Nalapanga	1	344.5775	344.5775
	2030-31	PPL – IX	Pipilia	Part	390.0	390.0
	2031-32	PPL – X		Balance	380.5810	380.5810
	Total RS				3334.1891	3334.1891

Bhimkund Reh. series (BMD)**Table No 16.4(xiii) Bhimkund Reh. series (BMD)**

Name of RS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Bhimkund Reh. series (BMD)	2022-23	BMD - I	Atei RF	1	279.3762	279.3762
	2023-24	BMD – II		2	170.9156	170.9156
	2024-25	BMD – III		3	147.0007	147.0007
	2025-26	BMD – IV		4(P)	250.0000	250.0000
	2026-27	BMD – V		4(B)	247.0775	247.0775
	2027-28	BMD – VI		5(P)	245.0000	245.0000
	2028-29	BMD –V II		5(B)	236.9294	236.9294
	2029-30	BMD – VIII		10(P)	230.0000	230.0000
	2030-31	BMD – IX		10(B)	200.5520	218.4120
			Barbil RF		17.8600	
	2031-32	BMD – X	Palaspada RF		14.7200	176.1543
			Machagarh DPF		14.3668	
			Mushkhori(A) DPF		50.8829	
			Mushkhori(B) DPF		72.2146	
			Chemna II DPF		23.9700	



	Total RS				2200.8657	2200.8657

Tangurubahal Reh. series (TGB)**Table No 16.4(xiv) Tangurubahal Reh. series (TGB)**

Name of RS	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe Area
Tangurubahal Reh. series (TGB)	2022-23	TGB - I	Binjabahal (A) DPF		18.3531	18.3531
	2023-24	TGB – II	Binjabahal (B) DPF		19.8303	19.8303
	2024-25	TGB – III	Madhyapur DPF	Part	51.0000	51.0000
	2025-26	TGB – IV		balance	50.5797	50.5797
	2026-27	TGB – V	Oriya DPF	Part	90.0000	90.0000
	2027-28	TGB – VI		balance	71.0948	71.0948
	2028-29	TGB –V II	Binjabahal (C) DPF		140.8300	140.8300
	2029-30	TGB – VIII	Tangurubahal DPF	1 st part	293.0000	293.0000
	2030-31	TGB – IX		2 nd part	100.0000	100.0000
	2031-32	TGB – X		Balance	100.8400	100.8400
	Total RS				935.5279	935.5279

16.4.5 Abstract of Sections of Rehabilitation Series:

Table No 16.5 Abstract of Area under Rehabilitation Series												
R.S No	Name of RS	Year										
		22-23	23-24	24-25	25-26	26-27	27-28	28-29	29-30	30.-31	31-32	Total
1	Karo, Reh. Series (KAR)	173.0045	384.4417	468.7244	480.5538	463.4478	202.1652	497.9082	297.2621	300.1153	222.6002	3490.2232
2	Thakurani Reh. series (TKN)	403.1248	457.8120	377.2243	384.1136	340.0316	426.7904	278.1251	149.0857	351.8769	205.5974	3373.7818
3	Kanjipani Reh. Series(KNP)	218.0103	400.0000	324.9460	120.0146	134.9700	179.1081	483.7163	259.4390	400.0000	392.8602	2913.0645
4	Gandhamardan Reh. Series (GMD)	155.9472	164.6000	300.0000	370.0934	391.0000	380.0000	350.3480	350.0000	350.0000	350.0000	3161.9886
5	Kalanda Reh Series (KND)	354.4638	320.9440	489.3750	290.9927	417.5775	250.0000	251.9573	350.0000	350.0000	360.8620	3436.1723
6	Kuanr Reh Series (KNR)	250.0000	225.3921	350.0000	270.0000	300.0000	250.0000	360.0000	280.0000	270.6917	88.6200	2644.7038
7	Kakharua Reh Series (KKR)	330.0000	300.0000	310.0000	300.0730	280.0000	320.0000	312.0000	200.6787	350.0000	233.8400	2936.5917
8	Khandadhar Reh. Series (KDR)	253.0000	250.0000	250.7537	300.0000	290.0000	280.0000	275.0000	250.0000	280.0000	281.4480	2710.2017
9	Jamirta Reh Series (JMR)	63.0000	50.0000	50.0000	50.0000	50.0000	50.6505	50.0000	40.0000	40.0000	40.2168	483.8673
10	Darkhola Reh . Series (DKL)	394.7855	302.0000	224.6695	185.5263	339.0000	426.8147	200.6912	365.0607	339.5217	418.6901	3196.7597
11	Balijodi Reh. Series (BLJ)	290.5767	325.1274	326.4856	288.5376	342.7302	280.0000	290.7267	320.0000	315.1144	516.2266	3295.5252
12	Pipilia Reh Series (PPL)	484.4328	249.3127	250.0000	258.1466	330.0000	326.1133	321.0252	344.5775	390.0000	380.5810	3334.1891
13	Bhimkund Reh Series (BMD)	279.3762	170.9156	147.0007	250.0000	247.0775	245.0000	236.9294	230.0000	218.4120	176.1543	2200.8657
14	Tangurubahal Reh Series (TGB)	18.3531	19.8303	51.0000	50.5797	90.0000	71.0948	140.8300	293.0000	100.0000	100.8400	935.5279
		3668.0749	3620.3758	3920.1792	3598.6313	4015.8346	3687.7370	4049.2574	3729.1037	4055.7320	3768.5366	38113.4625



16.5 Blocks, Compartments and JFM Area:

Out of total Forest under management in this plan i.e. 38113.4625 ha, 7224.4919ha from RF / PRF and DPF has been assigned to various Joint Management Committee. The details of Forest Block and area assigned to VSS (JFM Committee) are furnished below. (Table No 16.6)

Table No 16.6 Forests assigned to RWC & to VSS : Keonjhar Division.					
SI No	Name of Forest Block	Compt.	Area for management	RWC	JFM
	Reserve Forst				
	Badbil Range				
1	Kandara-A		6.6300	6.6300	6.0000
2	Karo	1	196.2264	196.2264	50.0000
	Karo	2	186.5534	186.5534	50.0000
	Karo	3	289.4511	289.4511	
	Karo	4	158.9004	158.9004	
	Karo	5	127.7842	127.7842	
	Karo	7	213.0557	11.5100	
	Karo	8	253.5588	11.7640	
	Karo	9	121.5139	10.7530	
3	Siddhamatha	1	135.6073	135.6073	34.0000
	Siddhamatha	2	101.7452	97.7762	41.0000
	Siddhamatha	5	66.0095	66.0095	50.0000
	Siddhamatha	6	83.4478	83.4478	51.0000
	Siddhamatha	7	115.3415	115.3415	51.0000
	Siddhamatha	8	75.7612	75.7612	
	Siddhamatha	22	115.1284	115.1284	
	Siddhamatha	23	680.1153	680.1153	
	Siddhamatha	24	156.5907	156.5907	
	Siddhamatha	25	162.2515	162.2515	
	Siddhamatha	26	85.6742	85.6742	
	Siddhamatha	27	211.5879	211.5879	
	Siddhamatha	28	202.1652	202.1652	
	Siddhamatha	29	309.8240	309.8240	
4	Thakurani		2877.1293	2848.9218	93.0000
	Total Barbil		6932.0529	6345.7750	426.0000
	BJP Range				
5	Gadgadei		218.0103	218.0103	49.4600
6	Jagar		155.9472	155.9472	



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7	Kanjipani		724.9460	724.9460	190.0000
8	Khajurimundi		180.6000	164.6000	180.5000
9	Saharpur		834.3484	670.0934	301.4500
	Total BJP		2113.8519	1933.5969	721.4100
	Gatgaon Range				
10	Atai	11	394.7855	394.7855	310.0000
	Atai	12	602.4653	526.6695	552.4000
	Atai	13	185.5263	185.5263	103.0000
	Atai	14	539.8147	539.8147	410.0000
	Atai	32	426.6912	426.6912	
	Atai	33	375.0607	365.0607	
	Atai	34	349.5217	339.5217	
	Atai	35	257.7466	257.7466	
	Atai	36	160.9435	160.9435	
	Atai	37	216.4438	216.4438	
	Atai	38	244.7985	244.7985	
	Atai	39	326.4856	326.4856	
	Atai	40	288.5376	288.5376	
	Atai	41	342.7302	342.7302	
	Atai	42	570.7267	570.7267	
	Atai	43	635.1144	635.1144	
	Atai	44	516.2266	516.2266	
	Atai	45	484.4328	484.4328	
	Atai	46	249.3127	249.3127	
	Atai	47	508.1466	508.1466	
	Atai	48	656.1133	656.1133	
	Atai	49	249.3177	225.3177	
12	Nalapanga	1	352.8800	344.5775	100.0000
13	Pipilia		770.5810	770.5810	166.4000
	Total Ghatgaon		9704.4030	9576.3047	1641.8000
	Patna Range				
	Atai	1	279.3762	279.3762	166.0000
	Atai	2	210.9156	170.9156	200.0000
	Atai	3	191.8487	147.0007	44.0000
	Atai	4	497.0775	497.0775	199.0000
	Atai	5	481.9294	481.9294	
	Atai	10	505.2520	430.5520	
14	Barbil		17.8600	17.8600	17.8600
15	Palaspada		14.7200	14.7200	



Revised Working Plan of Keonjhar Division for the period 2022-23 to 2031-32

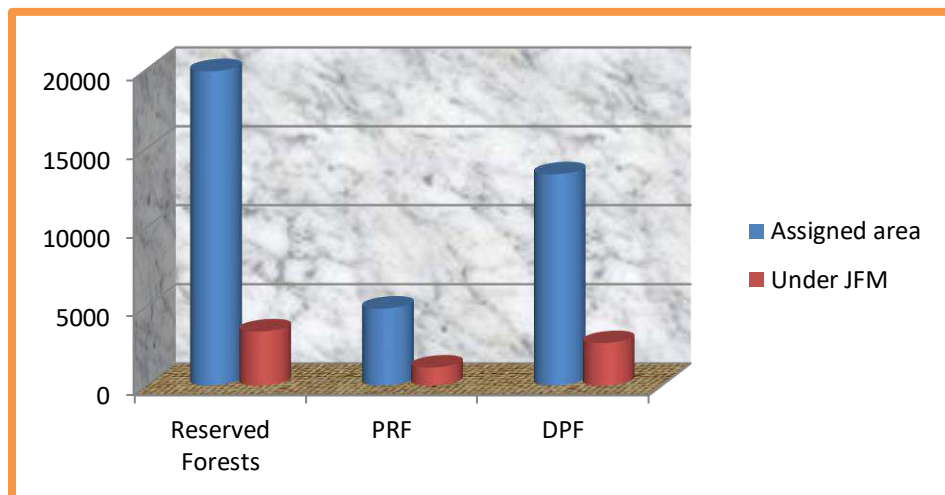
	Total Patna		2198.9794	2039.4314	626.8600
	Total RF		20949.2872	19895.1080	3416.0700
	PRF				
	BJP Range				
16	Amuni		50.5987	50.5987	
17	Champey		363.8651	303.8651	317
18	Danla		170.7029	170.7029	80
19	Digachampey		170.0146	120.0146	166.862
20	Dumuridiha		501.9573	501.9573	60
21	Gandhamardan		2171.3480	2171.3480	
22	Lunaghar-I		131.6830	120.2898	131.683
23	Lunaghar-II		360.9440	320.944	103.36
24	Raiguda		489.3750	489.375	71.6
25	Suakati-I		475.3921	475.3921	159
26	Suakati-II		134.9700	134.97	42.73
	Total BJP		5020.8507	4859.4575	1132.2350
	Total PRF		5020.8507	4859.4575	1132.2350
	DPF				
	Barbil Range				
27	Murgabeda		518.23	518.23	
	BJP Range				
28	Guptaganga		179.1081	179.1081	249.4830
29	Katira		483.7163	483.7163	211.0000
30	Pandadhar-Bayakumutia		259.4390	259.4390	30.0000
31	Sanaghagara(B)		792.8602	792.8602	
32	Sundurua		753.7537	753.7537	65.5000
33	Taramakanta		417.5775	417.5775	540.8200
34	Kalanda		1060.8620	1060.8620	40.0000
37	Kakharua		1240.0730	1240.0730	60.1700
38	Khandadhar		1956.4480	1956.4480	64.6800
39	Kuanr		2080.6917	2080.6917	272.7400
40	Kumundi(B)		88.6200	88.6200	88.0000
41	Sanghagara (A)		583.8400	583.8400	40.0000
42	Siddhamath		1112.6787	1112.6787	436.1000



	Bjp Range(Total)		11009.6682	11009.6682	2098.4930
	Champua Range				
43	Jamirta		313.6505	313.6505	
44	Kankana		170.2168	170.2168	50
	Champua Range		483.8673	483.8673	50
	Ghatgaon Range				
45	Kapaspada		80.3289	80.3289	
46	Khajurijuani		95.7075	95.7075	
47	Tara (B)		74.1329	74.1329	
	Ghatgaon(Total)		250.1693	250.1693	
	Patna Range				
48	Machhagarh		14.3668	14.3668	
49	Mushkhori (A)		50.8829	50.8829	50.8829
50	Mushakhori (B)		72.2146	72.2146	54.161
51	Chemena II		23.97	23.97	23.97
	Patna Total		161.4343	161.4343	129.0139
	Telkoi Range				
52	Binjabahal (A)		18.3531	18.3531	
53	Binjabahal (B)		19.8303	19.8303	
54	Madhyapur		101.5797	101.5797	
55	Oriya		161.0948	161.0948	159
56	Binjabahal (C)		140.83	140.83	125
57	Tangurubahal		493.84	493.84	114.68
	Telkoi Range Total		935.528	935.5279	398.680
	Total DPF		13358.8970	13358.8970	2676.1869
	G.total		39329.0349	38113.4625	7224.4919

Table No 16.7 ABSTRACT OF JFM AREA.

Sl No	Category of Forest	Total Area under management assigned to RWC	Area assigned to JFM	Percentage
1	Reserved Forests	19895.1080	3416.0700	17.08
2	PRF	4859.4575	1132.235	23.29
3	DPF	13358.8970	2676.1869	20.03
	Division Total	38113.4625	7224.4919	18.96



16.6 Special Objectives of Management:

The Special Objectives of Management set out for this Working Circle within the ambit of the general objectives of management are as follows.

- (i) To induce natural regeneration & improve the condition of existing forests through protection against encroachment, grazing, fires and illicit felling.
- (ii) To improve the crop density to more than 50% from the present position through protection, Silvicultural practices.
- (iii) To enhance soil enrichment through Soil & Moisture Conservation measures.
- (iv) To regulate the surface water runoff to enhance percolation and water availability down the streams.
- (v) To protect against the River Bank / Stream Bank erosion through vegetative measures.
- (vi) To restock barren areas through artificial regeneration with most desirable indigenous species.
- (vii) To have partnership with the local community in protection and management of the forests.
- (viii) To increase the water retaining capacity of the soil.
- (ix) To Control / eradicate the weeds and check its invasion.
- (x) To restore and improve the microclimate and micro edaphic condition of forests.
- (xi) To increase the biodiversity and heterogeneity in the forest crop by encouraging natural regeneration.

16.6.1 Analysis of the crop:

The Odisha Space Application Centre (ORSAC) / National Remote Sensing Centre (NRSC), Hyderabad has provided 804 sampling points for detail crop enumeration & analysis. The data were collected and uploaded in the website for analysis. The NRSC has analysed the

**Table No 16.9 Stand volume parameters – Keonjhar Division**

Criteria						
No of trees / ha	Basal Area per ha (M ³)	Volume per Ha (in M ³)	Mean Volume (in M ³)	Standard Error	LB (in M ³)	UB (in M ³)
388.46	14.21	111.32	119.29	0.02	114.56	124.02

data and inferred that the total forest area of the division comes under below 40% crop density and required to be treated under Rehabilitation Working Circle. On analysis the data reveals as follows.

Table No 16.8 Distribution of Sample points Range wise / Density wise enumerated: Keonjhar division.

Range	D1	D2	D3	D4	Total
Barbil	3	68	45	13	129
BJP	0	24	18	5	47
Champua	1	35	33	6	75
Ghatgaon	2	86	61	3	152
Keonjhar	3	42	35	8	88
Patna	0	25	21	0	46
Telkoi	92	120	105	6	323
Div Total	101	400	318	41	860

Canopy Density Classes are D1 : > 70%, D2 : 40–70% D3 : 10–40%, D4 : <10%

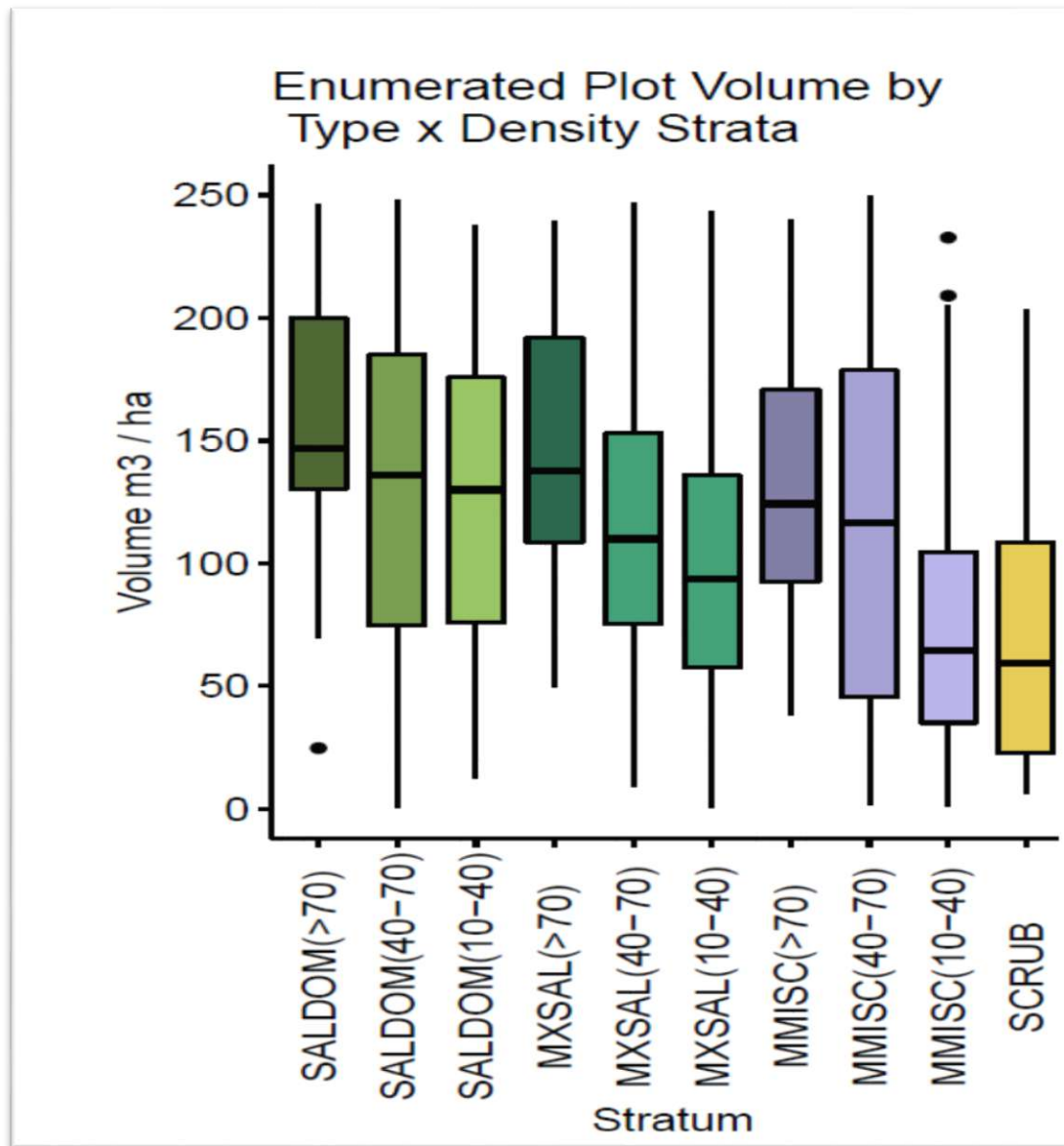
Out of 860 points enumerated, NRSC has analysed 804 points and the strata wise crop position is furnished below.

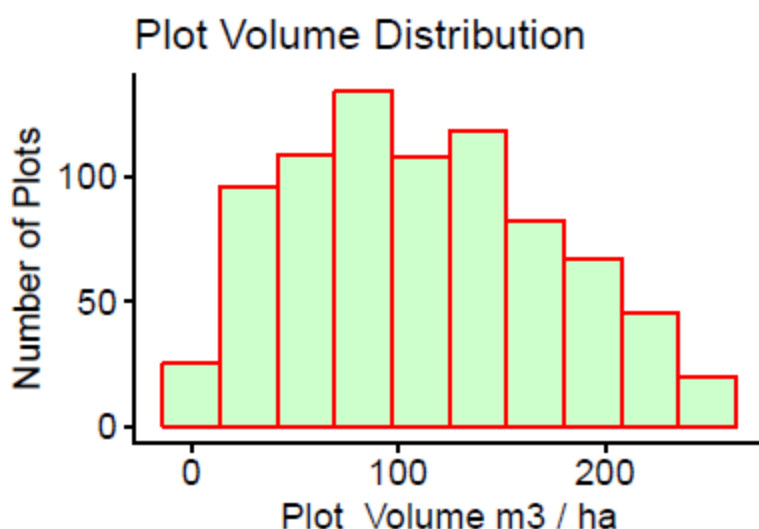
Table No 16.10 Stratum Data from Analysis report.

Stratum	Number Point	Mean Per Hectare
SAL DOM >70	31	156.86
SAL DOM (40-70)	97	127.37
SAL DOM (10-40)	39	124.05
MX SAL (>70)	43	145.29
MX SAL (40-70)	234	113.41
MX SAL (10-40)	208	99.95
MM ISC (>70)	15	133.47
MMISC (40-70)	46	109.21
MMISC (10-40)	56	76.95
SCRUB	35	72.58
Total Sampling Point	804	1159.14

(NB: Plots with volume over 250 tons per ha are not included in estimation)

The arrived Stand volume Parameters as arrived at by NRSC is furnished at Table No 16.10





The analysis report has indicated the crop density of all compartments / Blocks and number of stems available in the block.

From the report it is conclusively stressed that the forest has been degraded and Sal percentage is reducing day by day converting the forest blocks of non Sal / Misc species. The Growing stock in major area is below 50 cum per hectare.

The trees in various girth class has also been analysed from sampling data. Distribution of trees in different blocks taken for Rehabilitation are furnished below. Table No 16.11

Table No 16.11 Stand Table (Estimated number of stems)						
Block	GIRTH CLASS (cm)					
	30-60	60-90	90-120	120-150	>150	Total
Sidhamatha -27	54217	20546	8820	3660	1970	89213
Thakurani	770703	279118	128641	51044	32722	1262228
Suakati -I	25474	9099	2866	1049	546	39034
Bardhana	73373	30570	7230	2169	1445	114787
Atei-14	56604	23364	10470	4501	2246	97185
Atei -13	128739	50260	20075	7957	4812	211843
Total	1109110	412957	178102	70380	43741	1814290
Percentage	61.13	22.76	9.82	3.88	2.41	100.00

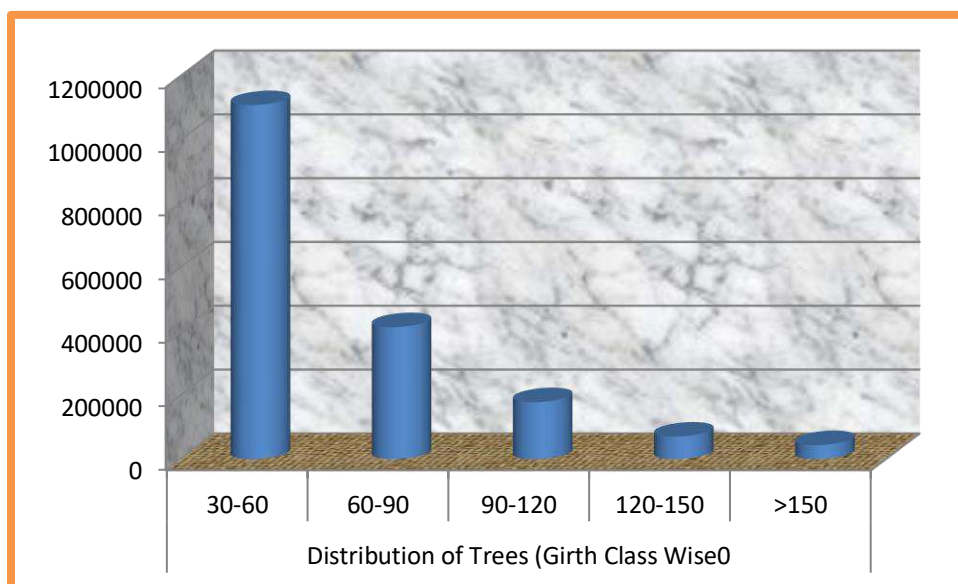
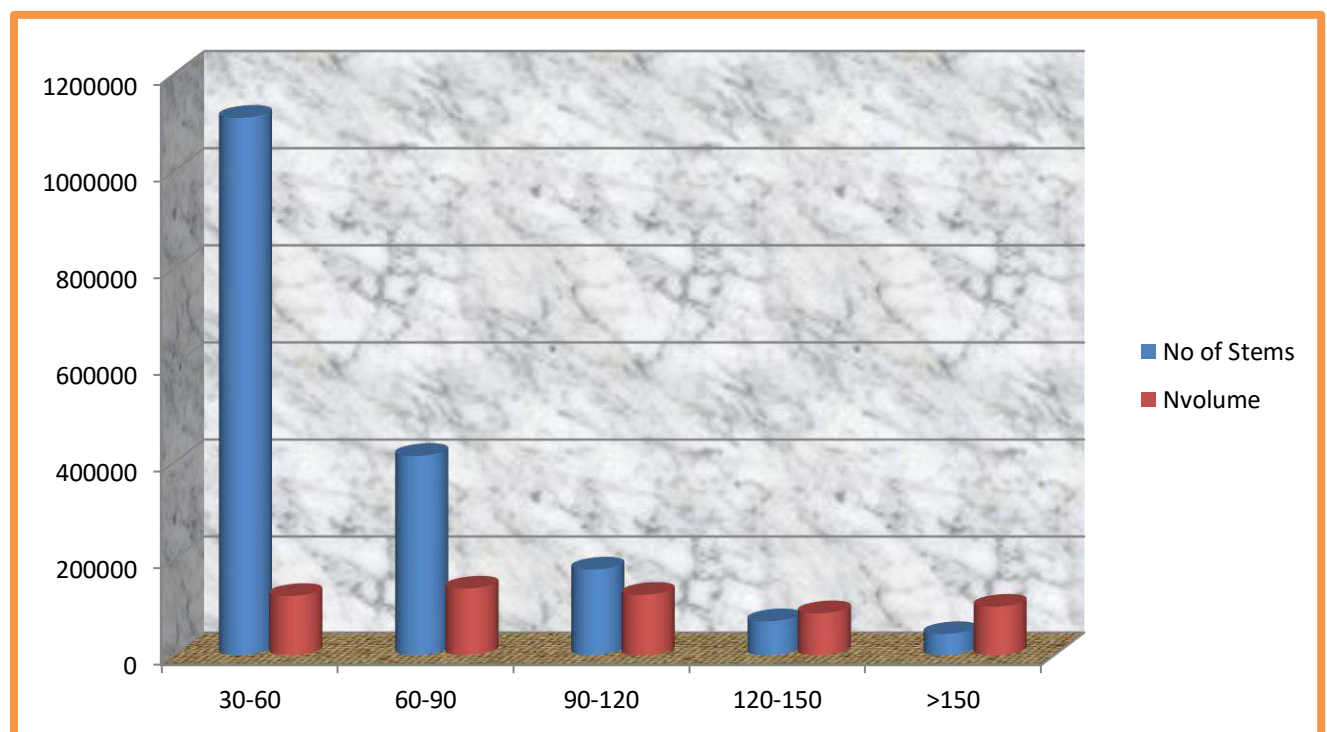
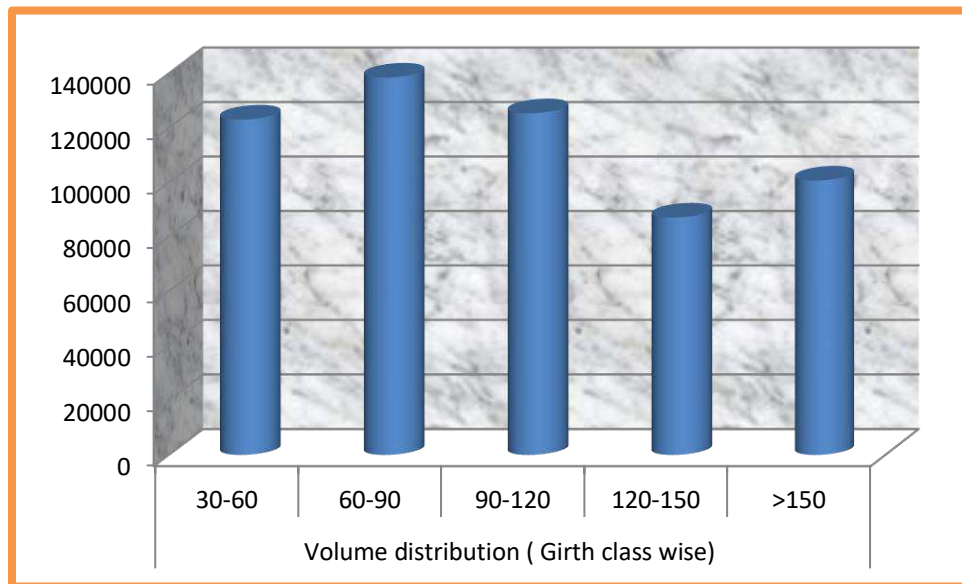
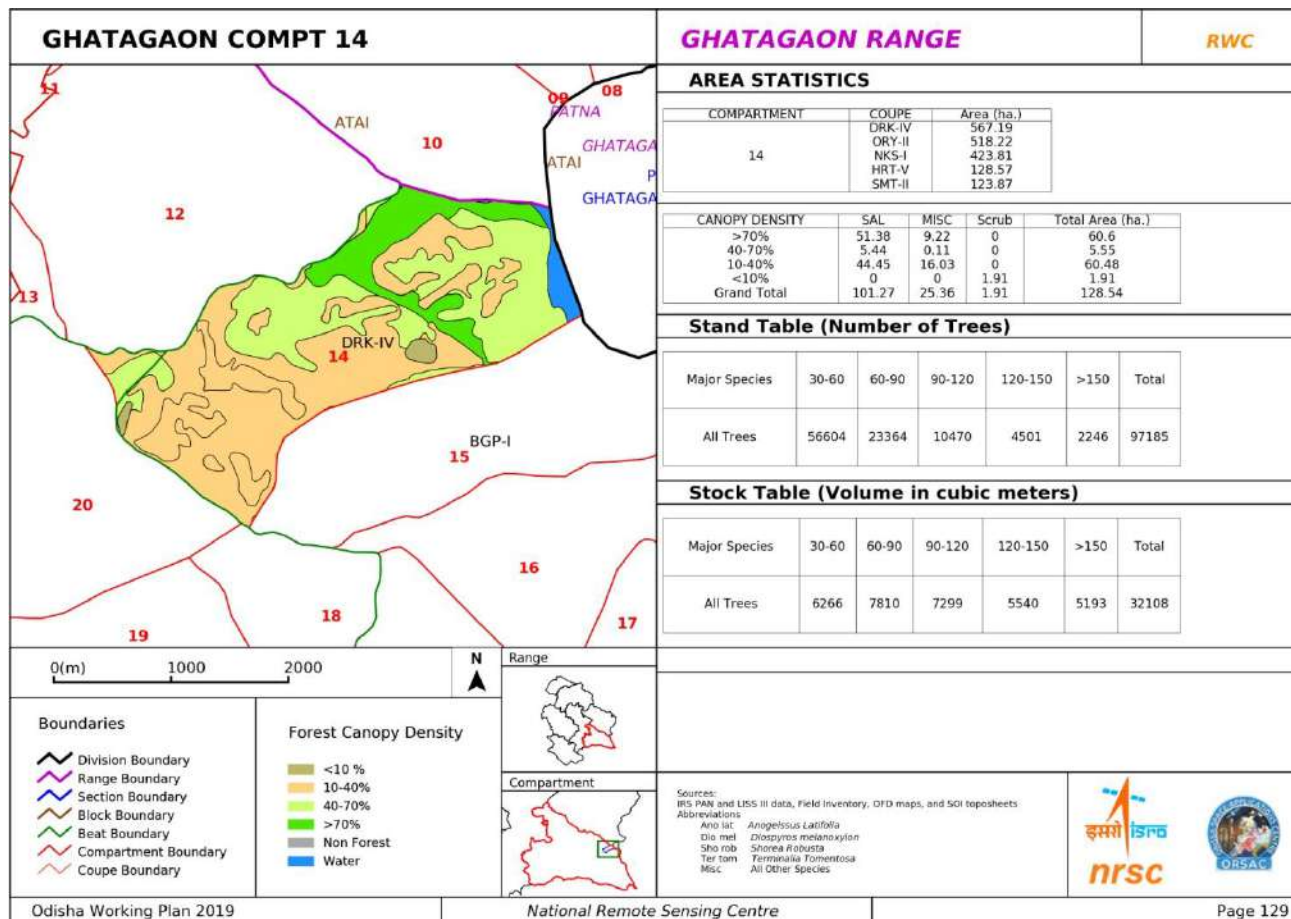
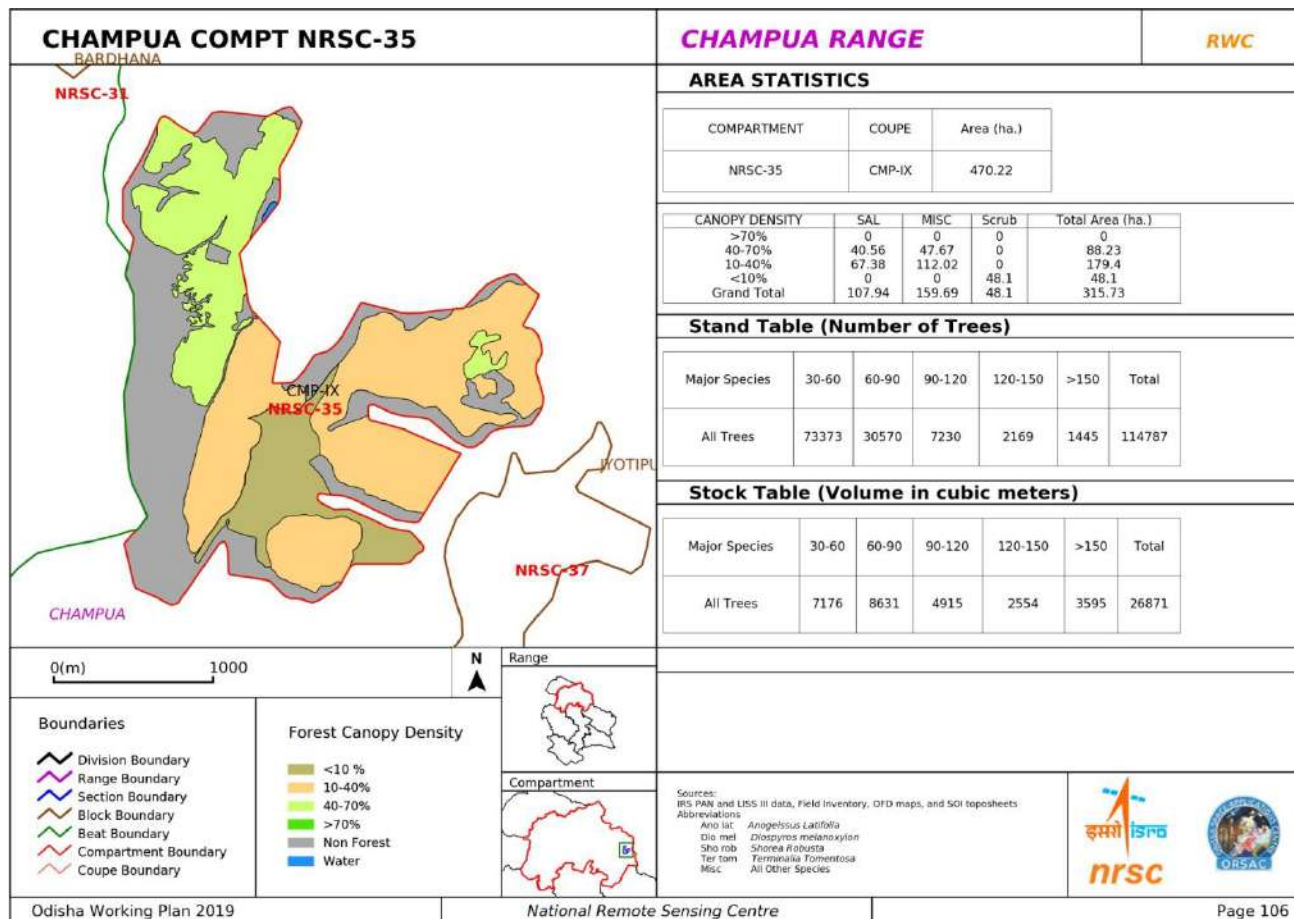


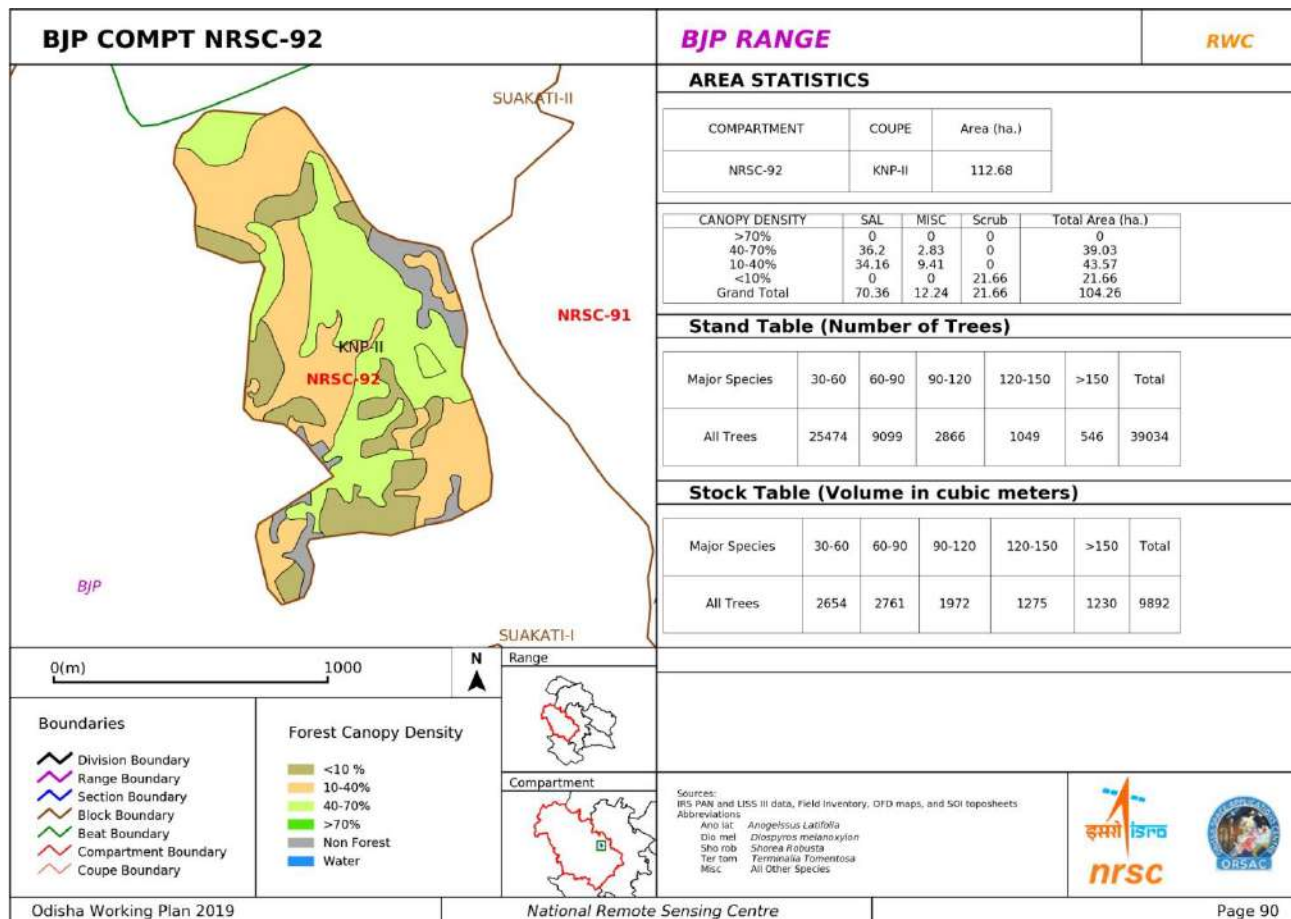
Table No 16.12 Stand Table (Estimated volume)						
Block	GIRTH CLASS (cm)					Total
	30-60	60-90	90-120	120-150	>150	
Sidhamatha -27	5925	6820	6105	4483	4522	27855
Takurani	86646	95652	91275	63414	75254	412241
Suakati-I	2654	2761	1972	1275	1230	9892
Bardhana	7176	8631	4915	2554	3595	26871
Atei -14	6266	7810	7299	5540	5193	32108
Atei- 13	14375	16779	13783	9799	10869	65605
Total	123042	138453	125349	87065	100663	574572
Percentage	21.41	24.10	21.82	15.15	17.52	100.00

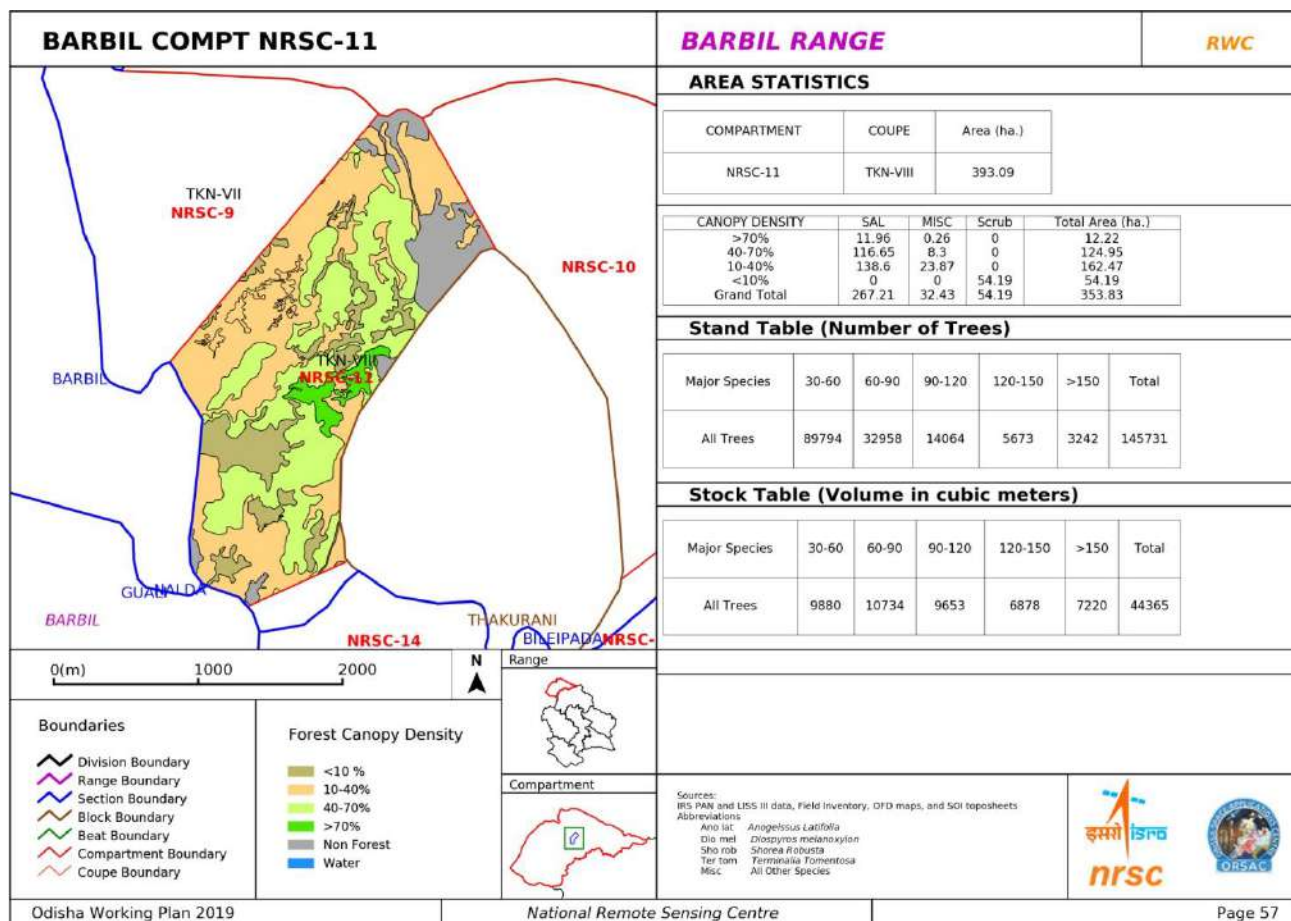


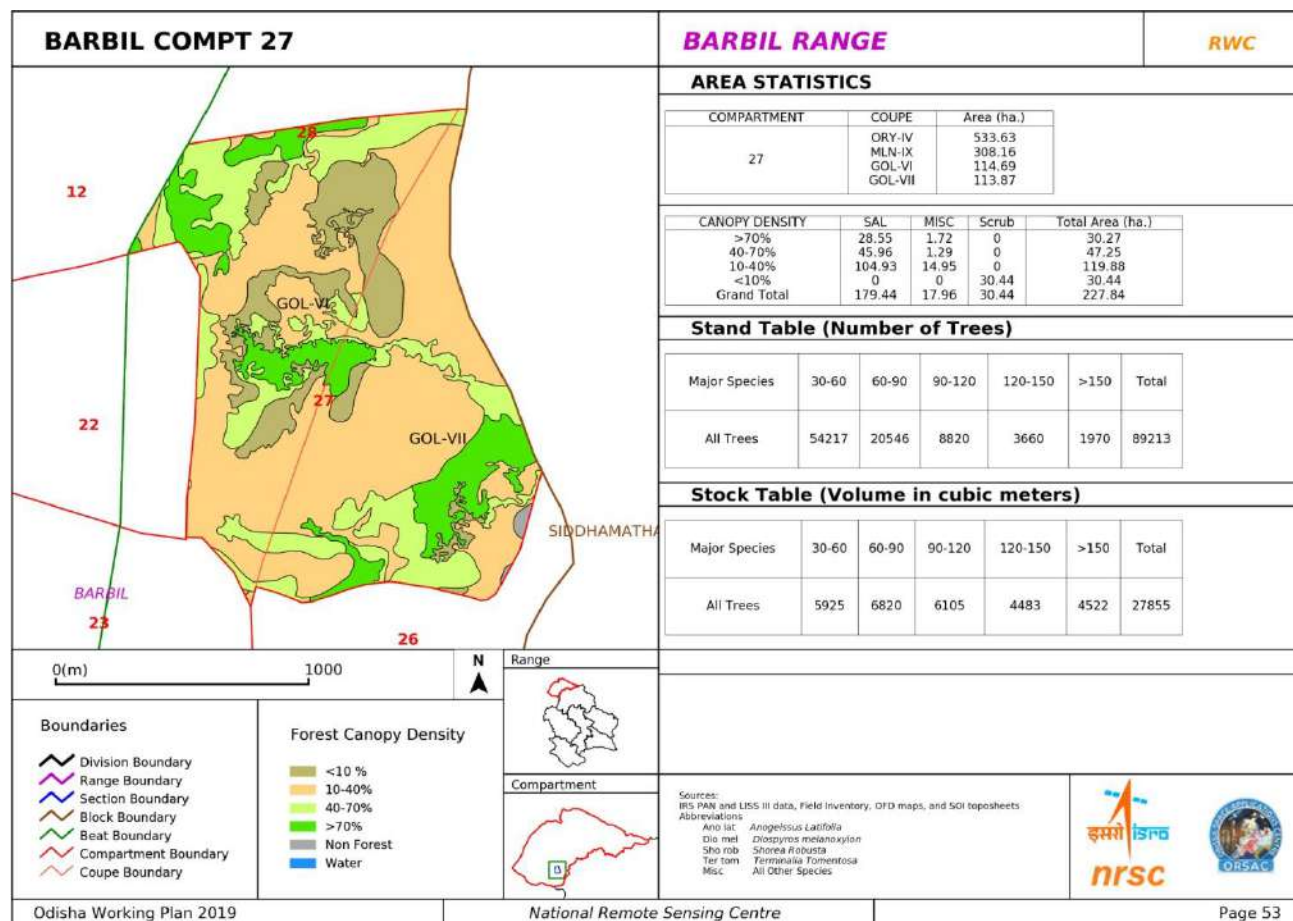
From the above data it is inferred that the growing stock and number of trees are not commensurating. More growing stock on overmatured trees available in forest.











From the above it is revealed that the crop is unevenly distributed. Trees are not passing to higher girth classes as desired. The regeneration is mostly from coppice origin than seed origin. These aspects will be addressed in the prescription in this working Circle.

16.6.2 Silvicultural System:

The Silvicultural System to be adopted for this working Circle is ***“Silvicultural Cleaning, Tending followed by Aided Natural Regeneration supplemented with enrichment Plantation”***

a) Silvicultural Cleaning: Silvicultural Cleaning operation includes

- Removal of soft stem Weeds (Annual in nature).
- Singling of Shoots.
- The species / plant if considered to be a good coppicer and in malformed, it may be cut flush to ground. This will induce a good promising shoot with high probability of ***“Established Regeneration”***.
- Cut back the living high stumps to produce good coppice shoot.



- The annual climbers which hinders with the establishment of regeneration to be removed.
- Woody Climbers interlinking the trees above 10 m height may not be removed as it will help to sustain wind pressure during Cyclone.
- Eradication of weeds as a priority.

b) Silvicultural Tending: Silvicultural Tending involves

- Thinning of natural growth in a congested patch (Above Sapling Stage i.e. in a pole crop to enhance diameter growth.)
- Advance growth / Natural growth are to be retained.
- Pruning in heavily branched individuals to allow faster height growth. Pruning should be restricted to one third height of the individual plant. ($\frac{1}{3}^{\text{rd}}$ of the Plant height)
- Woody climbers affecting poles below 5m height required to be cut down.
- List disturbance to Ground Flora.

c) Aided Natural Regeneration:

Besides Silvicultural Cleaning the following activities are prescribed for the Aided Natural Regeneration (ANR)

- Regeneration from Seed Origin (Recruits, Seedlings and Saplings) to be aided with weeding, Soil Working and application of fertilizer to enhance growth & speedy establishment.
- Extensive Soil & Moisture Conservation measures to be taken up. Besides Contour trenches, contour bonding, gully plugging, Vegetative check dams, percolation pits are required to be taken up to improve soil moisture regime. Individual plants of **Natural Origin** need to be provided with **Half Moon Trench**, Soil Mulching etc.

d) Enrichment Plantation

- In Blanks seedlings of indigenous species matching with the natural seedlings / saplings / vegetation available to be planted. Planting of teak inside natural forest to be avoided.
- Prepare the soil in blanks, around the existing seeding trees (Mother Trees) to receive seeds and allow the seeds to germinate and grow.



16.6.3 Rotation Period:

The present crop is not to be harvested during this plan period. Hence, No rotation period is prescribed at present. The entire area will be treated in a **Ten Year Cycle**.

16.6.4 Harvestable Diameters:

From enumeration / sampling data, it is observed that only 3.88 % of trees are above 120 cm and below 150 cm and 2.41 % above 150cm girth class. Under this condition some matured trees having no reproductive capacity / defective trees are required. As no general prescription for felling of trees prescribed, harvestable diameter for any species has not been fixed.

16.6.5 Reduced Factors and reduced areas:

As no yield is expected from the annual treatment area, there is no yield regulation hence no reducing factor assessed.

16.6.6 Treatment Cycle:

A treatment Cycle of 10 years i.e. co-terminus with Plan period is prescribed.

16.6.7 Division into Treatment Sections.

Each treatment Series is divided in to 10 sections fairly & evenly distributed throughout the division. It is tried to constitute each treatment series area within 2500 ha to 3800 ha and each section area limiting to 250 ha to 300 ha depending upon the block / compartment size. However area of the compartment will be taken in to consideration while making treatment sections.

16.6.8 Calculation of the yield:

As there is no prescription to harvest forest produce, no yield has been calculated. However during silvicultural cleaning and thinning, brush wood, Fire wood and poles may be obtained. In order to maintain hygiene of the forest, dead trees , highly unsound trees may be removed leaving some dead trees / fallen trees at least 4-5 trees per hectare for wildlife management point of view.

In case of VSS assigned area, the removed forest produce may be handed over to the Villagers as per JFM Resolution after maintaining necessary records of removal and sharing mechanism as per VSS Resolution.



16.6.9 Table of felling / Treatment:

The forest Blocks assigned to this working circle has been divided to 14 treatment series. For convenience of working each Treatment Series has been sub-divided into 10 sections. Each year the assigned area is required to be treated strictly. The Treatment Series and corresponding Sections and year of operation have been described under Para 16.4 above.

16.6.10 Method of executing the felling:

16.6.10.1 Demarcation of Annual Rehabilitation Area:

The Annual Rehabilitation Area (Treatment Area) has been depicted on Topo map (1: 50000 Scale) with marking like TS-1, TS-2. The area assigned for the year is to be surveyed, Pillars Posted well marked on the Ground. This will be done in following manner.

- (i) For identifying and locating the annual rehabilitation areas for respective rehabilitation series a preliminary reconnaissance survey will be carried out in the month of October.
- (ii) As the area is very susceptible to land encroachment / heavy Biotic Pressure, the Boundary of the Forest Block is to be clearly demarcated/ concrete pillars posted as per the guidelines of PCCF, Odisha.
- (iii) In the situation when the Treatment Section line is not coinciding with the block or Compartment lines, it is to be demarcated by cleaning a strip of 1.50 meter width and stone cairns of size 90 cm X 60 cm are to be erected at the corners at visible intervals along the line. While clearing 1.50 meter strip, all trees below 20 cm GBH are to be felled. Trees of larger girth occurring along coupe line at visible distances are to be given with two Black Paint rings at breast height.
- (iv) When Treatment Section Line is co-terminus with block or compartment line then the latter will be maintained as per prevailing practice.
- (v) When the Treatment Section line is coterminous with compartment line and the same has not been demarcated earlier, then two white paint rings at breast height are to be given in the trees standing along the Compartment line.
- (vi) The sign boards exhibiting the serial number of the Treatment Section and extent of rehabilitation area, name of rehabilitation series and year of working etc. shall be posted at prominent places preferably at the points where Treatment Section line meets the road.



16.6.10.2 Preparation of Treatment Map & Treatment Plan.

(a) Treatment Map:

Once the annual rehabilitation areas has been identified, delineated and demarcated in the field then an officer not below the rank of Range Officer, shall inspect and examine such area and prepare a treatment map. The treatment map so prepared should exhibit measures to be taken for different patches within the annual rehabilitation area. The areas included under this Working Circle are in different stage of degradation and require different type of site-specific treatment. While preparing treatment map following five types of areas will be distinguished.

Type “A”

Area to be taken for Silvicultural Cleaning which includes singling out of coppice shoot, pruning, climber cutting removal of high stumps and other tending operations. Area for eradication of weeds is to be marked on the map. Area with congested advance growth, if required thinning is also to be marked.

Type “B”

Seedlings / Recruits of seed origin available in the area are to be specifically noted & its approximate number / species to be mentioned. An available Blank Area which needs to be planted up is to be marked. The suitable species are also to be mentioned in the Treatment Plan.

Type “C”

Plantations raised under different Schemes (AR Only) are also to be specifically marked on the Map. The growth pattern and required treatment to plantations like thinning etc to be specifically indicated.

Type “D”.

The area assigned to VSS is also to be marked on treatment map. It may be cross checked with the VSS assigned map / MoU with the VSS to check the veracity.

Type “E”.

There are stony out crop of varied extent of sizable area. This type of area is also to be marked / noted on the Treatment Plan.

(b) Treatment Plan:

The treatment Plan shall include

- i) Site identification i.e. Forest Block/ Compartment No. / Treatment series No
- ii) Area and Treatment map.



- iii) Site characteristics (terrain, slope, drainage, soil type and depth).
- iv) Vegetation and extent of regeneration.
- v) Extent of degradation.
- vi) Year of operations (including maintenance if any).
- vii) Major operation to be undertaken.
- viii) Cost norms and calendar of operations.
- ix) Involvement of VSS and works that can be executed through VSS.
- x) In case of Plantation / Gap filling required, the species required to be planted are need to be mentioned.
- xi) In case of availability of Dead / fallen trees required to be removed during the operation, it will be marked and a marking list is to be prepared as per standard format.

The treatment Plan is to be prepared by the Range Officer, checked by the Asst. Conservator of Forests and to be approved by the DFO, Keonjhar Division for execution of works. The Treatment Plan may be drawn up within October – December of the previous year of assigned year. This will help in planning and arrangement of funds through budgetary provisions.

After receipt of the Treatment Plan, it is to be examined and execution plan to be decided by the Divisional Forest Officer well in advance.

(c) Execution of Rehabilitation Method.

After approval of the Treatment Map & Plan, the same is to be executed in the assigned year. The sequences of Operations are

- i) Removal of marked trees, if any.
- ii) Silvicultural Cleaning.
- iii) Silvicultural thinning,
- iv) Eradication of weeds,
- v) Treatment of bamboo clumps including Harvest / De-congestion)
- vi) Soil & Moisture Conservation.
- vii) Treatment of Natural seedlings available,
- viii) Restocking of Area by Planting (Artificial Regeneration) & Post-care operation.
- ix) Subsidiary Silvicultural Operation for bamboo.
- x) Control of Grazing,



xi) Fire Protection Measures.

16.6.11 Description of Operations:

i) Silvicultural Cleaning.

The silvicultural cleaning is intended to achieve healthy growth of existing seedlings / saplings / coppice shoots of favored species. The operation includes

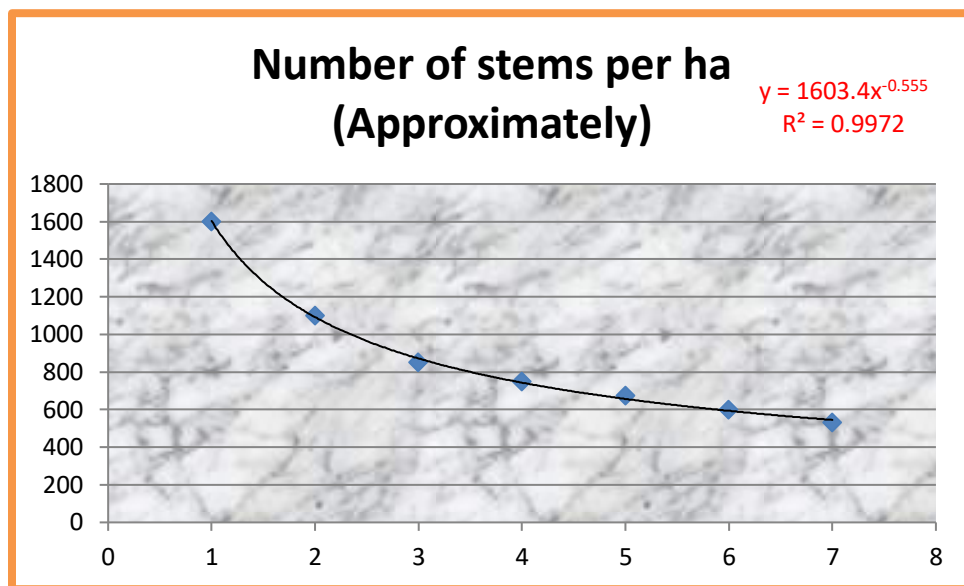
- Cutting back of high stumps with preference to living stumps and having a good coppicing power.
- Cutting of climbers those are of annual nature and uprooting them wherever possible. The woody climbers those are interlocking the existing trees should not be cutback as it gives enforcement to trees during Cyclone / heavy wind.
- Singling out of multiple coppice shoots and retaining most promising ones.

ii) Silvicultural thinning.

In cases of having congested advance growth at a pole stage, it is required to take up light thinning of “**C grade intensity**”. It is required to undertake removal of dead, moribund, diseased, suppressed, dominated and defective trees without creating a permanent gap in canopy. Some defective trees around five trees per hectare having cankers / holes should be retained for wildlife habitation. As the crop is mostly of coppice origin, heavy thinning is not preferred.

In case of Planted areas (AR Plantations) for which specific prescription not provided in this plan are to be thinned. The local stand table for miscellaneous plantations is required to be followed. From field observation, it is expected to have at least the number of stems per hectare as furnished below at Table No 16.12 in a miscellaneous plantation / B. Economic Plantation ideally. The equation / graph is given below. From the equation, the number of stems for any interim year can also be derived

Table No 16.13 Number of stems expected in different years from plantations.	
Year	Number of stems per ha (Approximately)
1st year	1600
5th Year	1100
10th year	850
15th year	750
20th year	675
25th year	600
30th year	530



iii) Eradication of weeds:

The present Blank area included in this Working Circle is heavily infested with Eupatorium, Lantana, Parthenium and other thorny weeds. These weeds are hindering with the growth of natural seed origin seedlings and planted seedlings. Before taking up plantation in these areas its eradication is essential. The details of eradication process have been described in Part-I of this plan. Methods like repeated cutting at tender stage, uprooting of weeds by tractors and immediate covering the area with plantations / grass land creation may be followed. About 7% to 10% of the area assigned to this Working Circle is observed to be infested with weed. This indicates the quantum of task ahead.

iv) Soil & Moisture Conservation.

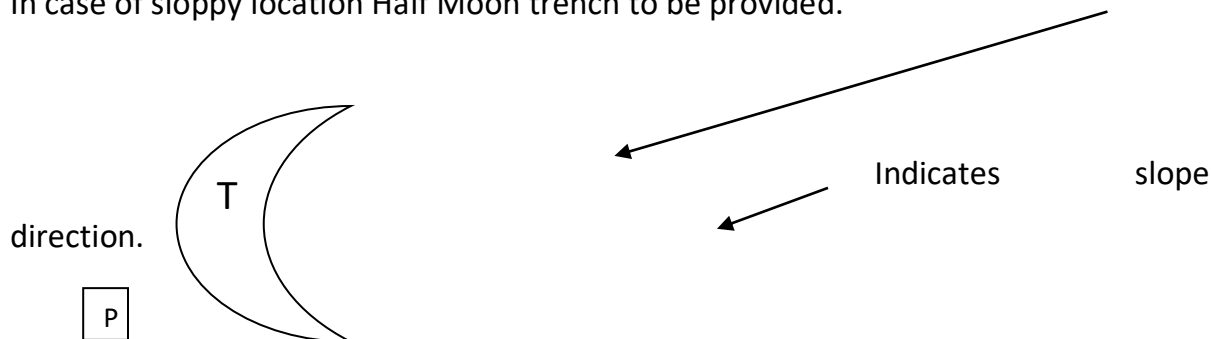
The area included in this working circle is mostly hilly terrain to moderate slope. Percolation pits of 2mx 1mx1m with gentle side slopes, Contour bonding within 200 meters from water body/ River bank, Treatment of nalla / Rills / gullies are prescribed. Maintaining thick leaf litters in humus form coupled with fire protection measures will also help in moisture conservation.

v) Treatment of Natural seedlings available,

The natural seedlings available in the treatment area are to be given appropriate attention to ensure its establishment. The following measures are prescribed.



- Deep Soil Working around the seedlings at a width of 0.50 m with application of fertilizer.
- Weeds to be removed / uprooted at a radius of 1 meter.
- In case of sloppy location Half Moon trench to be provided.



- T : Half Moon Trench
- P: Plant position.

vi) Restocking of Area by Planting (Artificial Regeneration) & Post-care operation.

Plantation of indigenous species preferably local species is required to be planted following the cost norm of Plantations approved by Forest department. The species suggested are Pahadi sisoo (*Dalbergia latifolia*), Khaira (*Senegalia catechu* / *Acacia catechu*), Bela (*Aegle marmelos*), Dhaura (*Anogeissus latifolia*), Asan (*Terminalia tomentosa*), Arjun (*T. arjuna*), Bahada (*T. belerica*), Bandhan (*Ougeinia oojeinensis*), Kuruma (*Adina cardifolia*), Jamu (*Syzygium cumini*) and Bamboo etc.

vii) Control of Grazing.

The assigned area for a particular year is required to be closed to grazing at least for three years. During that period, VSS members, villagers may be allowed to collect grasses by cutting only. After three years controlled grazing may be allowed considering the quantum of grass growth in the protected area.

viii) Fire Protection Measures.

The area is to be protected against fire. Fire line is required to be maintained along the periphery and internal lines. Controlled burning of weeds / fallen leafs may be taken up under strict supervision of section forester.



ix) Disposal of Forest Produce:

During Cleaning / thinning operation if any utilizable forest produce is obtained, it will be disposed up as per the guidelines of Forest Department. Delivery to OFDC Ltd is the favored practice. In case of VSS assigned area, it may be distributed to the VSS as per JFM resolution treating the produce as an interim harvest.

16.6.12: Subsidiary silvicultural operations (Cleaning & Thinning):

The process of thinning and Silvicultural cleaning has been described above.

16.6.13: Regeneration:

The area assigned to Rehabilitation Working Circle is found to be having poor regeneration. The basic objectives are to restock the area by

- Checking Degradation,
- Encourage High Forest System,
- Allow establishment of Saplings / regenerated seedlings within the time limit.
- Supplement the regeneration through planting

16.6.13.1: Checking of Degradation:

The Forests assigned to this working Circle are in a path of degradation. This may be due to constant biotic interference, Heavy Grazing, Loss of Soil fertility, Soil erosion, reduced moisture regime and most important is Fire invasion and illegal removal of forest produce i.e. timber, poles and brush woods. Dedicated efforts are required to check the drivers of forest degradation.

16.6.13.2: Encourage High Forest System:

Most of the forest crops are observed to be of coppice origin than of seed origin. It should be our endeavour to create favourable ground situation to have seedlings / recruits more in number. The following suggestions are made to follow to have a better High Forest system to develop than artificially supplementing the regeneration.

- a) Identification of mother trees in all forest blocks @5 trees per hectare irrespective of species. List of such trees may be prepared either prior to assigned year or in the assigned year. List of such mother trees may also be available in compartment history for the block.
- b) Most of the matured seeds fall to forest floor during winter and some species of low period of viability before rains. Seeds those matured during winter / spring should be collected from mother trees only.



- c) The ground / soil may be manipulated by loosening and kept ready to receive seeds for germination.
- d) In pre-monsoon shower seeds to be dibbled / broadcasted as convenient and the area may be protected against trampling / grazing.
- e) After germination, if required organic fertilizer, FYM or Chemical fertilizer may be applied to have a better growth.
- f) This patch to be under constant supervision of Range Officers for three years. The location of such patch (Latitude / Longitude) may be recorded in the compartment history / Register or Journal for reference by succeeding officials.
- g) Naturally available seedlings to be treated as described under Para 14.6.11. (vi) above.

16.6.13.3: Establishment of Saplings / regenerated seedlings within the time limit:

It is mostly observed that villagers are removing the small saplings / poles for fencing and house hold use. Whatever regenerated / established saplings achieved are going in vain due to removal of poles etc. in disguise of brush wood. Hence public awareness is required to be created for not removing any materials from forest in name of brush wood to have desired effect in a time limit.

16.6.13.4: Supplement the regeneration through planting.

Supplementing the regeneration by artificial method i.e. planting of seedlings is a favoured practice since long. The choice of seedlings in most cases mismatch with the local flora available and seedlings selected for planting is not compatible with the soil status / succession stage of plant community. In practice choice of species is guided by "Ease to raise nursery attitude and seeds availability" than site requirement. These aspects may be addressed in the Treatment Plan prepared in advance. It will lead to a better forest at par with neutrality and keep bio diversity of the area unaffected.

16.6.13.5 Area available for Compensatory afforestation:

Under provisions of Forest (Conservation) Act, 1980 Degraded Forest land (DFL) crop density less than 40% (<40%) are being provided to Central Government Projects, Transmission Lines. During Last five years are in the following Forest Blocks has been allotted. These are at Table No 16.13.

There are also DFL under administrative control of Forest department which can be provided for "Compensatory Afforestation" purpose. The forest blocks and area tentatively available is furnished at Table Ni 16.14.



Table No 16.14 List of forest blocks and area provided for Compensatory Afforestation purpose (During last 5 year)

SI No	Name of the Project	Name of Forest Block	DFL provided in Ha
1	Diversion of 30.98 ha forest land in Khandabandh Iron & Mn. Mines of M/s SreeMetalicks Pvt. Ltd	ACA- Anjar RF, BJP Range	31.00
		1.5 SZ- Anjar RF, BJP Range	7.191
2	Laying of slurry pipeline within Naibuga RF by M/s BRPL 0.1959	PCA- Uliburu RF, Barbil Range	0.5977
3	Four laning / six laning -NH-215 Panikoili -Remuli. Total diverted 151.94 ha (Cuttack Division-11.892 ha + Anandapur Division-7.353 ha + Keonjhar Division-132.695 ha)	CA- Kalapat RF, Telkoi Range	303.88
		CA-Barabanka RF, Ghatagaon Range	501.60
4	Diversion of 41.2442 ha forest land in Gandhamardan Iron Mines Block-A of M/s OMC Ltd.	PCA- Ranibeda RF, Telkoi Range	166.94
		1.5 SZ- Barabanka RF, Ghatagaon Range	4.5435
5	Diversion of 13.904 ha forest land in Murgabeda Iron Ore Mines of M/s D.R.Patnaik	PCA- Pedipokhari RF Champua Range	69.52
		1.5 SZ-Pedipokhari RF Champua Range	1.821
6	Diversion of 1177.211 ha forest land in Gandhamardan Iron Mines Block-B of M/s OMC Ltd.	PCA-Mudula RF BJP Range	0.85
		1.5 SZ- else where	17.11
		Gap Planting- else where	38.538
7	Diversion of 0.197 ha of forest land including 0.027 ha of sabikkisam forest land as on 25.10.1980 for laying of water pipeline for drawal of water from Karo River at village Hayarpur through the villages of Hayrpur, Uliburu and Uliburu RF in Keonjhar district, Odisha by Shri Jagannath Steels & Power Ltd for their integrated steel plant at village Uliburu.	Uliburu RF, Barbil Range	50.12
8	Diversion of 3.8332 ha forest land in	1.5 SZ- Barabank RF, Ghatagaon	1.0398



	Sirkagutu Iron ore mines of M/s Prakash Industries Ltd.	Range	
9	Prospecting over 0.948 ha in Thakuraniiron ore mines of M/s Kaypee Enterprises	Sidhamath RF, Barbil Range	0.5
10	Prospecting over 2.964 ha in Nuagaon iron ore mines of M/s KJS Ahluwalia	Sidhamath RF, Barbil Range	1.22
11	Prospecting over 2.690 ha in Balda Block Iron Ore mines of M/s Serajuddin& Co,	Ukhunda RF, Champua Range	0.7
12	Prospecting over 2.054 ha in Guali iron ore minse of M/s R.P. Sao	Sidhamath RF, Barbil Range	1.00
13	Bolani Ores Mines of M/s SAIL (6.90)	1.5 SZ- Laxmiposi RF, Champua Range	22.122
		Gap plantation- 100mtr outer perimeter of ML area (i.e. Karo RF)	15.00
14	Baitarani Iron Ore Mines of Dr.Sarajoni Pradhan over 61.5340 ha in Baitarani RF	PCA- Barabank RF under Keonjhar Range	30.09
		1.5 SZ Barabanka RF under Keonjhar Range	5.7945
15	Diversion of 111.407 ha forest land for rehabilitation and up-gradation of Singhra-Binjabahal Section NH-6 from Km310.806 to 414.982 within the jurisdiction of Keonjhar Division(100.071ha) &Karanjia Division (11.336ha)	CA Chamakpur PRF-22.672 ha (For KaranjiaDivn) Chamakpur -PRF-147.796 ha Kalikaprasad RF-17.005 ha (for KaranjiaDivn)	353.105
16	Diversion of 360.01 ha forest land in Katamati Iron Ore Mines of M/s TATA Steel Ltd.	Rebana RF under Ghatagaon Range	206.054
		Baitarani East-B PRF under Champua Range	3.300
		1.5 SZ Barabanka RF under Ghatagaon Range	4.737
17	M/s OMDC Ltd. - Bagiaburu Iron Ore Mines (Diversion of 4.437 ha forest land in addition to 17.083 ha already diverted) (17.083 ha + 4.437 ha= 21.52 ha)	PCA- Uliburu RF of Barbil Range	43.04



18	Diversion of 68.00 ha of forest land (49.34 ha of Sabik Forest and 18.660 ha Treated Forest in respect of Unchabali (Mahaprabat) Iron Ore Mines of M/s OMC Ltd	Baitarani East A PRF, Champua Range	16.86

Table No 16.14 List of forest blocks and Tentative area available for Compensatory Afforestation purpose

Sl No	Name of Forest Block	DFL available in Ha	Name of Range
1	Tungurubahal DPF	200	Telkoi
2	Tamanga RF	500	Telkoi
3	Salaikena RF	100	Telkoi
4	Kodbil RF	200	Telkoi
5	Benamunda RF	600	Telkoi
6	Nalapanga RF	500	Keonjhar
7	Champey PRF	200	BJP
8	Mundula RF	200	BJP
9	Musakhori DPF	140	Patna
10	Kuspada DPF	100	Ghatagaon

16.6.14 Associated regulations and measures:

Besides the above prescriptions, the following associated regulations are prescribed to be followed. These are

- Grazing in forests required to be regulated as more damaged is caused to regeneration through trampling.
- Fire protection in the forest blocks especially on treated area should be strictly enforced.
- No lopping is allowed within 5 years of treatment.
- Boundary maintenance in a cycle of 3 years is to be ensured.
- VSS is to be strengthened and regular interaction with villagers / VSS members to be maintained.

16.6.14.1 Deviation Statement.

The area assigned for Rehabilitation Treatment Series wise has been furnished. Due various reasons it may not be possible for taking appropriate work in the assigned area. In that case a deviation statement is required to be filed with reasons there up. It should be a part of



Compartment history. The format for submission of Deviation statement is furnished at table no 16.16.

Table no 16.16: Deviation Statement

Name of Rehabilitation Series.	Coupe No	Assignment year	Area in Ha	Operation Prescribed in Working Plan	Operations executed	Year of Operation	Reason for Deviation	Deviation Approval Status.





CHAPTER-17

PLANTATION WORKING CIRCLE (PLWC)

17.1 Name of working circle:

Keonjhar Forest Division is basically a Sal Dominated Forest Tract having a dense to moderate crop Density. About 73% of the Forests under management are under **“High Forest System”** i.e. SWC and Imp. WC and about 26% are under Rehabilitation Working circle under High forest system supplemented with artificial regeneration. There is limited scope of Artificial Regeneration through Planting. In previous working plans there was Overlapping Plantation Working Circle but no substantial plantation area could be assigned to Plantation Working Circle. On different circumstances, plantations have been raised during last Plan Period and beyond. These plantations are mostly Miscellaneous / Economic Plantations. These plantations are required to be managed under this plan.

During Social Forestry Project (SFP) Plantations have been raised and declared as Village Forest under Section 30 of the Odisha Forest Act, 1972. The Village Forest Committee looking after these plantations are in a dormant stage after abolishing & amalgamation of Social Forestry Project Divisions. The boundaries of such forests have not been properly dealt with and it is important to bring all such plantations raised and declared as **“Village Forest”** to management fold. In Keonjhar Division **2615.341 ha** plantation has been raised in 456 patches.

There are natural forests near to villages. The crop is mostly Sal and its associates. Government have declared small patches as Village Forests u/s 30 of the Odisha Forest Act, 1972 and management lies with Village Forest Committee. No “Joint Management Plan” has been prepared. To have a general guiding principle, there is a need to prescribe set of principles to manage Village Villages.

There are Protected Forests declared u/s 33 of the Odisha Forest Act, 1972. These lands are mostly area selected for “Compensatory Afforestation” purpose against diversion of Forest Land under provisions of Forest (Conservation) Act, 1972. In Keonjhar Division 44 Protected Forest is available covering an area of **2678.071 ha** and to be brought under management.



There are encroachments in various Forest blocks of the division. It is expected to evict encroachment and covered the area under Plantation. These areas under encroachment are also included in this Working Circle in anticipation of eviction.

There is no substantial blank area in the forest blocks (extent more than 4 ha in a patch). No blank area has been included for taking up block plantation. In order to have a precise management practices for all plantations this “**Plantation Working Circle**” has been constituted. Podu ravaged area has been proposed to be managed under Podu Reclamation Working Circle and not included in this Plantation Working Circle. An area of **8234.3647**ha has been assigned to this Working Circle which constitutes about 5.96% of the forest area under management.

17.2 General Constitution of Working Circle:

The area assigned to Plantation Working Circle is furnished at Table No 17.1 below.

Table No 17.1 Area assigned to Plantation Working circle.					
Sl No	Block	Compt.	Area for management	PWC	JFM
	Reserved Forest				
	Badbil Range				
1	Karo	10	60.7159	40.503	
	Karo	11	79.7934	20.000	
	Karo	13	292.004	40.000	
2	Siddhamatha	2	101.7452	3.969	
3	Thakurani		2877.1293	28.2075	
	Total Barbil		3411.3878	132.6790	
	BJP Range				
4	Anjar		196.4941	0.405	
5	Khajurimundi		180.6000	16.0000	
6	Saharpur		834.3484	164.2550	
	Total BJP		1211.4425	180.6600	
	Champua Range				
7	Baitarani-A		1445.6410	6.48	
8	Balibandha		915.540	70.000	50.00
9	Bardhana		942.5600	12.1703	
10	Jyotipur		882.2400	0.81	
11	Kalikaprasad		1410.466	130.085	40.00
12	Pedipokhari		1486.350	1.215	



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13	Ukhunda		946.590	60.810	60.00
	Total Champua		8029.3870	281.5704	150.00
	Gatgaon Range				
14	Atai	12	602.4653	75.7958	25.00
	Atai	17	380.7564	10	
	Atai	21	818.5801	10	
	Atai	33	375.0607	10	
	Atai	34	349.5217	10	
	Atai	49	249.3177	24	
15	Balipokhari		1011.75	44	
16	Barabanka	5	630.7777	50.000	
	Barabanka	6	314.2193	25.000	
	Barabanka	7	453.2338	35.000	
	Barabanka	8	420.1626	25.000	
	Barabanka	9	843.4398	22.000	
	Barabanka	10	479.1197	10.000	
	Barabanka	11	635.6119	30.000	
	Barabanka	12	518.7778	8.000	
	Barabanka	14	436.6983	0.810	
17	Kalimati		834.86	100	50.00
18	Masinabila		467.336	12.2485	
19	Nalapanga		352.88	8.3025	
	Total Ghatgaon		10174.5688	510.1568	75.00
	Keonjhar Range				
20	Balabhadrapur		746.67	40	40.00
	Barabanka	15	236.8039	65.835	
	Barabanka	16	248.2354	20	
	Barabanka	17	566.8606	33	
21	Basantapur		1187.79	50.4425	25.00
22	Belda		1058.94	85.992	30.00
23	Jadipada		1329.24	131.4125	50.00
24	Maidankela		872.53	1.215	
25	Nalapanga	2	834.1	4.455	
26	Narayanpur		1631.637	11.2805	
27	Nayagarh		2842.61	42	
28	Nelung		624.04	4.9977	
29	Raghunathpur		1221.38	40	
30	Raikala		690.01	36.4253	
31	Tangarani		409.1615	21.2228	



	Total Keonjhar		14500.0084	588.2783	145.00
	Patna Range				
	Atai	2	210.9156	40.0000	
	Atai	3	191.8487	44.8480	
	Atai	8	512.9323	35.0000	
	Atai	10	505.2520	74.7000	50.00
32	Baunsuli		629.3000	97.0000	40.00
33	Belapasi		46.1000	5.0000	
34	Billa-A		43.0800	10.0000	
35	Padmapur		795.6400	140.0000	50.00
36	Patna		1193.8600	129.0000	50.00
37	Poipani		533.7900	15.0000	
38	Pradhanpada		21.0600	10.0000	
39	Purunapani		180.5200	24.4658	
	Total Patna		4864.2986	625.0138	190.00
	Telkoi Range				
40	Bandhanjhari	1	288.6363	1.7415	
	Bandhanjhari	5	1226.0894	14.0000	
41	Benamunda	1	536.1099	7.6748	
	Benamunda	5	743.4774	65.5000	
42	C. Golabandha		41.5000	5.0000	
43	Jharbeda	1	360.0643	15.0000	
	Jharbeda	2	914.7357	12.0000	
44	Kalapat	3	643.1869	35.0000	
	Kalapat	9	768.0637	8.0000	
	Kalapat	14	601.7675	95.1100	45.00
	Kalapat	19	902.0019	45.0000	
	Kalapat	21	912.4849	60.0000	25.00
45	Kodbil	2	529.7740	6.0000	
	Kodbil	3	561.5448	24.0000	
46	Mankadchua	1	184.2127	3.0000	
47	Ranibeda	4	611.8135	5.0000	
48	Salaikena Siriabahal		89.4599	14.0000	
49	Samakoi		620.3700	10.0000	
50	Tamanga		1362.6424	3.0000	
	Total Telkoi		11897.9352	429.0263	70.00
	Total RF		54089.0283	2747.3846	630.00
	PRF				
	BJP Range				



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51	Bayakumutia		118.0045	4	
52	Champe		363.8651	60	30.00
53	Digachampe		170.0146	50	
54	Lunaghar-I		131.683	11.3932	
55	Lunaghar-II		360.944	40.00	
	Total BJP		1144.5112	165.3932	30.00
	Keonjhar Range				
55	Khajuribani		3575.4201	6	
	Telkoi Range				
56	Rekuti		275.3	2.1749	
57	Renda		1282.4329	3	
58	Sikheswari		3101.7	7	
59	Syamanali Koilisuta		148.278	10	
	Total Telkoi		4807.7109	22.1749	
	Total PRF		9527.6422	193.5681	30.00
	PF				
	BJP RANGE				
60	Tala Baitarani		13.4800	13.4800	
61	Jantari		22.8392	22.8392	
62	Fhuljhar-C		24.6000	24.6000	
63	Tentuli		28.6000	28.6000	
64	Dhaladihi		159.9685	159.9685	
65	Guptaganga		38.9050	38.9050	
66	Sukodola		85.5500	85.5500	
67	Sikulapada		9.6900	9.6900	
68	Jatra		14.3625	14.3625	
69	Tentulikhunti		287.0685	287.0685	
70	Sukodola		348.0119	348.0119	
71	Kalanda (Kha)		94.4965	94.4965	83.00
72	Kendughati		39.5046	39.5046	
73	Benidihi		22.1000	22.1000	
74	Anasuan		44.3210	44.3210	
75	Benidihi(A)		38.3300	38.3300	
76	Baragoda		276.3000	276.3000	
77	Raidiha(A)		20.3200	20.3200	
78	Lungajhar(i)		31.4081	31.4081	
79	Lungajhar		32.7186	32.7186	
80	Lungajhar-A		15.2770	15.2770	
81	Tentulikhunti		45.3220	45.3220	



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82	Jatra		117.9648	117.9648	
83	Champajhar		31.0000	31.0000	
84	Champajhar(A)		20.3619	20.3619	
85	Phuljhar-D		34.6500	34.6500	
86	Tana		64.3320	64.3320	
87	Anasuan(A)		0.1959	0.1959	
88	Kadalibadi		43.8900	43.8900	
89	Champajhar-B		3.1400	3.1400	
90	Champajhar		2.4500	2.4500	
91	Anasuan		55.0840	55.0840	
92	Champajhar		2.5000	2.5000	
93	Podadihi		120.8380	120.8380	
94	Upparabirikala-i		3.2280	3.2280	
95	Upparabirikala-ii		12.6900	12.6900	
	BJP RANGE(T)		2205.4980	2205.4980	
	CHAMPUA RANGE				
96	Kasia		105.3960	105.3960	
97	Kasia		7.6220	7.6220	
98	Chhatia		59.7082	59.7082	
99	Kaliapal		165.7930	165.7930	
	CHAMPUA(T)		338.5192	338.5192	
	KEONJHAR RANGE				
100	Hunda		82.5560	82.5560	
	TELKOI RANGE				
101	Dandargauni		34.0000	34.0000	
102	Kaliapani		13.7978	13.7978	
103	Rangamatia		3.7000	3.7000	
	Teloi Total		51.4978	51.4978	
	Total PF	0	2678.071	2678.071	83.00
	Total VF (456 Site)		2615.341	2615.341	
	G.Total		68910.0825	8234.3647	743.00

The Abstract of plantations included in the Working Circle are as follows.



Table NO 17.2 (A) Abstract of area assigned to P.W.C Keonjhar division			
Sl No	Category / Plantation Type	Area in ha	Remark
1	Teak / Economic Plantation	204.70	During Out going Plan (2007-2010)
2	Misc Plantation	2055.358	Out going plan Period (2007-08 to 2016-17)
3	Bamboo Plantation	335.00	Fodder Purpose
4	Enchroachment	345.8947	
5	PF	2678.071	CA land declared as Protected Forest
6	VF	2615.341	Erstwhile Social Forestry Plantations (VWL) & Natural Village Forests (NVF)
	Total	8234.3647	

17.2.1 The details of Plantation (Category Wise)

The category wise plantations considered for management is furnished at Table no 17.2 (i) to 17.2 (iv)

A) Teak Plantations

Table No 17.2 (i) List of Teak Plantations					
Sl No	Year of Plantation	Range	Location	Comp. No	Area in ha
1	2007-08	Champua	Ukhunda RF		40.0
2	2007-08	Keonjhar	Belda RF		15.0
3	2007-08	Keonjhar	Raghunathpur RF		15.0
4	2010-11	Keonjhar	Jadipada RF		40.0
5	2010-11	Patna	Atei RF	1	34.7
6	2010-11	Patna	Atei RF	2	40.0
7	2010-11	Patna	Baunsuli RF		20.0
	Total				204.70

**B) Miscellaneous Plantations**

Table No 17.2(ii) Miscellaneous Plantations				
Sl No	Year	Range	Block	Area in Ha
1	2007-08	Badbil	Thakurani RF	27.600
2	2007-08	Keonjhar	Nayagarh RF	10.000
3	2008-09	BJP	Bayakumutia PRF	4.000
4	2008-09	BJP	Khajurimundi RF	8.000
5	2008-09	BJP	Khajurimundi RF	8.000
6	2008-09	BJP	Saharpur RF	7.000
7	2008-09	BJP	Saharpur RF	8.000
8	2008-09	BJP	Saharpur RF	20.000
9	2008-09	BJP	Saharpur RF	30.000
10	2008-09	Ghatgaon	Barabanka RF	10.000
11	2008-09	Ghatgaon	Barabanka RF	15.000
12	2008-09	Ghatgaon	Masinabila RF	8.158
13	2008-09	Keonjhar	Raghunathpur RF	10.000
14	2008-09	Patna	Baunsuli RF	7.000
15	2008-09	Patna	Baunsuli RF	30.000
16	2008-09	Patna	Poipani RF	15.000
17	2008-09	Telkoi	Saleikana RF	5.000
18	2008-09	Telkoi	Tamanga RF	3.000
19	2008-09	Telkoi	Samakoi RF	10.000
20	2009-10	BJP	Champey PRF	5.000
21	2009-10	BJP	Champey PRF	5.000
22	2009-10	BJP	Champey PRF	5.000
23	2009-10	BJP	Champey PRF	5.000
24	2009-10	Keonjhar	Balabhadrapur RF	3.000
25	2009-10	Keonjhar	Balabhadrapur RF	3.000
26	2009-10	Keonjhar	Barabanka RF	55.000
27	2009-10	Keonjhar	Naranapur RF	8.000
28	2009-10	Keonjhar	Raghunathpur RF	5.000
29	2009-10	Keonjhar	Raikala RF	5.000
30	2009-10	Patna	Atei RF	15.000
31	2009-10	Telkoi	Golabandh RF	5.000
32	2010-11	BJP	Saharpur RF	88.850
33	2010-11	Champua	Balibandha RF	13.900
34	2010-11	Champua	Balibandha RF	16.100
35	2010-11	Champua	Balibandha RF	40.000



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36	2010-11	Champua	Kalikaprasad RF	10.000
37	2010-11	Champua	Ukhunda RF	20.000
38	2010-11	Ghatgaon	Barabanka RF	50.000
39	2010-11	Keonjhar	Belda RF	11.000
40	2010-11	Keonjhar	Tangarani RF	21.000
41	2010-11	Patna	Atei RF	28.000
42	2010-11	Patna	Patna RF	25.000
43	2010-11	Patna	Padmapur RF	100.000
44	2010-11	Telkoi	Benamunda RF	20.000
45	2010-11	Telkoi	Benamunda RF	30.000
46	2010-11	Telkoi	Kalapat RF	35.000
47	2010-11	Telkoi	Kalapat RF	45.000
48	2010-11	Telkoi	Kalapat RF	70.000
49	2010-11	BJP	Champey PRF	10.000
50	2010-11	BJP	Champey PRF	10.000
51	2010-11	BJP	Champey PRF	20.000
52	2010-11	BJP	Digchampey PRF	10.000
53	2010-11	BJP	Digchampey PRF	40.000
54	2010-11	BJP	Lunaghar I RF	10.000
55	2010-11	BJP	Lunaghar II RF	40.000
56	2010-11	BJP	Saharpur RF	10.000
57	2010-11	Ghatgaon	Atei RF	24.000
58	2010-11	Ghatgaon	Balipokhari RF	9.000
59	2010-11	Ghatgaon	Balipokhari RF	10.000
60	2010-11	Ghatgaon	Balipokhari RF	10.000
61	2010-11	Ghatgaon	Balipokhari RF	15.000
62	2010-11	Ghatgaon	Barabanka RF	8.000
63	2010-11	Ghatgaon	Barabanka RF	15.000
64	2010-11	Ghatgaon	Barabanka RF	30.000
65	2010-11	Ghatgaon	Barabanka RF	4.000
66	2010-11	Ghatgaon	Barabanka RF	8.000
67	2010-11	Ghatgaon	Barabanka RF	10.000
68	2010-11	Ghatgaon	Barabanka RF	30.000
69	2010-11	Ghatgaon	Kalimati RF	10.000
70	2010-11	Ghatgaon	Kalimati RF	20.000
71	2010-11	Keonjhar	Balabhadrapur RF	34.000
72	2010-11	Keonjhar	Barabanka RF	8.000
73	2010-11	Keonjhar	Barabanka RF	33.000
74	2010-11	Keonjhar	Barabanka RF	20.000



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75	2010-11	Keonjhar	Basantapur RF	9.000
76	2010-11	Keonjhar	Basantapur RF	13.000
77	2010-11	Keonjhar	Belda RF	10.000
78	2010-11	Keonjhar	Belda RF	5.000
79	2010-11	Keonjhar	Belda RF	10.000
80	2010-11	Keonjhar	Jadipada RF	18.000
81	2010-11	Keonjhar	Jadipada RF	40.000
82	2010-11	Keonjhar	Khajuribani PRF	6.000
83	2010-11	Keonjhar	Nayagarh RF	12.000
84	2010-11	Keonjhar	Raghunathpur RF	5.000
85	2010-11	Keonjhar	Raghunathpur RF	5.000
86	2010-11	Keonjhar	Raikala RF	14.000
87	2010-11	Keonjhar	Raikala RF	17.000
88	2010-11	Patna	Patna RF	53.000
89	2010-11	Patna	Patna RF	14.000
90	2010-11	Patna	Atei RF	80.000
91	2010-11	Patna	Baunsuli RF	10.000
92	2010-11	Patna	Baunsuli RF	10.000
93	2010-11	Patna	Baunsuli RF	20.000
94	2010-11	Patna	Belaposi RF	5.000
95	2010-11	Patna	Billa-A RF	10.000
96	2010-11	Patna	Padmapur RF	5.000
97	2010-11	Patna	Padmapur RF	10.000
98	2010-11	Patna	Patna RF	7.000
99	2010-11	Patna	Patna RF	15.000
100	2010-11	Patna	Patna RF	15.000
101	2010-11	Patna	Pradhanpada RF	10.000
102	2010-11	Patna	Purunapani RF	10.000
103	2010-11	Patna	Purunapani RF	14.000
104	2010-11	Telkoi	Bandhanjhari RF	14.000
105	2010-11	Telkoi	Benamunda RF	8.000
106	2010-11	Telkoi	Jharbeda RF	12.000
107	2010-11	Telkoi	Jharbeda RF	15.000
108	2010-11	Telkoi	Kalapat RF	8.000
109	2010-11	Telkoi	Koilisuta PRF	8.000
110	2010-11	Telkoi	Koilisuta PRF	2.000
111	2010-11	Telkoi	Kudbil RF	6.000
112	2010-11	Telkoi	Kudbil RF	24.000
113	2010-11	Telkoi	Mankadachua RF	3.000



114	2010-11	Telkoi	Ranibeda RF	5.000
115	2010-11	Telkoi	Renda PRF	3.000
116	2010-11	Telkoi	Saleikana RF	4.000
117	2010-11	Telkoi	Saleikana RF	5.000
118	2010-11	Telkoi	Sikheswari PRF	7.000
119	2013-14	Barbil	Karo RF	6.250
120	2014-15	Champua	Kalikaprasad RF	4.000
121	2014-15	Barbil	Karo RF	5.000
122	2015-16	Barbil	Karo RF	20.000
123	2015-16	Telkoi	Benamunda RF	7.500
124	2016-17	Champua	Kalikaprasad RF	10.000
		Total		2055.358

C) Bamboo Plantation:

Table No 17.2(iii) Bamboo Plantation				
Sl No	Year	Range	Location	Area in Ha
1	2011-12	Keonjhar	Basantapur RF	25.00
2	2012-13	Champua	Kalikaprasad RF	25.00
3	2012-13	Patna	Padmapur RF	25.00
4	2013-14	Ghatgaon	Kalimati RF	25.00
5	2014-15	Barbil	Karo RF	20.00
6	2014-15	Barbil	Karo RF	20.00
7	2014-15	Barbil	Karo RF	25.00
8	2014-15	Ghatgaon	Kalimati RF	10.00
9	2014-15	Ghatgaon	Kalimati RF	10.00
10	2014-15	Keonjhar	Nayagarh RF	10.00
11	2014-15	Keonjhar	Nayagarh RF	10.00
12	2014-15	Patna	Atei RF	10.00
13	2014-15	Patna	Atei RF	10.00
14	2015-16	Ghatgaon	Kalimati RF	25.00
15	2016-17	Telkoi	Kalapat RF	60.00
16	2016-17	Ghatgaon	Barabanka RF	25.00
		Total		335.00

**D) Enchroachment:**

Table No 17.2(iv) List of Enchroachment: Keonjhar Division.				
Sl No	Range	Name of the Forests	Comp. No	Area under encroachment
1	Barbil	Karo RF	10	4.2525
2	Barbil	Sidhamath RF	2	3.969
3	Barbil	Thakurani RF		0.6075
	Barbil Total			8.8290
4	B & JP	Anjar RF		0.405
5	B & JP	Saharpur RF		0.405
6	B & JP	Lunaghar-I PRF		1.3932
	BJP Total			2.2032
7	Patna	Atai RF	3	16.848
8	Patna	Purunapani RF		0.4658
	Patna Total			17.3138
9	Champua	Baitarani-A RF		6.48
10	Champua	Bardhana RF		12.1703
11	Champua	Jyotipur RF		0.81
12	Champua	Pedipokhari RF		1.215
13	Champua	Ukhunda RF		0.81
14	Champua	Kalikaprasad RF		81.0851
	Champua Total			102.5704
15	Ghatgaon	Barabanka RF	14	0.81
16	Ghatgaon	Masinabila RF		4.0905
17	Ghatgaon	Nalapanga RF	1	8.3025
18	Ghatgaon	Atai RF	12	75.7958
	Total Ghatgaon			88.9988
19	Keonjhar	Belda RF		34.992
20	Keonjhar	Jadipada RF		33.4125
21	Keonjhar	Barabanka RF	15	2.835
22	Keonjhar	Basantapur RF		3.4425
23	Keonjhar	Maidankel RF		1.215
24	Keonjhar	Nalapanga RF	2	4.455
25	Keonjhar	Narayanpur RF		3.2805
26	Keonjhar	Nelung RF		4.9977
27	Keonjhar	Raikala RF		0.4253
28	Keonjhar	Tangarani RF		0.2228



	Total Keonjhar			89.2783
29	Telkoi	Bandhanjhari RF	1	1.7415
30	Telkoi	Benamunda RF	1	7.6748
31	Telkoi	Kalapat RF	14	25.11
32	Telkoi	Rekuti PRF		2.1749
	Telkoi Total			36.7012
	Total			345.8947

E) Village Forests: (SFP VWL)

The list Social Forestry Project Plantations declared u/s 30 of the Odisha Forest Act, 1972

Table No ,17.2 (v) List of SFP Plantations under VF: Keonjhar Division.					
Sl. No.	Range	Name of Village Forest	Area in ha	Area diverted under FRA	Balance area
1	B & JP	Khuntakata	10.000	0	10.000
2	B & JP	Lunaghar	5.000	0	5.000
3	B & JP	Kushakala	11.310	0	11.310
4	B & JP	Anklpada	5.000	0	5.000
5	B & JP	Khajurimundi	10.000	0	10.000
6	B & JP	Suakati	5.000	0	5.000
7	B & JP	Karandadihi	10.000	0	10.000
8	B & JP	Baitarani Pahada	10.000	0	10.000
9	B & JP	Kanengadihi	10.000	0	10.000
10	B & JP	Taramakanta	5.000	0	5.000
11	B & JP	Balarei	5.220	0	5.220
12	B & JP	Jaladiha	5.280	0	5.280
13	B & JP	Gopapur	1.168	0	1.168
14	B & JP	Sagapada	10.580	0	10.580
Total			103.558	0	103.558
15	Barbil	Kudapi	5.736	0	5.736
Total			5.736	0	5.736
16	Champua	Mangalapur	5.5	0	5.5
17	Champua	Maheswarapur	5.500	0	5.5
18	Champua	Ghodaposi	5.008	0	5.008
19	Champua	Hanjiposi	5.600	0	5.6
20	Champua	Remuli	5.300	0	5.3



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21	Champua	Gambharia	6.675	0	6.675
22	Champua	Mukundapur	6.080	0	6.08
23	Champua	Maudi	5.240	0	5.24
24	Champua	Mangalapur	5.000	0	5
25	Champua	Sadangi	5.120	0	5.12
26	Champua	Ukhunda	5.000	0	5
27	Champua	Sabakdhanurjayapur	5.000	0	5
28	Champua	Arsala	6.268	0	6.268
29	Champua	Chelianal	4.772	0	4.772
30	Champua	Baria	4.694	0	4.694
31	Champua	Gidhibas	10.516	0	10.516
32	Champua	Sundhimarusuan	2.12	0	2.12
33	Champua	Kasipal	0.864	0	0.864
34	Champua	Asanpat	3.548	0	3.548
35	Champua	Manoharpur	7.248	0	7.248
36	Champua	Hastinapur	3.710	0	3.71
37	Champua	Chakulia	5.284	0	5.284
38	Champua	Sankarpur	3.468	0	3.468
39	Champua	Ankudi	5.750	0	5.75
40	Champua	Nishagadia	9.168	0	9.168
41	Champua	Pokharia	5.248	0	5.248
42	Champua	Kashipal	3.444	0	3.444
43	Champua	Durukulia	5.600	0	5.6
44	Champua	Bala	4.300	0	4.3
45	Champua	Godhuli	0.440	0	0.44
46	Champua	Katulikana	4.100	0	4.1
47	Champua	Sunaposi	7.624	0	7.624
48	Champua	Guludiposi	4.308	0	4.308
49	Champua	Bhanda	5.400	0	5.4
50	Champua	Purudiposi	5.000	0	5
51	Champua	Sirikuan	5.170	0	5.17
52	Champua	Maheswarapur	2.620	0	2.62
53	Champua	Nishagadia	5.020	0	5.02
54	Champua	Khuntapada	5.032	0	5.032
55	Champua	Rajia	5.200	0	5.2
56	Champua	Sadangi	5.020	0	5.02
57	Champua	Dakuaposi	6.044	0	6.044
58	Champua	Kanchandumuria	7.200	0	7.2
59	Champua	Bichitranandapur	8.800	0	8.8



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60	Champua	Parbatipur	5.000	0	5.000
61	Champua	Katuilikana	10.000	0	10
62	Champua	Talakanda	10.000	0	10
63	Champua	Jamudalka	10.000	10	0
64	Champua	Rajia	5.000	0	5
65	Champua	Mangalpur, Mathhurapur, Sankarpur	25	0	25
66	Champua	Tunutuna	5.000	0	5
67	Champua	Murusuan	7.000	0	7
68	Champua	Rajabasa	10.000	0	10
69	Champua	Mahadevpur	10.000	0	10
70	Champua	Durgapur	20.000	0	20
71	Champua	Parbatipur	5.004	0	5.004
72	Champua	Dudukundi	5.000	0	5
73	Champua	Tentala	4.92	0	4.92
74	Champua	Gambharia	8.800	8	0.8
75	Champua	Bidyadharpur	1.268	0	1.268
76	Champua	Barkhandia	7.060	0	7.06
77	Champua	Asuki	11.680	0	11.68
78	Champua	Patalaposi	4.568	0	4.568
79	Champua	Sarei	0.680	0	0.68
80	Champua	Urti	5.400	0	5.4
81	Champua	Kalinga	4.536	0	4.536
82	Champua	Kendua	2.06	0	2.06
Total			405.979	18	387.979
83	Ghatgaon	Patabari	3.36	0	3.36
84	Ghatgaon	Dinabandhupur	4.640	0	4.64
85	Ghatgaon	Adakata	0.468	0	0.468
86	Ghatgaon	Kalimati	11.46	0	11.46
87	Ghatgaon	Dhogotha	8.85	0	8.85
88	Ghatgaon	Jamujodi	6.650	0	6.65
89	Ghatgaon	Jhadpokhari	5.540	0	5.54
Total			40.968	0	40.968
90	Keonjhar	Totagaon	5	0	5
91	Keonjhar	Jajaposi	5.100	0	5.1
92	Keonjhar	Sunatangiri	5.000	0	5
93	Keonjhar	Nudurpada	2.316	0	2.316
94	Keonjhar	Dhanabeni	1.961	0	1.961



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95	Keonjhar	Gohjitanigiri	7.000	0	7
96	Keonjhar	Haladharapur	3.900	0	3.9
97	Keonjhar	Nuabeda	6.000	0	6.00
98	Keonjhar	Gopalabandhu-Kainsi	5.000	0	5.00
99	Keonjhar	Kathakaranjia	5.108	0	5.108
100	Keonjhar	Kathabaunsuli	4.000	0	4.00
101	Keonjhar	Baliabeda	0.4	0	0.4
102	Keonjhar	Haladharapur	5.100	0	5.10
103	Keonjhar	Khadiadiha	5.200	0	5.20
104	Keonjhar	Keri	6.400	0	6.40
105	Keonjhar	Kempasoda	5.100	0	5.10
106	Keonjhar	Mathuramunduli	5.080	5	0.08
107	Keonjhar	Kendua	10.080	0	10.08
108	Keonjhar	Padmapur	5.120	5	0.12
109	Keonjhar	Nuagaon	5.100	0	5.1
110	Keonjhar	Nuagaon (Mundasahi)	5.120	0	5.12
111	Keonjhar	Tarakakhaman	5.120	0	5.12
112	Keonjhar	Kathabaunsuli	6.000	0	6.00
113	Keonjhar	Upardiha	4.800	0	4.8
114	Keonjhar	Dungurisahi	5.100	0	5.1
115	Keonjhar	Nuabeda	5.200	0	5.2
116	Keonjhar	Kainsi	5.600	0	5.6
117	Keonjhar	Sahadapur	0.580	0	0.58
118	Keonjhar	Kamposoda	0.300	0	0.3
119	Keonjhar	Bijenitangar	5.200	0	5.2
120	Keonjhar	Bhanua	4.228	0	4.228
121	Keonjhar	Nuasahi	5.147	0	5.147
122	Keonjhar	Dhanabeni	5.800	0	5.8
123	Keonjhar	Baidanda	5.392	0	5.392
124	Keonjhar	Karanjia	5.000	0	5.00
125	Keonjhar	Jirang	10.0	0	10.0
126	Keonjhar	Mathuramunduli	5.040	0	5.04
127	Keonjhar	Sirishpal	7.850	0	7.85
128	Keonjhar	Atibudhipada	5.020	0	5.02
129	Keonjhar	Dimiribahal	7.120	0	7.12
130	Keonjhar	Ostaponga	11.320	0	11.32
131	Keonjhar	Budapalasa	8.000	0	8.0



132	Keonjhar	Padmapur	10.300	0	10.3
Total			231.202	10	221.202
133	Patna	Silapada	5.248	0	5.248
134	Patna	Kuaposi	6.252	0	6.252
135	Patna	Tainsira	8.800	0	8.80
136	Patna	Nuapada	3.672	0	3.672
137	Patna	Sanajamuposi	3.608	0	3.608
138	Patna	Sabanalibeda	10.132	0	10.132
139	Patna	Lunga	3.848	0	3.848
140	Patna	Tendera	8.556	0	8.556
141	Patna	Balibandha	3.452	0	3.452
142	Patna	Maliposi	2.220	0	2.22
143	Patna	Saraskela	9.856	0	9.856
144	Patna	Kuaposi	2.036	0	2.036
145	Patna	Guludiposi	0.652	0	0.652
146	Patna	Patanali	7.512	0	7.512
147	Patna	Rengalbeda	6.900	0	6.90
148	Patna	Nuakhaman	3.140	0	3.14
149	Patna	Aharapada	2.084	0	2.084
150	Patna	Barigaon	11.960	0	11.96
151	Patna	Aharapada	2.744	0	2.744
152	Patna	Bhalupahadi	5.0	0	5.0
153	Patna	Bhuduripali	5.000	0	5.0
154	Patna	Daxinaposi	5.000	0	5.0
155	Patna	Kashipur	10.000	0	10.0
156	Patna	Mahisamundi	21.000	0	21.0
157	Patna	Chhatarapani (Barabeda)	7.000	0	7.0
158	Patna	Gojitangiri	4.000	0	4.0
159	Patna	Tangarapada	3.000	0	3.0
160	Patna	Gojitangiri	2.272	0	2.272
161	Patna	Barabeda	3.358	0	3.358
162	Patna	Kakharuabeda	15.636	0	15.636
163	Patna	Tentala	10.008	0	10.008
164	Patna	Sarasposi	4.200	0	4.20
165	Patna	Jharbeda	20.064	0	20.064
166	Patna	Katupada	5.290	0	5.29
167	Patna	Dendra	1.220	0	1.22
168	Patna	Denua	5.000	0	5.00



169	Patna	Atharanalisahi	5.140	0	5.14
170	Patna	Chaturisahi	5.180	0	5.18
171	Patna	Bholapada	0.020	0	0.02
172	Patna	Chhatarapani	4.670	0	4.67
173	Patna	Digiposi	2.650	0	2.65
174	Patna	Telipada	6.220	0	6.22
175	Patna	Ankura	5.768	0	5.768
176	Patna	Barabeda	9.003	0	9.003
177	Patna	Kiapada	11.480	0	11.48
178	Patna	Kendeiposi	20.880	0	20.88
179	Patna	Sialijoda	5.059	0	5.059
180	Patna	Khuntapada	5.350	0	5.35
181	Patna	Nischintapur	3.728	0	3.728
182	Patna	Tando	5.008	0	5.008
183	Patna	Purunapani	5.312	0	5.312
184	Patna	Banamahuladiha	2.648	0	2.648
185	Patna	Kumudabahali	2.660	0	2.66
186	Patna	Dianali	4.648	0	4.648
187	Patna	Dasharathapur	5.112	0	5.112
188	Patna	Madhubanasahi	5.368	0	5.368
189	Patna	Kantiapada	2.980	0	2.98
190	Patna	Dhuliasahi	5.452	0	5.452
191	Patna	Jamunaposi	0.988	0	0.988
192	Patna	Hatibari	5.148	0	5.148
193	Patna	Tentela	5.400	0	5.4
194	Patna	Duaghata	4.666	0	4.666
195	Patna	Tavasaru	1.156	0	1.156
196	Patna	Dsihigudasahi (Kumudabahali)	5.896	0	5.896
197	Patna	Golasahi (Jamunaposi)	3.472	0	3.472
198	Patna	Bhrungarajposi	4.008	0	4.008
199	Patna	Mursuan	8.192	0	8.192
200	Patna	Godhisahi	10.000	0	10
201	Patna	Jamunaposi	10.000	0	10
202	Patna	Mangalpur	5.000	0	5
203	Patna	Erendei	13.000	0	13
204	Patna	Nischintapur	10.000	0	10
205	Patna	Budhikapudi	0.002	0	0.002



206	Patna	Tavasarua	20.0	0	20
207	Patna	Tavasarua	5.000	0	5
Total			465.984	0	465.984
208	Telkoi	Saleikana	5.05	0	5.05
209	Telkoi	Dimiria	5.230	0	5.23
210	Telkoi	Koisisuta	10.526	0	10.526
211	Telkoi	Kalima	6.560	0	6.56
212	Telkoi	Golabandha	10.19	10	0.19
213	Telkoi	Bhimkand	5.170	0	5.17
214	Telkoi	Sikulabahal	10.98	10	0.98
215	Telkoi	Saruali	5.480	0	5.48
216	Telkoi	Siribahal	5.520	0	5.52
217	Telkoi	Tangurubahal	10.760	0	10.76
218	Telkoi	Patatangara	11.760	0	11.76
Total			87.226	20	67.226
Grand Total			1340.653	48	1292.653

Table 17.2(v)(A) ABSTRACT (VF of SIDA)

Range	No of Patches	Area notified	Diverted under FRA	Balance available for management
BJP	14	103.558	0.000	103.558
Barbil	1	5.736	0.000	5.736
Champua	67	405.979	18.000	387.979
Ghatgaon	7	40.968	0.000	40.968
Keonjhar	43	231.202	10.000	221.202
Patna	75	465.984	0.000	465.984
Telkoi	11	87.226	20.000	67.226
Total	218	1340.653	48.000	1292.653

**F) Natural Forests declared U/s 30 of OFA,1972 as Village Forest**

Table No17.2(vi) Natural Forests declared U/s 30 of OFA,1972 as Village Forest					
Sl. No.	Range	Name of Village Forest	Area in ha	Area diverted under FRA	Balance area
1	Barbil	Putugaon	5.6	0	5.600
2	Barbil	Aseinkala	5.268	0	5.268
Total			10.868	0	10.868
3	Champua	Gidhibasa	5	0	5.00
4	Champua	Nagarpal	5.000	0	5.00
5	Champua	Teliarsals	5.000	0	5.00
6	Champua	Arsala	5.000	0	5.00
7	Champua	Sabaka Dhanurjayapur	5.000	0	5.00
8	Champua	Balabhadrapur	5.000	0	5.00
9	Champua	Madama	5.000	0	5.00
10	Champua	Jagannathpur	5.000	0	5.00
11	Champua	Sitarampur	5.000	0	5.00
12	Champua	Gidunia	5.000	0	5.00
13	Champua	Barana	5.000	0	5.00
14	Champua	Gopiballavpur	5.000	0	5.00
15	Champua	Chelianal	5.000	0	5.00
16	Champua	Kanchandumuria	5.000	0	5.00
17	Champua	Badaposi	5.000	0	5.00
18	Champua	Pichilabeda	5.000	0	5.00
19	Champua	Rasabantala	15.000	0	15.00
20	Champua	Kaunrikala	6.000	0	6.00
21	Champua	Manada	10.000	0	10.00
22	Champua	Andharikhaman	5.000	0	5.00
23	Champua	Mundachauthia	5.000	0	5.00
24	Champua	Gidhibasa	5.000	0	5.00
25	Champua	Nandapur	5.000	0	5.00
26	Champua	Tangarpada	5.000	0	5.00
27	Champua	Madhupur	5.000	0	5.00
28	Champua	Ramachandrapur	10.000	0	10.00
29	Champua	Ukhunda	10.000	0	10.00
30	Champua	Pichhulabeda	5.000	0	5.00
31	Champua	Angulia	5.000	0	5.00



32	Champua	Gundunia	4.000	0	4.00
33	Champua	Badadumuria	10.000	0	10.00
34	Champua	Barkhandia	10.000	0	10.00
35	Champua	Sananeuli	5.000	0	5.00
36	Champua	Tangarsi	5.000	0	5.00
37	Champua	Bhimapur	5.000	0	5.00
38	Champua	Ankudi	5.000	0	5.00
39	Champua	Badanai	5.000	0	5.00
40	Champua	Chamakpur	5.000	0	5.00
41	Champua	Marusuan	5.000	0	5.00
42	Champua	Sankankana	5.000	0	5.00
43	Champua	Ramachandrapur	5.000	0	5.00
44	Champua	Sarei	5.000	0	5.00
45	Champua	Jamudalka	5.000	5	0.00
46	Champua	Kanjiasula	5.000	0	5.00
47	Champua	Chandrasekharapur	5.000	0	5.00
48	Champua	Raruangoda	10.000	0	10.00
49	Champua	Sunariposi	5.000	0	5.00
50	Champua	Badasahi	5.000	0	5.00
51	Champua	Durukulia	5.000	0	5.00
52	Champua	Nayadhanurjayapur	5.000	0	5.00
53	Champua	Kanjiposi	5.000	0	5.00
54	Champua	Mamulijoda	5.000	0	5.00
55	Champua	Hariposi	5.000	0	5.00
56	Champua	Bhagianasa	5.000	0	5.00
57	Champua	Sabakdhanurjayapur	5.000	0	5.00
58	Champua	Pahadpur	5.000	0	5.00
59	Champua	Cheelipa	5.000	0	5.00
60	Champua	Asanpat	5.156	0	5.16
61	Champua	Madhupur	1.720	0	1.72
62	Champua	Nagarpal	4.480	0	4.48
63	Champua	Sitarampur	2.240	0	2.24
64	Champua	Asuki	0.712	0	0.71
65	Champua	Bhubanaposi	2.020	0	2.02
66	Champua	Asuki	4.292	0	4.29
67	Champua	Kalinga	3.156	0	3.16
68	Champua	Badaposi	5.088	0	5.09
69	Champua	Sanneuli	5.096	0	5.10
70	Champua	Bagiabeda	1.696	0	1.70



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71	Champua	Baruna	2.508	0	2.51
72	Champua	Hastinapur	5.000	0	5.00
73	Champua	Gidhibasa	5.000	0	5.00
74	Champua	Sarasinga	2.144	0	2.14
75	Champua	Padmakesharpur	6.104	0	6.10
76	Champua	Ramachandrapur	2.848	0	2.85
77	Champua	Kanchandumuria	5.000	0	5.00
78	Champua	Bichitranandapur	5.000	0	5.00
79	Champua	Tukudiha	5.292	0	5.29
80	Champua	Ratnaposi	5.088	0	5.09
81	Champua	Jamunaposi	5.500	0	5.50
82	Champua	Kantiaposi	5.350	0	5.35
83	Champua	Bhaliadipa	3.080	0	3.08
84	Champua	Raruangoda	4.628	0	4.63
85	Champua	Icchinda	9.140	0	9.14
86	Champua	Sandhapur	5.000	0	5.00
Total			437.3380	0	437.338
87	Ghatgaon	Marhapur	10.00	0	10.00
88	Ghatgaon	Kamarnali	8.00	0	8.00
89	Ghatgaon	Patabari	5.00	0	5.00
90	Ghatgaon	Kasibeda	5.45	0	5.45
91	Ghatgaon	Ankhpada	5.00	0	5.00
Total			33.45	0	33.45
92	Keonjhar	Kemendia	5.000	0	5.000
93	Keonjhar	Dhanabeni	5.000	0	5.000
94	Keonjhar	Patalikata	5.000	0	5.000
95	Keonjhar	Nuagaon	5.000	0	5.000
96	Keonjhar	Rutisila	5.000	0	5.000
97	Keonjhar	Buxibarigaon	10.000	0	10.000
98	Keonjhar	Ostaponga	10.000	0	10.000
99	Keonjhar	Baijapada	10.000	0	10.000
100	Keonjhar	Janghira	10.000	0	10.000
101	Keonjhar	Pandapada	10.000	0	10.000
102	Keonjhar	Dharapada	10.000	0	10.000
103	Keonjhar	Jhumukaposi	5.000	0	5.000
104	Keonjhar	Badabarabeda	5.000	0	5.000
105	Keonjhar	Badabarabeda	5.000	0	5.000
106	Keonjhar	Dumuria	5.000	0	5.000
107	Keonjhar	Mahuldiha	5.000	0	5.000



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108	Keonjhar	Nuagaon	10.000	0	10.000
109	Keonjhar	Bajinitangar	10.000	0	10.000
110	Keonjhar	Jadipada	5.000	0	5.000
111	Keonjhar	Sunatangiri	5.000	0	5.000
112	Keonjhar	Dhanaberu	6.644	0	6.644
113	Keonjhar	Balidanda	5.100	0	5.100
114	Keonjhar	Gohitangiri	4.000	0	4.000
115	Keonjhar	Patipanga	4.320	0	4.320
116	Keonjhar	Buxibarigaon	5.000	0	5.000
117	Keonjhar	Nuasahi	6.116	0	6.116
118	Keonjhar	Balisahi	5.088	0	5.088
119	Keonjhar	Badamusi	5.000	0	5.000
120	Keonjhar	Keri	10.000	0	10.000
121	Keonjhar	Daxinaposi	5.000	0	5.000
122	Keonjhar	Jhaliapada	5.000	0	5.000
123	Keonjhar	Badasati(Badasahi)	5.000	0	5.000
Total			206.268	0	206.268
124	Patna	Rashiapada	5	0	5.000
125	Patna	Kolhasahi-Irrendei	5.000	0	5.000
126	Patna	Purunapani	5.000	0	5.000
127	Patna	Naranaposi	5.000	0	5.000
128	Patna	Tentela	5.000	0	5.000
129	Patna	Childa	5.000	0	5.000
130	Patna	Angikala	5.000	0	5.000
131	Patna	Kenduiposi	5.000	0	5.000
132	Patna	Bolaniposi	5.000	0	5.000
133	Patna	Shyamasundarpur	5.000	0	5.000
134	Patna	Mirigikhoji	5.000	0	5.000
135	Patna	Bhimapada	5.000	0	5.000
136	Patna	Chandiapada	5.000	0	5.000
137	Patna	Purunia	5.000	0	5.000
138	Patna	Chinamaliposi	5.000	0	5.000
139	Patna	Tentulikhunnti	5.000	0	5.000
140	Patna	Purandarapur	5.000	0	5.000
141	Patna	Dimirigoda	5.000	0	5.000
142	Patna	Kaliaduma	5.000	0	5.000
143	Patna	Begna	5.000	0	5.000
144	Patna	Khajuripat	10.000	0	10.000
145	Patna	Khuntapingu	5.000	0	5.000



146	Patna	Silda	20.000	0	20.000
147	Patna	Bhagaposi	5.000	0	5.000
148	Patna	Manapur	10.000	0	10.000
149	Patna	Sangamharia	10.000	0	10.000
150	Patna	Bolaniposi	5.000	0	5.000
151	Patna	Brahmanideo	10.000	0	10.000
152	Patna	Sangamharia	10.000	0	10.000
153	Patna	Badanuagaoon	10.000	0	10.000
154	Patna	Erendei	5.000	0	5.000
155	Patna	Mangalapur	5.000	0	5.000
156	Patna	Kathaghara	10.000	0	10.000
157	Patna	Rasapada	5.000	0	5.000
158	Patna	Mangalapura	5.000	0	5.000
159	Patna	Kantiapada	5.000	0	5.000
160	Patna	Banamalipura	10.000	0	10.000
161	Patna	Gamabarei	5.000	0	5.000
162	Patna	Beganakhman	20.000	0	20.000
163	Patna	Khamua	5.000	0	5.000
164	Patna	Sankhamua	5.000	0	5.000
165	Patna	Khireitangiri	5.000	0	5.000
166	Patna	Padakhman	5.000	0	5.000
167	Patna	Batesahi	5.000	0	5.000
168	Patna	Kumudabahali	5.000	0	5.000
169	Patna	Godipokhari	5.000	0	5.000
170	Patna	Kantiapada	5.000	0	5.000
171	Patna	Ankura	5.000	0	5.000
172	Patna	Ankura	5.000	0	5.000
173	Patna	Mirigikhoji	5.000	0	5.000
174	Patna	Dhanurjayapur	5.000	0	5.000
175	Patna	Bijanalisahi	5.000	0	5.000
176	Patna	Saradhapur	5.000	0	5.000
177	Patna	Silda	5.000	0	5.000
178	Patna	Khuntapada	5.000	0	5.000
179	Patna	Mahisamundi	5.000	0	5.000
180	Patna	Phulapahadi	5.000	0	5.000
181	Patna	Barbil-Nuasahi	5.000	0	5.000
182	Patna	Nuabandha	5.000	0	5.000
183	Patna	Badasahi	5.000	0	5.000
184	Patna	Jamudia	5.000	0	5.000



185	Patna	Jamudia	5.000	0	5.000
186	Patna	Tavasarua	5.000	0	5.000
187	Patna	Suagapur	5.000	0	5.000
188	Patna	Kapundi	5.000	0	5.000
189	Patna	Hariharapur	5.000	0	5.000
190	Patna	Bhandaribilla	5.000	0	5.000
191	Patna	Jarkanibeda	5.000	0	5.000
192	Patna	Medinipur	5.000	0	5.000
193	Patna	Raidiha	5.000	0	5.000
194	Patna	Begana	5.000	0	5.000
195	Patna	Begana	5.000	0	5.000
196	Patna	Godhinali	5.000	0	5.000
197	Patna	Banamalipur	5.000	0	5.000
198	Patna	Panalisahi (Nuagaon)	10.000	0	10.000
199	Patna	Badamahuldiha	5.528	0	5.528
200	Patna	Erendei	5.068	0	5.068
201	Patna	Tangiasahi	4.348	0	4.348
202	Patna	Mundasahi	5.280	0	5.280
203	Patna	Silda	5.264	0	5.264
204	Patna	Tentulikhunti	4.960	0	4.960
205	Patna	Bandhasahi	5.264	0	5.264
206	Patna	Patanali	3.396	0	3.396
207	Patna	Dulang	3.224	0	3.224
208	Patna	Kantiapada	1.816	0	1.816
209	Patna	Chanduapada	3.460	0	3.460
210	Patna	Godhiramapura	3.928	0	3.928
211	Patna	Kumudabahali	6.292	0	6.292
212	Patna	Kantiapada	5.120	0	5.120
213	Patna	Mahisamundi	5.108	0	5.108
214	Patna	Chinamaliposi	1.960	0	1.960
215	Patna	Godhiramapada	5.088	0	5.088
216	Patna	Kumudabahali	6.012	0	6.012
217	Patna	Tentela	4.652	0	4.652
218	Patna	Purandarapur	7.340	0	7.340
219	Patna	Rengalbeda	1.416	0	1.416
220	Patna	Dabarchua	5.06	0	5.060
221	Patna	Machhabhanar	4.020	0	4.020
222	Patna	Junei	5.000	0	5.000
223	Patna	Junei	5.000	0	5.000



224	Patna	Muktapur	5.000	0	5.000
225	Patna	Ramachandrapur	6.500	0	6.500
	Total		575.104	0	575.104
226	Telkoi	Bhimkand	5	0	5.000
227	Telkoi	Kantalei	5.000	0	5.000
228	Telkoi	Saleikena	5.460	0	5.460
229	Telkoi	Kuladera	6.100	0	6.100
230	Telkoi	Banabiharipur	5.380	0	5.380
231	Telkoi	Khuntapada	5.000	0	5.000
232	Telkoi	Kalima	6.000	0	6.000
233	Telkoi	Saruali	5.320	0	5.320
234	Telkoi	Nuadiha	5.360	0	5.360
235	Telkoi	Patatangara	5.380	0	5.380
236	Telkoi	Dimiria	5.180	0	5.180
237	Telkoi	Dandumunda	5.000	0	5.000
238	Telkoi	Golabandha	10.480	10	0.480
Total			74.660	15	59.660
Grand Total			1337.688	15.000	1322.688

Table No 17.2(v)(B) ABSTRACT (VF of Natural)

Range	No of Patches	Area notified	Diverted under FRA	Balance available for management
BJP	0	0	0	
Barbil	2	10.868	0	10.868
Champua	84	437.338	0	437.338
Ghatgaon	5	33.45	0	33.45
Keonjhar	32	206.268	0	206.268
Patna	102	575.104	0	575.104
Telkoi	13	74.66	15	59.66
Total (Natural)	238	1337.688	15	1322.688
Total (SIDA)	218	1340.653	48	1292.653
Total VF	456	2678.341	63	2615.341



G) Protected Forests:

Table No 2(vii) List of Protected Forests included in Pl. W.C Keonjhar Division.

Sl No	Range	Name of the Block	Compt. no	Area (Notified)	Area available for management in ha	Remark
1	BJP	Anasuan		44.321	44.321	Planted
2	BJP	Anasuan		55.084	55.084	Not Plant
3	BJP	Anasuan(A)		0.1959	0.1959	Planted
4	BJP	Baragoda		276.3	276.3	Not Plant
5	BJP	Benidihi		22.1	22.1	Planted
6	BJP	Benidihi(A)		38.33	38.33	Planted
7	BJP	Champajhar		31	31	Not Plant
8	BJP	Champajhar		2.45	2.45	Not Plant
9	BJP	Champajhar		2.5	2.5	Not Plant
10	BJP	Champajhar(A)		20.362	20.362	Not Plant
11	BJP	Champajhar-B		3.14	3.14	Not Plant
12	BJP	Dhaladihi		159.97	159.97	Not Plant
13	BJP	Fhuljhar-C		24.6	24.6	Not Plant
14	BJP	Guptaganga		38.905	38.905	Not Plant
15	BJP	Jantari		22.839	22.839	Planted
16	BJP	Jatra		14.363	14.363	Planted
17	BJP	Jatra		117.96	117.96	Planted
18	BJP	Kadalibadi		43.89	43.89	Planted
19	BJP	Kalanda (Kha)		94.497	94.497	Planted
20	BJP	Kendughati		39.505	39.505	Planted
21	BJP	Lungajhar		32.719	32.719	Planted
22	BJP	Lungajhar(i)		31.408	31.408	Planted
23	BJP	Lungajhar-A		15.277	15.277	Not Plant
24	BJP	Phuljhar-D		34.65	34.65	Not Plant.
25	BJP	Podadihi		120.84	120.84	Not Plant
26	BJP	Raidiha(A)		20.32	20.32	Not Plant
27	BJP	Sikulapada		9.69	9.69	Planted
28	BJP	Sukodola		85.55	85.55	Planted
29	BJP	Sukodola		348.01	348.01	Planted
30	BJP	Tala Baitarani		13.48	13.48	Not Plant
31	BJP	Tana		64.332	64.332	Not Plant
32	BJP	Tentuli		28.6	28.6	Planted



33	BJP	Tentulikhunti		287.07	287.07	Planted
34	BJP	Tentulikhunti		45.322	45.322	Not Plant
35	BJP	Upparabirikala-i		3.228	3.228	Not Plant
36	BJP	Anasuan		44.321	44.321	Not Plant
37	Champua	Chhatia		59.7082	59.7082	Not Plant
38	Champua	Kaliapal		165.793	165.793	Not Plant
39	Champua	Kasia		105.396	105.396	Not Plant
40	Champua	Kasia		7.622	7.622	Not Plant
41	Keonjhar	Hunda		82.5560	82.556	Not Plant
42	Telkoi	Dandargauni		34.0	34.0	Not Plant
43	Telkoi	Kaliapani		13.7978	13.7978	Not Plant
44	Telkoi	Rangamatia		3.7	3.7	Not Plant
		Total PF	0	2678.0710	2678.0710	

17.3 Charectoristic of Vegetation:

- The area included in this working circle are either planted up or to be planted. The teak plantations raised and included are to be with varied growth. The oldest plantation included is of 14 years old and last plantation is of 10 years old. The growth is of medium status i.e. height within 5m and girth 20-30cm.
- Miscellaneous Plantation included are all planted up area with mostly timber species like Sisoo, Gambar, Acacia, Asan, Chakunda, Sirisa and other long term rotation species. The growth status is fair. Average height 5-7 meters and Girth around 30-45cm.
- Bamboo plantation has been taken up in Non Bamboo Zone to enhance fodder availability to wild life. The bamboo is in “Non Clump formation” stage and needs improvement.
- All enchroached areas are under cultivation and seasonal crop like pulses, highland paddy are being cultivated. It is to be evicred and brought under plantation.
- The Compensatory afforestation areas have been partly planted up and rest to be covered up under plantation depending upon release of fund under CAMPA. The User agency has already deposited the estimated amount. (Declaed as PF) (Area Planted up –1264.065ha, Not Planted 1414.005ha)



- f) In Village Woodlots of Social Forestry Project the main crop is Eucalyptus, Acacia and San Chakunda. The growth is good on alluvial soils but stunted on dry stony soil. About 30% have achieved a girth of 75 cm and above. The crop is scattered.
- g) The Forest & Environment department has also notified Natural Sal Forest existing near to village as Village forest besides the Social forestry Project Plantations. These are Natural Sal forest having a crop density of above 40% but no harvestable trees available. No detail Study has been done by NRSC. The provisions of Imp. Working will be applicable. The need of Vilagers are to be meet from this forets as per resolution of VFC

17.4 Treatment Series and JFM Area:

The area under this working circle assigned to VSS has been indicated in Table No 17.1. Besides these areas all Village forests have been assigned to VFC (Village Forest Committee) as per Odisha Village forest Rulle, 1985 and amendment ther after.

17.4.1 Constitution of Treatment series.

a) Teak Treatment (Thinning Series)

All plantations raised under Economic plantations are included in this series for treatment broadly silvicultural thinning.

I) Keonjhar Teak Series (KTS)

Table No 17.3 (i) Keonjhar Teak Series					
Name of seies	Range	Blcok	Comp no	Area in ha	Total area
Keonjhar Teak Series (KTS)	Champua	Ukhunda RF		40.0000	204.70
	Keonjhar	Belda RF		15.0000	
	Keonjhar	Raghunathpur RF		15.0000	
	Keonjhar	Jadipada RF		40.0000	
	Patna	Atei RF		34.7000	
	Ghatgaon	Atei RF		40.0000	
	Patna	Baunsuli RF		20.0000	

**b) Bamboo Treatment Series:**

Table No 17.3 (ii) Bamboo Treatment Series: Keonjhar					
Name of series	Range	Block	Comp no	Area in ha	Total area
Bamboo Treatment series	Keonjhar	Basantapur RF		25.00	335.00
	Champua	Kalikaprasad RF		25.00	
	Patna	Padmapur RF		25.00	
	Ghatgaon	Kalimati RF		25.00	
	Barbil	Karo RF		20.00	
	Barbil	Karo RF		20.00	
	Barbil	Karo RF		25.00	
	Ghatgaon	Kalimati RF		10.00	
	Ghatgaon	Kalimati RF		10.00	
	Keonjhar	Nayagarh RF		10.00	
	Keonjhar	Nayagarh RF		10.00	
	Patna	Atei RF		10.00	
	Patna	Atei RF		10.00	
	Ghatgaon	Kalimati RF		25.00	
	Telkoi	Kalapat RF		60.00	
	Ghatgaon	Barabanka RF		25.00	

c) Miscellaneous Plantations:

The miscellaneous plantations have been raised as enrichment plantations at various blocks. The species matches with natural vegetation i.e. Asana, Arjun, Sisoo, Gambhar Siris etc. As the vegetation has been merged with the natural forests and its boundary is not clearly identifiable at this stage, it is proposed to manage with the vegetation / prescriptions of the Forest block where it is planted will be applicable. No specific prescriptions have been suggested. Hence no series has been constituted for detail management.

**d) Enchroachment Eviction Series (EES)****iii) Keonjhar Enchroachment Eviction Series: (KES)****Table No 17.3 (iii) Keonjhar Enchroachment Eviction Series: (KES)**

Name of seies	Range	Blcok	Comp no	Area in ha	Total area
Keonjhar Enchroachment Eviction Series: (KES)	Barbil	Karo RF	10	4.2525	345.8947
	Barbil	Sidhamath RF	2	3.969	
	Barbil	Thakurani RF		0.6075	
	B & JP	Anjar RF		0.405	
	B & JP	Saharpur RF		0.405	
	B & JP	Lunaghar-I PRF		1.3932	
	Patna	Atai RF	3	16.848	
	Patna	Purunapani RF		0.4658	
	Champua	Baitarani-A RF		6.48	
	Champua	Bardhana RF		12.1703	
	Champua	Jyotipur RF		0.81	
	Champua	Pedipokhari RF		1.215	
	Champua	Ukhunda RF		0.81	
	Champua	Kalikaprasad RF		81.0851	
Keonjhar Enchroachment Eviction Series: (KES)	Ghatgaon	Barabanka RF	14	0.81	
	Ghatgaon	Masinabila RF		4.0905	
	Ghatgaon	Nalapanga RF	1	8.3025	
	Ghatgaon	Atai RF	12	75.7958	
	Keonjhar	Belda RF		34.992	
	Keonjhar	Jadipada RF		33.4125	
	Keonjhar	Barabanka RF	15	2.835	
	Keonjhar	Basantapur RF		3.4425	
	Keonjhar	Maidankel RF		1.215	
	Keonjhar	Nalapanga RF	2	4.455	
	Keonjhar	Narayanpur RF		3.2805	
	Keonjhar	Nelung RF		4.9977	
Keonjhar Enchroachment Eviction Series: (KES)	Keonjhar	Raikala RF		0.4253	
	Keonjhar	Tangarani RF		0.2228	
	Telkoi	Bandhanjhari RF	1	1.7415	
	Telkoi	Benamunda RF	1	7.6748	
	Telkoi	Kalapat RF	14	25.11	
	Telkoi	Rekuti PRF		2.1749	
	Total			345.8947	345.8947



e) Village Forest Series (Village Wood Lot)

Table No 17.3(iv) Constitution of Village Forest Series (VWL)

Name of seies	Range	Blcok	Comp no	Area in ha	Total area
BJP VW Series	B & JP	Khuntakata		10.000	103.558
	B & JP	Lunaghar		5.000	
	B & JP	Kushakala		11.310	
	B & JP	Anklpada		5.000	
	B & JP	Khajurimundi		10.000	
	B & JP	Suakati		5.000	
	B & JP	Karandadihi		10.000	
	B & JP	Baitarani Pahada		10.000	
	B & JP	Kanengadihi		10.000	
	B & JP	Taramakanta		5.000	
	B & JP	Balarei		5.220	
	B & JP	Jaladiha		5.280	
	B & JP	Gopapur		1.168	
	B & JP	Sagapada		10.580	
Barbil-Ghatgaon VW Series	Barbil	Kudapi		5.736	46.704
	Ghatgaon	Patabari		3.36	
	Ghatgaon	Dinabandhupur		4.640	
	Ghatgaon	Adakata		0.468	
	Ghatgaon	Kalimati		11.46	
	Ghatgaon	Dhogotha		8.85	
	Ghatgaon	Jamujodi		6.650	
	Ghatgaon	Jhadpokhari		5.540	

Champua VW Series	Champua	Mangalapur		5.5	387.979
	Champua	Maheswarpur		5.5	
	Champua	Ghodaposi		5.008	
	Champua	Hanjiposi		5.6	
	Champua	Remuli		5.3	
	Champua	Gambharia		6.675	
	Champua	Mukundapur		6.08	
	Champua	Maudi		5.24	
	Champua	Mangalapur		5.00	
Champua VW Series	Champua	Sadangi		5.12	
	Champua	Ukhunda		5	



	Champua	Sabakdhanurjayapur	5
	Champua	Arsala	6.268
	Champua	Chelianal	4.772
	Champua	Baria	4.694
	Champua	Gidhibas	10.516
	Champua	Sundhimarusuan	2.12
	Champua	Kasipal	0.864
	Champua	Asanpat	3.548
	Champua	Manoharpur	7.248
	Champua	Hastinapur	3.71
	Champua	Chakulia	5.284
	Champua	Sankarpur	3.468
	Champua	Ankudi	5.75
	Champua	Nishagadia	9.168
	Champua	Pokharia	5.248
	Champua	Kashipal	3.444
	Champua	Durukulia	5.6
	Champua	Bala	4.3
	Champua	Godhuli	0.44
	Champua	Katulikana	4.1
	Champua	Sunaposi	7.624
Champua VW Series	Champua	Guludiposi	4.308
	Champua	Bhanda	5.4
	Champua	Purudiposi	5
	Champua	Sirikuan	5.17
	Champua	Maheswarpur	2.62
	Champua	Nishagadia	5.02
	Champua	Khuntapada	5.032
	Champua	Rajia	5.2
	Champua	Sadangi	5.02
Champua VW Series	Champua	Dakuaposi	6.044
	Champua	Kanchandumuria	7.2
	Champua	Bichitranandapur	8.8
	Champua	Parbatipur	5.004
	Champua	Katuilikana	10
	Champua	Talakanda	10
	Champua	Jamudalka	0
	Champua	Rajia	5
	Champua	Mangalpur,	25



		Mathhurapur, Sankarpur			
	Champua	Tunutuna		5	
	Champua	Murusuan		7	
	Champua	Rajabasa		10	
	Champua	Mahadevpur		10	
	Champua	Durgapur		20	
	Champua	Parbatipur		5.000	
	Champua	Dudukundi		5	
	Champua	Tentala		4.92	
	Champua	Gambharia		0.8	
	Champua	Bidyadharpur		1.268	
	Champua	Barkhandia		7.06	
	Champua	Asuki		11.68	
	Champua	Patalaposi		4.568	
	Champua	Sarei		0.68	
	Champua	Urti		5.4	
	Champua	Kalinga		4.536	
	Champua	Kendua		2.06	

Keonjhar VW Series	Keonjhar	Totagaon		5	221.202
	Keonjhar	Jajaposi		5.1	
	Keonjhar	Sunatangiri		5	
	Keonjhar	Nudurpada		2.316	
	Keonjhar	Dhanabeni		1.961	
	Keonjhar	Gohjatangiri		7	
	Keonjhar	Haladharapur		3.9	
	Keonjhar	Nuabeda		6.00	
	Keonjhar	Gopalabandhu-Kainsi		5.00	
	Keonjhar	Kathakaranjia		5.108	
	Keonjhar	Kathabaunsuli		4.00	
Keonjhar VW Series	Keonjhar	Baliabeda		0.4	
	Keonjhar	Haladharapur		5.10	
	Keonjhar	Khadiadiha		5.20	
	Keonjhar	Keri		6.40	
	Keonjhar	Kempasoda		5.10	
	Keonjhar	Mathuramunduli		0.08	
	Keonjhar	Kendua		10.08	



	Keonjhar	Padmapur		0.12	
	Keonjhar	Nuagaon		5.1	
	Keonjhar	Nuagaon (Mundasahi)		5.12	
	Keonjhar	Tarakakhaman		5.12	
	Keonjhar	Kathabaunsuli		6.00	
	Keonjhar	Upardiha		4.8	
	Keonjhar	Dungurisahi		5.1	
	Keonjhar	Nuabeda		5.2	
	Keonjhar	Kainsi		5.6	
	Keonjhar	Sahadapur		0.58	
	Keonjhar	Kamposoda		0.3	
	Keonjhar	Bijenitangar		5.2	
Keonjhar VW Series	Keonjhar	Bhanua		4.228	
	Keonjhar	Nuasahi		5.147	
	Keonjhar	Dhanabeni		5.8	
	Keonjhar	Baidanda		5.392	
	Keonjhar	Karanjia		5.00	
	Keonjhar	Jirang		10.0	
	Keonjhar	Mathuramunduli		5.04	
	Keonjhar	Sirishpal		7.85	
Keonjhar VW Series	Keonjhar	Atibudhipada		5.02	
	Keonjhar	Dimiribahal		7.12	
	Keonjhar	Ostaponga		11.32	
	Keonjhar	Budapalasa		8.0	
	Keonjhar	Padmapur		10.3	
Patna –I VW Series	Patna	Silapada		5.248	229.720
	Patna	Kuaposi		6.252	
	Patna	Tainsira		8.80	
	Patna	Nuapada		3.672	
	Patna	Sanajamuposi		3.608	
	Patna	Sabanalibeda		10.132	
	Patna	Lunga		3.848	
	Patna	Tendera		8.556	
	Patna	Balibandha		3.452	
	Patna	Maliposi		2.22	
	Patna	Saraskela		9.856	
	Patna	Kuaposi		2.036	
	Patna	Guludiposi		0.652	
	Patna	Patanali		7.512	



	Patna	Rengalbeda		6.90	
	Patna	Nuakhaman		3.14	
	Patna	Aharapada		2.084	
	Patna	Barigaon		11.96	
	Patna	Aharapada		2.744	
	Patna	Bhalupahadi		5.0	
	Patna	Bhuduripali		5.0	
	Patna	Daxinaposi		5.0	
	Patna	Kashipur		10.0	
	Patna	Mahisamundi		21.0	
	Patna	Chhatarapani (Barabeda)		7.0	
	Patna	Gojitangiri		4.0	
	Patna	Tangarapada		3.0	
	Patna	Gojitangiri		2.272	
	Patna	Barabeda		3.358	
	Patna	Kakharuabeda		15.636	
	Patna	Tentala		10.008	
	Patna	Sarasposi		4.20	
	Patna	Jharbeda		20.064	
	Patna	Katupada		5.29	
	Patna	Dendra		1.22	
	Patna	Denua		5.00	

Patna –II VW Series	Patna	Atharanalisahi		5.14	236.264
	Patna	Chaturisahi		5.18	
	Patna	Bholapada		0.02	
	Patna	Chhatarapani		4.67	
	Patna	Digiposi		2.65	
	Patna	Telipada		6.22	
	Patna	Ankura		5.768	
	Patna	Barabeda		9.003	
	Patna	Kiapada		11.48	
	Patna	Kendeiposi		20.88	
Patna –II VW Series	Patna	Sialijoda		5.059	
	Patna	Khuntapada		5.35	
	Patna	Nischintapur		3.728	
	Patna	Tando		5.008	



	Patna	Purunapani		5.312	
	Patna	Banamahuladiha		2.648	
	Patna	Kumudabahali		2.66	
	Patna	Dianali		4.648	
	Patna	Dasharathapur		5.112	
	Patna	Madhubanasahi		5.368	
	Patna	Kantiapada		2.98	
	Patna	Dhuliasahi		5.452	
	Patna	Jamunaposi		0.988	
	Patna	Hatibari		5.148	
	Patna	Tentela		5.4	
	Patna	Duaghata		4.666	
	Patna	Tavasaru		1.156	
	Patna	Dsihigudasahi (Kumudabahali)		5.896	
Patna –II VW Series	Patna	Golasahi (Jamunaposi)		3.472	
	Patna	Bhrungarajposi		4.008	
	Patna	Mursuan		8.192	
	Patna	Godhisahi		10	
	Patna	Jamunaposi		10	
	Patna	Mangalpur		5	
	Patna	Erendei		13	
	Patna	Nischintapur		10	
	Patna	Budhikapudi		0.002	
	Patna	Tavasaru		20	
	Patna	Tavasaru		5	

Telkoi VW Series	Telkoi	Saleikana		5.05	67.226
	Telkoi	Dimiria		5.23	
	Telkoi	Koisisuta		10.526	
	Telkoi	Kalima		6.56	
	Telkoi	Golabandha		0.19	
	Telkoi	Bhimkand		5.17	
	Telkoi	Sikulabahal		0.98	
	Telkoi	Saruali		5.48	
	Telkoi	Siribahal		5.52	
	Telkoi	Tangurubahal		10.76	
	Telkoi	Patatangara		11.76	

**f) Natural Village Forest:**

The Sal Natural Forests declared as Village Forest and assigned to village Forest committee is the only unit available with each Village for management. The forest produce they may procure from these forests as and when required by the Villagers. Constitution of treatment series and section there after is of no utility for the villagers for management purpose. General management practices will be prescribed for the village Forest unit and to be followed by the VFC. No series is constituted.

g) Keonjhar Protected Forest Series:

Table No 17.3 (v) Constitution of PF Series (Treatment)					
Name of series	Range	Block	Comp no	Area in ha	Total area
Keonjhar PF (treatment) Series	BJP	Anasuan		44.321	1261.048
	BJP	Anasuan(A)		0.1959	
	BJP	Benidihi		22.1	
	BJP	Benidihi(A)		38.33	
	BJP	Jantari		22.839	
	BJP	Jatra		14.363	
	BJP	Jatra		117.96	
	BJP	Kadalibadi		43.89	
	BJP	Kalanda (Kha)		94.497	
	BJP	Kendughati		39.505	
	BJP	Lungajhar		32.719	
	BJP	Lungajhar(i)		31.408	
	BJP	Sikulapada		9.69	
	BJP	Sukodola		85.55	
	BJP	Sukodola		348.01	
	BJP	Tentuli		28.6	
	BJP	Tentulikhunti		287.07	



Table No 17.3 (vi) Constitution of PF Seies (Plantation) : Keonjhar Division

Name of seies	Range	Blcok	Comp no	Area in ha	Total area
Keonjhar PF(Plantation) Series.	BJP	Anasuan		55.084	1417.023
	BJP	Baragoda		276.3	
	BJP	Champajhar		31	
	BJP	Champajhar		2.45	
	BJP	Champajhar		2.5	
	BJP	Champajhar(A)		20.362	
	BJP	Champajhar-B		3.14	
	BJP	Dhaladihi		159.97	
	BJP	Fhuljhar-C		24.6	
	BJP	Guptaganga		38.905	
	BJP	Lungajhar-A		15.277	
	BJP	Phuljhar-D		34.65	
	BJP	Podadihi		120.84	
	BJP	Raidiha(A)		20.32	
	BJP	Tala Baitarani		13.48	
	BJP	Tana		64.332	
	BJP	Tentulikhunti		45.322	
	BJP	Upparabirikala-i		3.228	
	BJP	Upparabirikala-ii		12.6900	
	Champua	Chhatia		59.7082	
	Champua	Kaliapal		165.793	
	Champua	Kasia		105.396	
	Champua	Kasia		7.622	
	Keonjhar	Hunda		82.5560	
	Telkoi	Dandargauni		34.0	
	Telkoi	Kaliapani		13.7978	
	Telkoi	Rangamatia		3.7	



17.4.1 Abstract of Plantation Series (Constituted)

Table No 17.3(Vii) Abstract of Plantation series			
Sl No	Name of Series	Area assigned	Remark
1	Keonjhar Teak Series (KTS)	204.70	
2	Miscellaneous Plantations:	2055.358	No series constituted
3	Bamboo Treatment Series	335.00	
4	Keonjhar Enchroachment Eviction Series: (KES)	345.8947	
5	BJP VW Series	103.558	SFP Plantations
6	Barbil- Ghatgaon VW Series	46.704	
7	Champua VW Series	387.979	
8	Keonjhar VW Series	221.202	
9	Patna –I VW Series	229.720	
10	Patna –II VW Series	236.264	
11	Telkoi VW Series	67.226	
12	Sal Natural VF	1322.688	No series constituted
13	Keonjhar PF (treatment) Series	1261.048	Planted Up
14	Keonjhar PF(Plantation) Series	1417.023	To be planted
	Total	8234.3647	

17.5 Blocks, compartments and JFM area:

The area assigned to JFM has been indicated in Table No 17.1. No Economic / teak plantation has been assigned to any VSS. The Village Forests are assigned to Village Forest Committee as per Odisha Village Forest Rules,1985 and amendment thereafter. All the Protected Forests are assigned to VSS. Out of total 8234.3647 ha assigned to this Working Circle, 3358.341 ha (40.78%) has been assigned to VSS/ VFC for management.

Table No 17.4 Area assigned to VSS / VFC unbdar P.WC. Keonjhar Division.				
Sl No	Category	Assigned to P.WC	Assigned to VSS / VFC	Percentage
1	Reserved Forest	2747.3846	630.00	
2	Proposed Reserved Forests	193.5681	30.00	
3	Demarcated Protected Forests			
4	Protected Forests	2678.071	83.00	
5	Village Forests	2615.341	2615.341	
	Total	8234.3647	3358.341	40.78



17.6 Special objectives of Management:

The objectives of management of this working circle are in tandem with the general objectives of this Plan. The Special Objectives are as follows.

- i) To manage Economic plantations / Teak Plantations of outgoing plans in a scattered manner and improve growth status through Silvicultural practices.
- ii) To bring the plantations raised here and there to a single management folds and scientifically manages to optimize the yield.
- iii) To encourage participatory management of erstwhile Social Forestry Plantations and activate the VFC.
- iv) To manage the plantations raised under Compensatory Afforestation Scheme and declared as Protected Forest thereafter.
- v) To Increase availability of Firewood and timbers in the locality and reduce pressure on forests for fuel wood and furniture wood.
- vi) To increase the crop density of forests and improve the Carbon Sequestration.
- vii) To develop a healthy usufruct benefit sharing mechanism in the villages and encourage natural resource management with a community approach method.
- viii) To take suitable measures to prevent soil erosion and conserve soil and moisture in barren hilly tracts.
- ix) To cover-up the encroached areas under tree cover after its eviction.

17.6.1 Analysis of the crop:

The crops included in this working circle are of three type's i.e.

- i. **Teak Plantations/ Economic Plantations:** The survivals of Teak plantations are very good and in the Range of survival vary depending on age of plantations. It varies from 40% to 75% depending upon age class. The growth data has been furnished at Table No 17.5 Below.



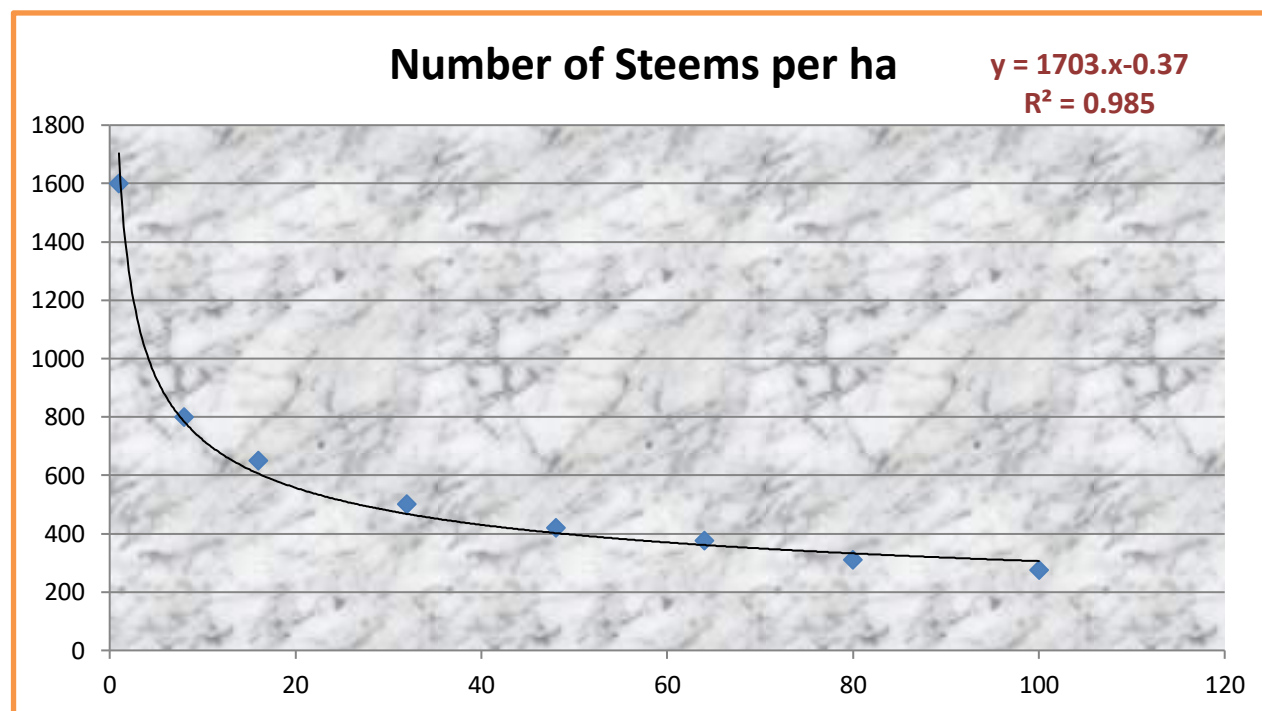
Table No 17.5 Decadal Growth Pattern of Economic Plantation

Year	Area in Ha	Growth Status		Remark
		Girth in cm	Height in Meter	
2001- 2010	204.70	30-45 cm	8-10 m	Branchy shape

The diameter growth is restricted due to more number of stems per hectare with comparison to age class. In teak Plantations the Stand table should follow this curve / equitation (derived from Field observation)

Table No 17.6 Stand Table for Teak – Keonjhar ision

Age	Number of Planted trees	Age	Number of Planted trees	Remark
01	1600	48	420	Rotation age = 100 year
08	800	64	375	
16	650	80	310	
32	500	100	275	





ii) Social Forestry Project Plantation:

Plantations Raised in Social Forestry project consists of Small Timber / Fuel Wood, Fodder/ Fruit Bearing and NTFP Species. Teak, Eucalyptus, Acacia, Sisoo, Bamboo, Mango, Karanja are the most preferred species planted. Trees are of varied growth pattern and planted to meet various objectives. At present Teak, Eucalyptus Acacia, Sisoo are available. The crop height varies from 10m to 15m in average. The Girth also varies from 75 cm to 120 cm depending upon species planted. The survival percentage is near 50%. These plantations were raised in between 1986 to 1995. Hence the trees available are 25 year to 35 year. Fuel wood species have been harvested by Villagers without following any silvicultural practices **“Jyoutha Parichalana Yojana”**. No systematic survey for crop condition has been taken up. During field visit, the present situation has been studied at random.

ii) Natural Sal Forest:

There are natural forests (small patches about 5-15 ha in general has been declared as Village Forests u/s 30 of the Odisha Forest act, 1972 and assigned to VFC under Odisha Village Forest Rules, 1985. The vegetation is in Pole to Tree stage. Average Girth class varies from 30-90cm in most of the cases. Trees of higher girth class is hardly 2-3% of the crop.

iii) Encroachment:

Encroachment is a great problem in this tract. There are encroachments indicated in last outgoing plan. No land could be reclaimed / evicted. To give stress on eviction these lands have been included in this working circle. The land is mostly used for Agricultural purpose.

iv) Plantations under Compensatory Afforestation:

The non Forest Area provided against diversion of forest land under provisions of Forest (Conservation) Act, 1980 are mutated in favour of Forest department and declared as Protected Forest under provisions of Odisha Forest Act, 1972. The species planted are of timber species matched with natural vegetation. Some Natural growth has come up to fill up any void space developed in course of time. These forests are also to be managed for production of timber of long term rotation. (Preferable 100 yr)

developed / come up, the same will also be retained to reduce the replanting cost. The number of standards per hectare will depend upon biotic interference, possibility of dispersal of seeds for a high forest system, fruit bearing species, having timber value at a



higher girth class. The minimum number of trees prescribed for retention is 25 number and maximum 75 numbers per hectare.

In case of Teak Plantation / Economic Plantation / Compensatory afforestation raised in outgoing Plans or under other schemes it will be Silviculturally tendered to have a good stand. Thinning along with Soil & Moisture conservation measures will be implemented to enhance growth rate with removal of **“Stems Having Utility Value”**.

The encroached areas after eviction will be planted up following standard planting procedure / norm.

17.6.3 Rotation period:

Rotation period for Sal, Teak and other species for the Division has been discussed at Para14.6.3. The Rotation Period of 120 years for Sal is prescribed and followed. In the outgoing Plan 120 years of Rotation age was prescribed for all species. During field visit and growth statistics available it is felt that Except Teak for all other species, the Rotation Period of 120 years is accepted and followed. In case of teak which has been introduced in many Forest blocks in Block Plantation in blank areas under Economic Plantation, the growth is very encouraging. Due to its high timber value it is in much demand in the locality, in the State and outside. Selective removal by illicit felling is a perceptible threat. Considering all its aspect i.e. Growth Status and Market demand, rotation age of 100 years for teak in this division is suggested. For other species usually planted is as follows.

Table No 17.7 Rotation Period for various species in Plantation			
Sl No	Species	Rotation Period in Year	Remark
1	Teak	100	In case of SFP Plantations Clear felling with Standard is being followed. Rotation period is applicable for Standards only.
2	Sisoo, Gambhari	100	
3	Eucalyptus, Other Soft wood, Acacia, Cassia etc	25	
4	Fruit bearing	As long as fruiting continues	

17.6.4 Harvestable diameters:

Harvestable diameter is being prescribed in different plans for different species from time to time. The criteria considered for recommended “Harvestable Diameter / Girth” are as follows.



- i) The Annual Increment of the Species,
- ii) Development of unsoundness due to climatic and biotic factors,
- iii) Marketability & Demand,
- iv) Site Quality and productivity of Soil

Considering the present scenario GBH for exploitation is prescribed as follows.

Table No 17.8 Harvestable Girth / Diameter of other planted species.				
Sl no	Species	Girth in cm	Diameter in cm	Remark
1	<i>Acacia auriculiformis</i> (Sunajhari)	90	29	
2	<i>Anacardium occidentale</i> (Cashew)			As long as Fruiting continues.
3	<i>Anogeissus acuminata</i> (Phashi)	180	48	
4	<i>Anthocephalus cadamba</i> (Kadamba)	150	48	
5	<i>Azadirachta indica</i> (Neem)	180	57	
6	<i>Bomax ceiba</i> (Simili)	150	48	
7	<i>Erythrina variegata</i> (Paladhua)	120	38	
8	<i>Gmelina arborea</i> (gambhari)	120	38	
9	<i>Melia azedarach</i> (Mahaneema)	120	38	
10	Fruit bearing species			As long as Fruiting continues.
11	Teak, Sisoo	120	38	

This is applicable for all plantations under Economic Plantation head, Compensatory Afforestation program and plantations raised under other schemes.

17.6.5 Reducing factors and reduced areas:

The yield from plantations will be small quantum and irregular. It will be regulated “by area only”. Hence no reduced factor is prescribed in this plan.

17.6.6 Felling cycle:

The area assigned to each Planting series will be covered within the plan period i.e. in 10 years. Hence a planting cycle / Treatment Cycle of ten years will be followed.

17.6.7 Division into Planting Section / Treatment Section:

For convenience in execution and distributed work load each Planting Series / Treatment Series is divided in to ten sections normally termed as **Coupe**. The Sections are constituted as in following table.



17.6.7.1 Keonjhar Teak Series

Table no 17.9 (i) Sections of Keonjhar Teak Series							
Name of Series	Range	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe area (Total)
Keonjhar Teak Series (KTS)	Champua	2022-23	KTS-I	Ukhunda RF		40.0	70.00
	Keonjhar			Belda RF		15.0	
	Keonjhar			Raghunathpur RF		15.0	
		2023-24	KTS-II			0	0
		2024-25	KTS-III			0	0
	Keonjhar	2025-26	KTS-IV	Jadipada RF		40.0	134.70
	Patna			Atei RF	1	34.7	
	Patna			Atei RF	2	40.0	
	Patna			Baunsuli RF		20.0	
		2026-27	KTS-V			0	0
		2027-28	KTS-VI			0	0
		2028-29	KTS-VII			0	0
		2029-30	KTS-VIII			0	0
		2030-31	KTS-IX			0	0
		2031-32	KTS-X			0	0
				Total		204.70	204.70

17.6.7.2 Bamboo Treatment Series.

Table no 17.9 (ii) Sections of Bamboo Treatment Series.(BTS): Keonjhar Division



Name of Series	Range	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe area(Total)
Bamboo treatment Series. (BTS)	Keonjhar	2022-23	BTS-I	Basantapur RF		25.00	50.00
	Champua			Kalikaprasad RF		25.00	
	Patna	2023-24	BTS-II	Padmapur RF		25.00	50.0
	Ghatgaon			Kalimati RF		25.00	
	Barbil	2024-25	BTS-III	Karo RF	10	20.00	40.00
	Barbil			Karo RF	11	20.00	
	Barbil	2025-26	BTS-IV	Karo RF	13	25.00	25.0
	Ghatgaon	2026-27	BTS-V	Kalimati RF		10.00	20.0
	Ghatgaon			Kalimati RF		10.00	
	Keonjhar	2027-28	BTS-VI	Nayagarh RF		10.00	20.00
	Keonjhar			Nayagarh RF		10.00	
	Patna	2028-29	BTS-VII	Atei RF	17	10.00	20.0
	Patna			Atei RF	21	10.00	
	Ghatgaon	2029-30	BTS-VIII	Kalimati RF		25.00	25.00
	Telkoi	2030-31	BTS-IX	Kalapat RF		60.00	60.00
	Ghatgaon	2031-32	BTS-X	Barabanka RF		25.00	25.00
		Total				335.0	335.0

17.6.7.3 Encroachment Series:

In encroachment Series **345.8947**ha has been included. It is not certain in which year, which area can be evicted. It is proposed to evict & plant about 30-40 ha of land from any block included in the series. During plan period it is expected to cover the entire encroached land under plantation. However a tentative Yearly Work Program is furnished below.

Table No 17.9(iii) Sections of Encroachment Eviction Series- Keonjhar Division.

Name of Series	Range	Year of Working	Coupe No	Forest Block	Comp. No	Area in ha	Coupe area



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							(Total)
Encroachment Eviction Series (EES)	Barbil	2022-23	EES-I	Karo RF	10	4.2525	35.4740
	B & JP			Anjar RF		0.405	
	B & JP			Saharpur RF		0.405	
	B & JP			Lunaghar-I PRF		1.3932	
	Patna			Atai RF	3	16.848	
	Champua			Bardhana RF		12.1703	
	Ghatgaon	2023-24	EES-II	Barabanka RF	14	0.81	42.8895
	Ghatgaon			Masinabila RF		4.0905	
	Ghatgaon			Nalapanga RF	1	8.3025	
	Barbil			Sidhamath RF	2	3.969	
	Barbil			Thakurani RF		0.6075	
	Telkoi			Kalapath RF	14	25.11	
Encroachment Eviction Series (EES)	Patna	2024-25	EES-III	Purunapani RF		0.4658	33.8783
	Keonjhar			Jadipada RF		33.4125	
	Champua	2025-26	EES-IV	Kalikaprasad RF	(1 st P)	25.00	37.7332
	Keonjhar			Nalapanga RF	2	4.455	
	Keonjhar			Narayanpur RF		3.2805	
	Keonjhar			Nelung RF		4.9977	
	Champua	2026-27	EES-V	Kalikaprasad RF	2 nd P	25.0	36.5912
	Telkoi			Bandhanjhari RF	1	1.7415	
	Telkoi			Benamunda RF	1	7.6748	
	Telkoi			Rekuti PRF		2.1749	
Encroachment Eviction Series (EES)	Champua	2027-28	EES-VI	Kalikaprasad RF	Bal	31.0851	35.7426
	Keonjhar			Basantapur RF		3.4425	
	Keonjhar			Maidankel RF		1.215	
	Champua	2028-29	EES-VII	Pedipokhari RF		1.215	32.4503
	Champua			Ukhunda RF		0.81	
	Ghatgaon			Atai RF	12 P1)	30.0	
	Keonjhar			Raikala RF		0.4253	
	Ghatgaon	2029-30	EES-VIII	Atai RF	12(P2)	30.0	30.00
	Ghatgaon	2030-31	EES-IX	Atai RF	12(B)	15.7958	35.7878
	Keonjhar			Belda RF		19.992	
	Keonjhar	2031-31	EES-X	Barabanka RF	15	2.835	25.3478
	Keonjhar			Tangarani RF		0.2228	
	Keonjhar			Belda RF		15.0	
	Champua			Baitarani-A RF		6.48	
	Champua			Jyotipur RF		0.81	



				Total		345.8947	345.8947

17.6.7.4 Village Woodlot Series:**(i) BJP VW Series**

Table No 17.9 (iv) Sections of BJP VW Series: Keonjhar Division.						
Name of Series	Range	Year of Working	Coupe No	Forest Block	Area in ha	Coupe area (Total)
BJP VW Series	B & JP	2022-23	BVW-I	Khuntakata	10.000	10.00
		2023-24	BVW-II	Lunaghar	5.00	11.4480
				Jaladiha	5.280	
				Gopapur	1.168	
		2024-25	BVW-III	Kushakala	11.310	11.310
		2025-26	BVW-IV	Khajurimundi	10.000	10.00
		2026-27	BVW-V	Balarei	5.220	5.220
		2027-28	BVW-VI	Anklpada	5.000	5.0
		2028-29	BVW-VII	Suakati	5.000	15.00
				Karandadihi	10.000	
		2029-30	BVW-VIII	Baitarani Pahada	10.000	10.0
		2030-31	BVW-IX	Kanengadihi	10.000	15.0
				Taramakanta	5.000	
		2031-32	BVW-X	Sagapada	10.580	10.580
			Total		103.558	103.558

(ii) Barbil- Ghatgaon VW Series

Table No 17.9(v) Sections of Barbil- Ghatgaon VW Series: Keonjhar Division.						
Name of	Range	Year of	Coupe No	Forest Block	Area in	Coupe



Series		Working			ha	area (Total)
Barbil- Ghatgaon VW Series	Barbil	2022-23	GVW-I	Kudapi	5.736	5.736
	Ghatgaon	2023-24	GVW-II	Patabari	3.36	3.36
	Ghatgaon	2024-25	GVW-III	Dinabandhupur	4.640	4.640
	Ghatgaon	2025-26	GVW-IV	Adakata	0.468	0.468
	Ghatgaon	2026-27	GVW-V	Kalimati(P)	5.00	5.00
	Ghatgaon	2027-28	GVW-VI	Kalimati(B)	6.46	6.46
	Ghatgaon	2028-29	GVW-VII	Dhogotha(P)	4.5	4.5
	Ghatgaon	2029-30	GVW-VIII	Dhogotha(B)	4.35	4.35
	Ghatgaon	2030-31	GVW-IX	Jamujodi	6.650	6.650
	Ghatgaon	2031-32	GVW-X	Jhadpokhari	5.540	5.540
				Total	46.704	46.704

(iii) Champua VW Series

Table No 17.9(vi) Sections of Champua VW Series: Keonjhar Division

Name of Series	Range	Year of Working	Coupe No	Forest Block	Area in ha	Coupe area (Total)
Champua VW Series	Champua	2022-23	CVW-I	Mangalapur	5.5	39.663
	Champua			Maheswarpur	5.5	
	Champua			Ghodaposi	5.008	
	Champua			Hanjiposi	5.6	
	Champua			Remuli	5.3	
	Champua			Gambharia	6.675	
	Champua			Mukundapur	6.08	
	Champua					
Champua VW Series	Champua	2023-24	CVW-II	Maudi	5.24	41.094
	Champua			Mangalapur	5	
	Champua			Sadangi	5.12	
	Champua			Ukhunda	5	
	Champua			Sabakdhanurjayapur	5	
	Champua			Arsala	6.268	
	Champua			Chelianal	4.772	
	Champua			Baria	4.694	
	Champua					
Champua VW Series	Champua	2024-25	CVW-III	Gidhibas	10.516	39.524
	Champua			Asanpat	3.548	
	Champua			Manoharpur	7.248	
	Champua			Hastinapur	3.71	



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	Champua			Chakulia	5.284	
	Champua			Sankarpur	3.468	
	Champua			Ankudi	5.75	
Champua VW Series	Champua	2025-26	CVW-IV	Sundhimarusuan	2.12	38.808
	Champua			Kasipal	0.864	
	Champua			Nishagadia	9.168	
	Champua			Pokharia	5.248	
	Champua			Kashipal	3.444	
	Champua			Durukulia	5.6	
	Champua			Bala	4.3	
	Champua			Godhuli	0.44	
	Champua			Sunaposi	7.624	

Champua VW Series	Champua	2026-27	CVW-V	Katulikana	4.1	39.230
	Champua			Guludiposi	4.308	
	Champua			Bhanda	5.4	
	Champua			Purudiposi	5	
	Champua			Sirikuan	5.17	
	Champua			Nishagadia	5.02	
	Champua			Khuntapada	5.032	
	Champua			Rajia	5.2	
Champua VW Series	Champua	2027-28	CVW-VI	Maheswarapur	2.62	39.684
	Champua			Sadangi	5.02	
	Champua			Dakuaposi	6.044	
	Champua			Kanchandumuria	7.2	
	Champua			Bichitranandapur	8.8	
	Champua			Katuilikana	10	
Champua VW Series	Champua	2028-29	CVW-VII	Parbatipur	5.000	35.00
	Champua			Talakanda	10.0	
	Champua			Jamudalka	0	
	Champua			Durgapur	20.0	
Champua VW Series	Champua	2029-30	CVW-VIII	Mangalpur, Mathhurapur, Sankarpur	25	40.72
	Champua			Rajabasa	10	
	Champua			Tentala	4.92	
	Champua			Gambharia	0.8	
Champua	Champua	2030-31	CVW-	Tunutuna	5	39.064



VW Series	Champua		IX	Murusuan	7	
	Champua			Mahadevpur	10	
	Champua			Parbatipur	5.004	
	Champua			Dudukundi	5	
	Champua			Barkhandia	7.06	
Champua VW Series	Champua	2031-32		Bidyadharpur	1.268	35.192
	Champua			Asuki	11.68	
	Champua			Patalaposi	4.568	
	Champua			Sarei	0.68	
	Champua			Urti	5.4	
	Champua			Kalinga	4.536	
	Champua			Kendua	2.06	
	Champua			Rajia	5.0	
				Total	387.979	387.979

(iv) Keonjhar VW Series

Table No 17.9(vii) Sections of Keonjhar VW Series: Keonjhar Division						
Name of Series	Range	Year of Working	Coupe No	Forest Block	Area in ha	Coupe area (Total)
Keonjhar VW Series	Keonjhar	2022-23	KVW-I	Totagaon	5	19.377
	Keonjhar			Jajaposi	5.1	
	Keonjhar			Sunatangiri	5	
	Keonjhar			Nudurpada	2.316	
	Keonjhar			Dhanabeni	1.961	
	Keonjhar	2023-24	KVW-II	Gohjitangiri	7	21.90
	Keonjhar			Haladharapur	3.9	
	Keonjhar			Nuabeda	6.00	
				Gopalabandhu-Kainsi		
	Keonjhar				5.00	
Keonjhar VW Series	Keonjhar	2024-25	KVW-III	Kathakaranja	5.108	22.208
	Keonjhar			Baliabeda	0.4	
	Keonjhar			Haladharapur	5.10	
	Keonjhar			Khadiadiha	5.20	
	Keonjhar			Keri	6.40	
	Keonjhar	2025-26	KVW-IV	Kathabaunsuli	4.00	19.26
	Keonjhar			Kempasoda	5.10	
	Keonjhar			Mathuramunduli	0.08	



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	Keonjhar			Kendua	10.08	
Keonjhar VW Series	Keonjhar	2026-27	KVW-V	Padmapur	0.12	21.46
	Keonjhar			Nuagaon	5.1	
	Keonjhar			Nuagaon (Mundasahi)	5.12	
	Keonjhar			Tarakakhaman	5.12	
	Keonjhar			Kathabaunsuli	6.00	

Keonjhar VW Series	Keonjhar	2027-28	KVW-VI	Upardiha	4.8	21.28
	Keonjhar			Dungurisahi	5.1	
	Keonjhar			Nuabeda	5.2	
	Keonjhar			Kainsi	5.6	
	Keonjhar			Sahadapur	0.58	
Keonjhar VW Series	Keonjhar	2028-29	KVW-VII	Kamposoda	0.3	20.675
	Keonjhar			Bijenitangar	5.2	
	Keonjhar			Bhanua	4.228	
	Keonjhar			Nuasahi	5.147	
	Keonjhar			Dhanabeni	5.8	
Keonjhar VW Series	Keonjhar	2029-30	KVW-VIII	Baidanda	5.392	23.392
	Keonjhar			Budapalasa	8.0	
	Keonjhar			Jirang	10.0	
	Keonjhar	2030-31	KVW-IX	Mathuramunduli	5.04	25.030
	Keonjhar			Sirishpal	7.85	
	Keonjhar			Atibudhipada	5.02	
	Keonjhar			Dimiribahal	7.12	
Keonjhar VW Series	Keonjhar	2031-32	KVW-X	Ostaponga	11.32	26.62
	Keonjhar			Karanjia	5.00	
	Keonjhar			Padmapur	10.3	
				Total	221.2020	221.2020

(v) Patna –I VW Series

Table No 17.9(viii) Sections of Patna –I VW Series: Keonjhar Division						
Name of Series	Range	Year of Working	Coupe No	Forest Block	Area in ha	Coupe area (Total)



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Patna –I VW Series	Patna	2022-23	PVW-I	Silapada	5.248	23.972
	Patna			Kuaposi	6.252	
	Patna			Tainsira	8.80	
	Patna			Nuapada	3.672	
	Patna	2023-24	PVW-II	Sanajamuposi	3.608	22.296
	Patna			Sabanalibeda	10.132	
	Patna			Tendera	8.556	
	Patna	2024-25	PVW-III	Lunga	3.848	22.064
	Patna			Balibandha	3.452	
	Patna			Maliposi	2.22	
	Patna			Saraskela	9.856	
	Patna			Kuaposi	2.036	
	Patna			Guludiposi	0.652	
Patna –I VW Series	Patna	2025-26	PVW-IV	Patanali	7.512	22.380
	Patna			Rengalbeda	6.90	
	Patna			Nuakhaman	3.14	
	Patna			Aharapada	2.084	
	Patna			Aharapada	2.744	
	Patna	2026-27	PVW-V	Barigaon	11.96	21.96
	Patna			Bhalupahadi	5.0	
	Patna			Bhuduripali	5.0	
	Patna	2027-28	PVW-VI	Daxinaposi	5.0	23.22
	Patna			Kashipur	10.0	
				Chhatarapani (Barabeda)	7.0	
	Patna			Dendra	1.22	
Patna –I VW Series	Patna	2028-29	PVW-VII	Mahisamundi	21.0	23.272
	Patna			Gojitangiri	2.272	
	Patna	2029-30	PVW-VIII	Gojitangiri	4.0	25.994
	Patna			Tangarapada	3.0	
	Patna			Barabeda	3.358	
	Patna			Kakharuabeda	15.636	
	Patna	2030-31	PVW-IX	Jharbeda	20.064	20.064
	Patna	2031-32	PVW-X	Tentala	10.008	24.498
	Patna			Sarasposi	4.20	
	Patna			Katupada	5.29	
	Patna			Denua	5.00	
			Total		229.720	229.720

**(Vi) Patna –II VW Series**

Table No 17.9(ix) Sections of Patna –II VW Series: Keonjhar Division						
Name of Series	Range	Year of Working	Coupe No	Forest Block	Area in ha	Coupe area (Total)
Patna –II VW Series	Patna	2022-23	P2V-I	Atharanalisahi	5.14	23.880
	Patna			Chaturisahi	5.18	
	Patna			Bholapada	0.02	
	Patna			Chhatarapani	4.67	
	Patna			Digiposi	2.65	
	Patna			Telipada	6.22	
	Patna	2023-24	P2V-II	Ankura	5.768	26.2510
	Patna			Barabeda	9.003	
	Patna			Kiapada	11.48	
Patna –II VW Series	Patna	2024-25	P2V-III	Kendeiposi	20.88	23.540
	Patna			Kumudabahali	2.66	
	Patna	2025-26	P2V-IV	Sialijoda	5.059	24.4570
	Patna			Khuntapada	5.35	
	Patna			Nischintapur	3.728	
	Patna			Tando	5.008	
	Patna			Purunapani	5.312	
	Patna	2026-27	P2V-V	Banamahuladiha	2.648	23.228
	Patna			Dianali	4.648	
	Patna			Dasharathapur	5.112	
	Patna			Madhubanasahi	5.368	
	Patna			Dhuliasahi	5.452	
Patna –II VW Series	Patna	2027-28	P2V-VI	Jamunaposi	0.988	23.254
	Patna			Hatibari	5.148	
	Patna			Tentela	5.4	
	Patna			Duaghata	4.666	
	Patna			Tavasaru	1.156	
	Patna			Dsihigudasahi (Kumudabahali)	5.896	
	Patna	2028-29	P2V-VII	Golasahi (Jamunaposi)	3.472	25.672
	Patna			Bhrungarajposi	4.008	
	Patna			Mursuan	8.192	
	Patna			Godhisahi	10.0	



	Patna	2029-30	P2V-VIII	Jamunaposi	10.0	20.00
	Patna			Mangalpur	5.0	
	Patna			Tavasarua	5.0	
	Patna	2030-31	P2V-IX	Erendei	13.0	23.0
	Patna			Nischintapur	10.0	
	Patna	2031-32	P2V-X	Budhikapudi	0.002	22.982
	Patna			Tavasarua	20	
	Patna			Kantiapada	2.98	
			Total		236.264	236.264

(vii) Telkoi VW Series:

Table No 17.9(x) Sections of Telkoi VW Series: Keonjhar Division						
Name of Series	Range	Year of Working	Coupe No	Forest Block	Area in ha	Coupe area (Total)
Telkoi VW Series	Telkoi	2022-23	TVS-I	Saleikana	5.05	5.05
	Telkoi	2023-24	TVS-II	Dimiria	5.23	5.23
	Telkoi	2024-25	TVS-III	Koiisuta	10.526	10.526
	Telkoi	2025-26	TVS-IV	Kalima	6.56	6.56
	Telkoi	2026-27	TVS-V	Golabandha	0.19	6.34
				Bhimkand	5.17	
				Sikulabahal	0.98	
	Telkoi	2027-28	TVS-VI	Saruali	5.48	5.48
	Telkoi	2028-29	TVS-VII	Siribahal	5.52	5.52
	Telkoi	2029-30	TVS-VIII	Tangurubahal	5.0	5.0
	Telkoi	2030-31	TVS-IX	Tangurubahal	5.76	5.76
	Telkoi	2031-32	TVS-X	Patatangara	11.76	11.76
			Total		67.226	67.226

17.6.7.5 Protected Forest (tending) Series:

(i) Keonjhar PFT Series

Table No 17.9(xi) Sections of Keonjhar PFT Series						
Name of	Range	Year of	Coupe	Forest Block	Area in ha	Coupe area



Series		Working	No			(Total)
Keonjhar PFT Series	BJP	2022-23	PFT-I	Anasuan	44.321	104.9469
	BJP			Anasuan(A)	0.1959	
	BJP			Benidihi	22.1	
	BJP			Benidihi(A)	38.33	
	BJP	2023-24	PFT-II	Jantari	22.839	109.6920
	BJP			Jatra	14.363	
	BJP			Kadalibadi	43.89	
	BJP			Tentuli	28.6	
	BJP	2024-25	PFT-III	Jatra	117.96	117.96
	BJP	2025-26	PFT-IV	Kalanda (Kha)	94.497	125.905
	BJP			Lungajhar(i)	31.408	
	BJP	2026-27	PTF-V	Kendughati	39.505	81.914
	BJP			Lungajhar	32.719	
	BJP			Sikulapada	9.69	
	BJP	2027-28	PTF-VI	Sukodola	85.55	185.55
				Tentulikhunti (P)	100.0	
	BJP	2028-29	PTF-VII	Sukodola(1 st P)	116.0	116.0
	BJP	2029-30	PTF-VIII	Sukodola(2 nd P)	116.0	116.0
	BJP	2030-31	PTF-IX	Sukodola (B)	116.01	116.01
	BJP	2031-32	PTF-X	Tentulikhunti (B)	187.07	187.07
			Total		1261.0479	1261.0479

17.6.7.6 Protected Forest (Planting) Series:

(ii) Keonjhar PFP Series

Table No 17.9(xii) Sections of Keonjhar PFP Series



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Name of Series	Range	Year of Working	Coupe No	Forest Block	Area in ha	Coupe area (Total)
Keonjhar PFP Series	BJP	2022-23	PFP-I	Anasuan	55.084	119.4160
	BJP			Tana	64.332	
	BJP	2023-24	PFP-II	Tentulikhunti	45.322	104.7740
	BJP			Champajhar	31	
	BJP			Champajhar	2.45	
	BJP			Champajhar	2.5	
	BJP			Champajhar(A)	20.362	
	BJP			Champajhar-B	3.14	
	BJP	2024-25	PFP-III	Dhaladihi	159.97	159.97
	BJP	2025-26	PFP-IV	Fhuljhar-C	24.6	163.4320
	BJP			Guptaganga	38.905	
	BJP			Lungajhar-A	15.277	
	BJP			Phuljhar-D	34.65	
	BJP			Baragoda (1 st P)	50.0	
	BJP	2026-27	PFP-V	Podadihi	120.84	170.84
	BJP			Baragoda (2 nd P)	50.0	
Keonjhar PFP Series	BJP	2027-28	PFP-VI	Raidiha(A)	20.32	187.306
	BJP			Tala Baitarani	13.48	
	BJP			Baragoda (3 rd P)	76.30	
	Champua			Chhatia	59.7082	
	Telkoi			Kaliapani	13.7978	
	Telkoi			Rangamatia	3.7	
	Champua	2028-29	PFP-VII	Kaliapal (P)	85.0	150.918
	BJP			Upparabirikala-i	3.228	
	BJP			Upparabirikala-ii	12.6900	
	BJP			Baragoda (3 rd P)	50.0	
	Champua	2029-30	PFP-VIII	Kasia	7.622	122.415
	Champua			Kaliapal	80.793	
	Telkoi			Dandargauni	34.0	
	Champua	2030-31	PFP-IX	Kasia	105.396	105.396
	Keonjhar	2031-32	PFP-X	Hunda	82.5560	132.5560
	BJP			Baragoda (B)	50.0	
				Total	1417.0230	1417.0230



17.6.7.5 Abstract of Sections (Annual Working Area Allotted)

Table No 17.10 Annual Working area assigned in Ha- Keonjhar Division)

Series	Year										
	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	Total
KTS	70.0	0	0	134.70	0	0	0	0	0	0	204.70
BTS	50.0	50.0	40.0	25.0	20.0	20.0	20.0	25.0	60.0	25.0	335.0
EES	35.474	42.8895	33.8783	37.7332	36.5912	35.7426	32.4503	30.0	35.7878	25.3478	345.8947
BJP											
VW	10.0	11.448	11.31	10	5.22	5.0	15.0	10.0	15.0	10.58	103.558
BGVW	5.736	3.36	4.64	0.468	5.	6.46	4.5	4.35	6.65	5.54	46.704
CVW	39.663	41.094	39.524	38.808	39.23	39.684	35	40.72	39.064	35.192	387.979
KVW	19.377	21.9	22.208	19.26	21.46	21.28	20.675	23.392	25.03	26.62	221.202
PVW	23.972	22.296	22.064	22.38	21.96	23.22	23.272	25.994	20.064	24.498	229.72
P2VW	23.88	26.251	23.54	24.457	23.228	23.254	25.672	20.0	23.0	22.982	236.264
TVS	5.05	5.23	10.526	6.56	6.34	5.48	5.52	5	5.76	11.76	67.226
KPFTS	104.9469	109.6920	117.9600	125.9050	81.9140	185.5500	116.0000	116.0000	116.0100	187.0700	1261.048
KPFPS	119.4160	104.7740	159.9700	163.4320	170.8400	187.3060	150.9180	122.4150	105.3960	132.5560	1417.0230
S. Total	507.5149	438.9345	485.6203	608.7032	431.7832	552.9766	449.0073	422.871	451.7578	507.1458	4856.3186
No series (Misc. Plantation)											2055.358
Village Forest (Natural)											1322.688
Total of Plantation WC											8234.3647



17.6.8 Calculation of the yield:

The areas allotted to this working circle are planted up area, encroached land. The plantations are to be thinned out to put diameter growth. Plantations those are above 30 years are expected to yield poles / materials of utility and have a market. Saleable material from Teak thinning is also not expected as the plantations are of 15 years old only. From Village wood lots Timber @ 7.5 Cum per ha, Fire wood @10 T per ha is expected. From PF series no saleable material is expected.

Table No 17.11 Annual Yield Estimation- Sambalpur Division)

Series	Year										
	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	Total
BJP											
VW	10.0	11.448	11.31	10	5.22	5.0	15.0	10.0	15.0	10.58	103.558
BGVW	5.736	3.36	4.64	0.468	5.	6.46	4.5	4.35	6.65	5.54	46.704
CVW	39.663	41.094	39.524	38.808	39.23	39.684	35	40.72	39.06	35.192	387.979
KVW	19.377	21.9	22.208	19.26	21.46	21.28	20.675	23.392	25.03	26.62	221.202
PVW	23.972	22.296	22.064	22.38	21.96	23.22	23.272	25.994	20.064	24.498	229.72
P2VW	23.88	26.251	23.54	24.457	23.228	23.254	25.672	20.0	23.0	22.982	236.264
TVS	5.05	5.23	10.526	6.56	6.34	5.48	5.52	5	5.76	11.76	67.226
Sub Total	127.6780	131.5790	133.8120	121.9330	122.4380	124.3780	129.6390	129.4560	134.5640	137.1720	1292.6530
Timber @7.5 cum	957.585	986.8425	1003.59	914.4975	918.285	932.835	972.2925	970.92	1009.23	1028.79	9694.898
FW @10.0 T/ ha	1276.78	1315.79	1338.12	1219.33	1224.38	1243.78	1296.39	1294.56	1345.64	1371.72	12926.53

Yield during plan period: i) Total Timber: 9694.898 Cum, ii) Firewood: 12926.53



17.6.9 Table of felling/ treatment:

Table of annual felling / treatment is furnished at Table No 16.23. The corresponding details of forest blocks and extent of area has been described in the Para 17.6 above.

17.6.10 Method of executing the Felling / Planting & tending:

17.6.10.1 For Teak Plantations / Economic Plantations

- i) **Demarcation of Area:** The plantation area for treatment is required to be re demarcated in the assigned year of operation. Simple Coal tar ring on trees standing on boundary is suggested.
- ii) **Inspection & Report:** The plantation area is to be thoroughly inspected by the Section Forest and Forest Guard. After inspection required Silvicultural operation is to be suggested. Operations are cleaning in Sapling Stage (Plantation within 5 years of age). In case of plantations more than 5 years thinning can be suggested. Thinning regime for all teak plantations / Economic Plantations/ Compensatory Afforestation raised since 1983 onwards is on 8th Year, 16th Year, 32nd Year, 48th Year, 64th Year, 80th Year and final harvest on 100th Year. (Rotation period: 100 year)
- iii) **Thinning Grade to be suggested:** On 8th Year first thinning is suggested which is Mechanical thinning. Observing the Ground reality a modified Mechanical thinning is suggested. In this thinning Mechanical thinning will be carried out with a bend to retain promising stems. 2nd and 3rd thinning will be of C grade to D grade thinning i.e. light to moderate thinning. From 4th and onward, thinning consideration is of putting diameter growth, removal of utilizable trees / poles without lasting gap. Mostly Elite thinning principle is to be adopted. Trees attaining exploitable Girth i.e. 120cm and above are to be removed and it will be of **Heavy to very heavy thinning**. Marking for thinning is strictly to be done by Range Officers and to be checked by Asst. Conservator of Forests. In case of Plantations having survival less than 40 % no thinning is to be carried out as the number of stems per ha is not above the standard stem table for the area in a particular age class.
- iv) **Retention of Natural Vegetation:** In some Plantations, Natural vegetation has come up. Sal, Asan and other prominent associates like Kendu, Bahada, Chara etc are coming up due to protection of the area. During Thinning these species are to be considered and retained as practicable.



- v) **Stems to be retained:** The number of stems that can be sustained by the land depends on its quality on Soil and moisture regime. The number of stems that is to be retained has been discussed at Para 17.6.1

17.6.10.2 For Social Forestry Plantation (VWL Series):

a) Consultation with VSS / VFC:

Prior to taking of Operation like demarcation, marking etc, the VSS / VFC is required to be consulted, if the area is assigned to VSS/ VFC. The process of harvesting and restocking is to be explained. The mechanism of Usufruct Sharing is to be decided and resolution to be passed to that effect. Sharing of produce either in monetary term or in kind to be specifically discussed & decided. In case of Village Forest the working cost is required to be adjusted against sale value / royalty of the produce so obtained. Voluntary contribution of labour by villagers for operations may also be examined to reduce the cost of operation. After harvesting, the planting modality is also to be discussed at length.

b) Demarcation of Area:

In case of Village Forests, the area / boundary is not demarcated on ground. It is required to demarcate the Village Forest as notified with the help of Revenue personal in presence of VFC Members. RCC pillars of 20cm x 20cm x 120cm may be posted to keep the boundary line visible permanently. In all cases, the entire block is assigned for working in a single year; in that case only boundary line is of importance. This demarcation process is to start at least from April- May of previous year. For keeping the boundary line naturally demarcated, it is proposed to put Palm Seeds on the boundary at an interval of 5 meters which will grow to a tree within 5 years. In the VF notification in many cases Plot no etc pertains to Sabik Settlement. The corresponding Hal (Major) Settlement records / maps required to be procured and record updated.

c) Selection of Standard Trees:

As the system to be followed is “**Clear Felling with Standard**”, it is required to mark the standards initially. The criteria for selection of standards in general are furnished below.

- Timber species of greater importance,
- Fruit bearing trees like Mango, Jack Fruit, Barkoli (Zyziphus), Palm, Cashew,
- Any Plus tree suitable for seed collection for raising plantations,
- Any trees associated with sentiments of local villagers are to be retained as standard.



- All trees required for chariot constructions (Shree Jagannath Temple / Shree Lingaraj Temple)

The number of Standard trees per hectare shall not be less than 25 and more than 75. A list of Standard Trees to be prepared and will be a part of Compartment History File. The information may be recorded in a standard format.

Suggested format:

1. Name of Range:
2. Name of Forest Block / Coupe:
3. Area under marking in Ha:
4. Year of Marking:
5. Name of Marking Officer & Designation.

List of Standard Trees selected for retention					
Sl No	Name of Species	GBH in cm	Latitude / Longitude	Crown width in meter	Remark
				Signature of Marking Officer.	

d) Marking of trees for felling:

After selection of Standard trees, all remaining trees above 30cm GBH are marked for felling. However marking on sensitive areas, the following marking rules are to be followed.

- i) Trees near to perennial nala / river banks to a width of 40m measured from High Flood level are not to be marked.
- ii) Tree on which bird's nests is observed is to be retained.
- iii) Trees having cavity, suitable for nocturnal birds habitation up to five numbers per hectares is to be retained.
- iv) Trees on rocky surface / above 30° slope / high erosion prone area are not to be marked for felling.

Marking should be taken up by the section forester and to be checked by the Range Officer minimum up to 20% of marked trees. The marking list is to be prepared in quadruplicate in standard format with a standard estimate of timber and fire wood production. Marking is to be done in February / March of previous year to year of working.



e) Delivery of Coupes for Harvesting:

The Coupe are to be delivered to OFDC Ltd for harvesting and marketing thereof. In case the VSS /VFC is willing to participate in harvesting operation, they may be engaged by OFDC Ltd for felling / logging & conversion operation. The Coupe working may be allowed normally for nine months. Any extension of working period may be allowed as per administrative instruction / Odisha Forest Contract Rules, 1966.

The VSS / VFC may take up the harvesting operation as the yield expected will not be economical to OFDC Ltd. In that case, the removal of trees and sharing will be under supervision of Range Officer / Forest Department.

f) Felling of trees & Removal thereof:

The marked trees may be felled, converted and removed as per modern logging practices and the Odisha Timber and Other forest produce transit Rules, 1980 and up to date amendments thereof. The provisions of Odisha Village Forest Rules, 1985 and amended there after is also to be followed. The trees felled by axe and saw do not produce coppice shoots. As most of the species are good coppice, it is suggested to fell the trees with axe only. Subsequent logging may be taken up by saw or as convenient to OFDC Ltd / VFC as per modern logging practices.

g) Sharing of Produce in case of VSS / VFC area:

Sharing of forest produce, in case of VSS area will be regulated as per **Para 11 of Joint Forest Management Resolution, 2011**. In case of village Forests, the sharing of forest produce will be regulated as per **Rule 9 of the Odisha Village Forest Rules, 1985**.

h) Surrender of Coupe Area:

After harvesting the marked trees and removal thereof, the Coupe area shall be surrendered by OFDC Ltd as soon as possible so as to take subsidiary silvicultural operation / planting activities on the same area. In case of harvesting by VFC, preliminary operation for planting may be taken up simultaneously.

17.6.11(a) Cleaning:

As the silvicultural system adopted is clear felling, the cleaning operation involves

- Removal of debris from the coupe and either buried under ground with a purpose to allow left over materials decompose and enrich soil organic content.
- Fell & Remove the marked trees, if not removed by the OFDC Ltd.
- Remove all weeds by cutting mechanically.
- Make the coupe area suitable for taking up plantation.



17.6.11(b) Thinning:

In the coupe area, if any advance growth is left unmarked / not removed for any consideration and the advance growth is at pole stage, it is required to take up thinning. In this case no thinning will be required as the felling cycle is ten year and clear felling with standard system is adopted.

17.6.12 Regeneration:

The assigned area is to be restocked through Artificial Regeneration i.e. by planting of seedlings with adequate Soil & Moisture Conservation measures.

17.6.12.1 Survey, demarcation, site preparation, alignment & stacking:

The assigned area has been well demarcated and pillars posted during coupe marking and described under **Para 16.6.10.1(b)**. In case of Block plantation @1600 trees per hectare spacing of 2.5mx2.5m is to be adopted. The approved cost norm is to be followed.

17.6.12.2 Pitting:

The areas under consideration are mostly of gravelly /alluvial soil. As per instructions all seedlings of 18month old is required to be planted. A pit size of 45cmx45cmx45cm is recommended. Though pitting is generally carried out during January- March, there is possibility of refilling of pits during pre-monsoon due to rain water. It is normally recommended to carryout pitting in March- May and allows weathering at least for one month before planting.

17.6.12.3 Choice of Species & Nursery:

It is recommended to plant species matching to the vegetation of the forest. Government has also suggested not to plant Acacia, Eucalyptus, Sana Chakunda, Teak in natural forests. As this area is under VF, the choice of species depends upon VFC Resolution and local requirements. Some timber species required for chariot construction is to be planted (Atleast upto 15%) of the planted seedlings. The other species recommended are

- i) *Azadirachta indica*
- ii) *Anogeissus latifolia* (Dhaura),
- iii) *Bahunia purpuria* (Kanchan),
- iv) *Bahunia Vahilii* (Siali),
- v) *Bombax ceiba* (Simili),
- vi) *Dalbergia Sisoo* (Bali Sisoo),
- vii) *Dalbergia latifolia* (Pahadi Sisoo),
- viii) *Embllica occicinalis* (Anla),
- ix) *Erithrina indica / suberosa* (Paladhua),



- x) *Gmelina arborea* (Gamhar),
- xi) *Melia azadirachta* (maha neema),
- xii) *Samania saman* (Bada chakunda,
- xiii) *Syzygium cumini* (Jamu),
- xiv) *Terminalia tomentosa* (Asan)

Nursery for required species and number may be raised in permanent nursery or in a temporary nursery as convenient. The standard nursery technique found in any silviculture text or standard practices may be followed. The recommended height of seedling before planting is 125cm in case of 18 month old seedlings. For seed collection & use, plus trees available in the locality or brought from known source of origin may only be utilized. Unknown source should be strictly avoided to have a better plantation.

17.6.12.4 Planting:

Planting of seedlings shall be taken up during last week of June / 1st week of July. During planting, application of Chemical fertilizer is recommended at sites away from water sources. Near water source application of FYM / Organic fertilizer is recommended. In no case chemical insecticides should be applied.

After planting following Post care is recommended.

a) Causality Replacement.

After planting, some planted seedlings may get damaged. These dead / defective seedlings are required to be replaced within 15 days of planting or as soon as possible with better seedlings.

b) Weeding & Soil Working:

After 30 days of planting, the planted seedlings start bearing new leaf. From 30 days to 45 days soil working around the plant along with application of fertilizer is recommended. Weeding around the plant i.e. patch weeding is to be taken up. In case of area with heavy weeds or grasses strip weeding proves beneficial. Number of weeding in a year may be decided as per cost norm provisions. Two weeding in 1st year is always prescribed.

c) Mulching:

In sandy / refractory soil mulching by grasses from February to June helps in retaining soil moisture. Hence it is recommended in case of sand or refractory soil with complete open areas.



d) Fire Protection / watch & ward:

Fire protection measures and watch & ward against grazing are strictly to be implemented.

17.6.12.5 Soil & Moisture Conservation:

To improve the vegetation and ensure a good plantation role of Soil & Moisture Conservation is crucial. As the selected site is mostly of degraded soil, it is recommended to have contour bonding, percolation pits, contour trenches and half moon trench in all plantations within cost norm provided. In case of eroded soil, gully plugging is also to be executed on priority.

17.6.12.6 For Protected Forests Series:

The area assigned is of area alienated in favour of Forest department for Compensatory afforestation. The planting can be taken up after receipt of funds from CAMPA Head. Steps required to be taken to obtain funds prior to assigned year. The plantations will be as per approved Compensatory Afforestation Scheme. There are sites which have been planted up. In these sites appropriate thinning is to be carried out as suggested under teak plantations.

17.6.12.7 Treatment to VF (Natural) Forest:

The natural forests declared as Village forest are in small area and mainly of sal crop. The Village forests have been maintained to provide small timbers / Firewood etc as and when required. No Joint Management plan has been prepared. The following guidelines are to be followed.

- a) The VFC is to regularly meet and assess any requirement of Timber / Fire wood of the villagers arising due to any calamity / Social need etc.
- b) The requirement is to be passed in the VFC executive Meeting and proceeding submitted to Range Officer concerned and DFO Keonjhar.
- c) The Range officer will visit the forest and find out possibility / ways to meet the requirement from the Village Forest.
- d) Tree required only to be removed in presence of Forestes/ Forest Guards as per directions of the range Officers.
- e) To improve growth status thinning principle can be adopted so as to meet the requirement as well as thinning for improvement.
- f) The forest floor is observed to be devoid of under growth. Steps may be taken to open canopy to a lighter degree to allow regeneration to come up.
- g) Soil & Moisture conservation may be taken up by VFC to improve the condition.
- h) In case of blank areas more than 1.0 ac, it may be covered up by seed sowing / tree planting by VFC. Only seedlings can be provided by the department.



17.6.13 Associated Regulations and Measures:

In case of plantations the plantation journal, Nursery journal is to be maintained. The details of operation, yield, year of working etc along with the photographs are to be recorded / placed in the Compartment history. Each plantation site may be given a Identification number to be maintained at Division level for ease identification.

17.6.13.1 Grazing:

The area planted is to be closed to Grazing for at least for 3 years. The VFC / VSS may be allowed to cut and take grasses from plantations to encourage stall feeding.

17.6.13.2 Map on Topo Sheet:

The planted up area is required to be marked / depicted on Survey of India topo map either 1:50000 scale of 1:25000 scale for future management and next plan preparation.

17.6.13.3 Plantation Control Form:

After completion of planting, a plantation control form is required to be submitted by the Range Officer to regulate activities as per Working Plan prescription.

Table No 17.12 Plantation Control Form No-3						
Name of Planting Series	Year of Working	Area assigned in ha	No of Standard Trees marked	Quantum of Timber / F.W obtained	Area actually planted up	Reason of Deviation if any.





CHAPTER- 18

PROTECTION WORKING CIRCLE (PR.WC)

18.1 Name of working circle:

River Baitarani has originated from Gonasika area of BJP Range in Keonjhar Division. Barbil and Champua range are normally drains to Baitarani. The origin of river is proposed to be under protection to make to origin undisturbed.

With this back ground it is proposed to constitute a Protection Working circle with **“No Activity Zone”** except **Soil & Moisture Conservation** activities, if so warranted in passage of time. The total area assigned to this Working Circle is **448.3916** ha which is about 0.31% of the forest area under Management.

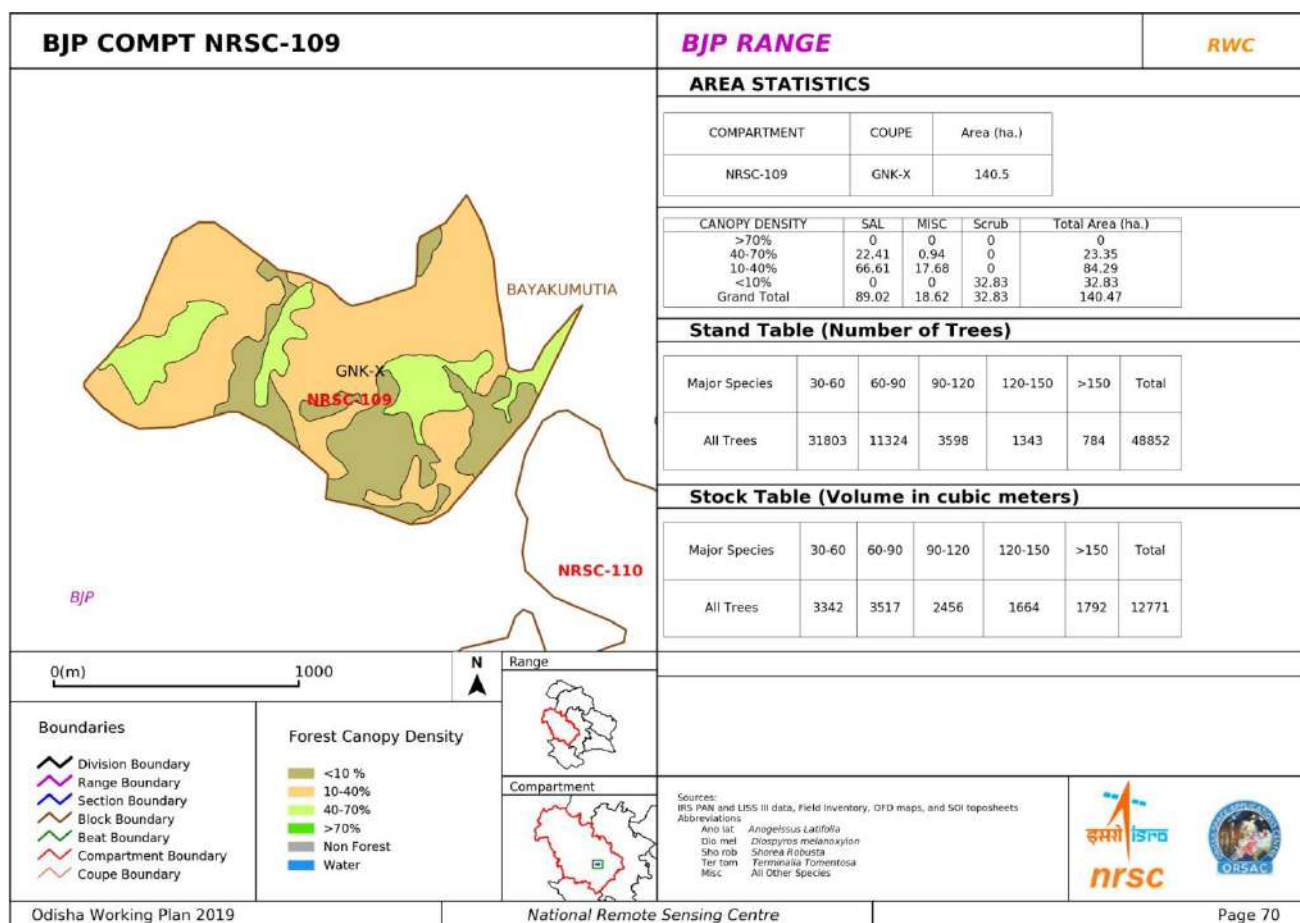
18.2 General constitution of working circle:

The forest blocks desired to be protected and included in this working Circle is at table No 18.1 below.

Table no 18.1 Constitution of working circle					
Sl No	Range	Name of the Forests	Notified / GIS Area	Area under Working Plan	Protection W.C.
1	B & JP	Bayakumutia PRF	118.0045	118.0045	114.0045
2	B & JP	Gonasika PPF	334.3871	334.3871	334.3871
	Total		452.3916	452.3916	448.3916

18.3 General characteristics of vegetation:

The vegetation is fairly Sal Forests to Mixed Forests. Previously it was in Rehabilitation Working circle. As it is felt to keep the River Orgins on disturbed, it has been included in the Protection Working Circle.



**18.4 Treatment series / sections and JFM areas:**

For better management & protection of these forests, forests coming within a range jurisdiction are considered as a Treatment Series. Only one series i.e. Guptaganga Protection Series is constituted.

Table No 18.2 Constitution of Protection Series- Sambalpur Division

Sl No	Name of Series	Forest Block	Comp. No	Area in ha	Total area of the Series
1	Guptaganga Protection Series	Bayakumutia PRF		114.0045	448.3916
		Gonasika PRF		334.3871	
		Total		448.3916	

18.5 Blocks, compartments and JFM area:

The blocks / compartments assigned to this Working Circle have been furnished at Table No 17.1 above. No forest is assigned to VSS for protection & management.

18.6 Special objectives of Management:

The special objectives of Management of this Working Circle are within broader objectives of this working plan. The objectives are outlines as follows.

- To completely check soil erosion in forests coming within origin of Baitarani River.
- Soil Erosion of any form is to be completely reduced / checked.
- Full protection to vegetation against illicit felling, Fire.
- Ensure regeneration of palatable food / grass stock all along the protected area.
- No tree felling in any forest for any purpose within this area will be taken up.

18.6.1 Analysis of the crop:

The proposed area in this working circle comes in the River Origin.

18.6.3 Silvicultural system:

The area assigned to this working circle will be under **“360° Protection”** from all angles. Hence no Silvicultural System is prescribed for assigned blocks / areas. In case of exigency required **“Soil & Moisture Conservations”** of limited scale is recommended. It is better to allow nature to nurse the crop with an ideal concept **“Least management is the best management”**

18.6.4 Rotation period:

There is no prescription for removal of trees from these forests under this Working Circle. Hence no rotation period is prescribed.



18.6.5 Harvestable diameters:

As no felling is involved there is no **“Harvestable Diameter”** recommendation in this working circle.

18.6.6 Reducing factors and reduced areas:

No yield is predicted under this working circle. Hence there are no Reducing factors **and reduced areas consideration:**

18.6.7 Treatment Cycle:

The treatment cycle is 10 years i.e. coterminous with the Plan Period.

18.6.8 Division into Treatment Section:

For management purpose One Protection Series have been constituted. As there is no working prescription than “General Principles & Guidelines” no sections have been constituted sub dividing the series stated above (Para- 18.4)

18.6.9 Calculation of the yield:

As there is no felling involved, there is no yield prediction.

18.6.10 Table of Treatment.

The Protection Series is considered as one unit within the Range jurisdiction. Any activities will be warranted in course of time will be implemented in a local approach. Hence any interventions / activities required to be taken up is **“As is Where is and where ever felt necessary basis” No treatment table is suggested.**

18.6.11 Method of execution:

The assigned area to this working circle will be strictly protected against fire, illicit felling, poaching, encroachment etc. No activities are generally prescribed. In case of any extra-ordinary situation, activities may be taken up with the approval of higher authority and with a justification for deviation. Annual deviation statement needs to be submitted and get approval.

18.6.12 Associated regulations and measures:

This working circle is constituted with an objective to maintain natural vegetation without any interference or managerial / silvicultural manipulation of crop composition. This principle is to be strictly adhering to.





CHAPTER-19

PODURECLAMATION (OVERLAPPING) WORKING CIRCLE

[PODU (O) WC]

19.1 Name of working circle:

Podu is a traditional system of cultivation used by tribes in India, whereby different areas of jungle forest are cleared by burning each year to provide land for crops. The word comes from the Telugu language. Podu is a form of shifting agriculture using slash-and-burn methods. Traditionally used on the hill-slopes of Andhra Pradesh, it is similar to the jhum method found in north-east India and the bewar system of Madhya Pradesh. Since 1930s, there have been attempts to restrict its use in order to conserve forests and permit growth of commercial tree species such as teak. In the 1980s, it remained the principal method of tilling land for some tribal communities in districts such as East Godavari, West Godavari and, most prevalently, Srikakulam, although even by the 1950s its use by the Kolam and Naikpod tribes of Adilabad district had been entirely suppressed. This practice is in practice in neighbouring districts of Andhra, Chatisgarh and seen in undivided Keonjhar district, part of Keonjhar district. At least in some areas, the podu system also carried implied land rights. A resident of a village could return to land that they had previously cultivated as part of a rotation without fear of dispute from other villagers, although land that had lain unused for some time was considered to be common property and could be adopted for clearance by any villager. Forest officials had introduced restrictions on use but that these were not as onerous in some places as in others, and that in villages with little flat land there were none at all. In Keonjhar Division / District, such podu cultivation is observed since long. The area coming within the administrative control of forest department has also been suffering from “**slash-and-burn methods**”. It is aimed to reclaim such podu ravaged area in a systematic manner and this Working Circle has been constituted to have a special attention to the problem and prescribe a set of guidelines to reclaim the area. This Working circle is designated as “**Podu Reclamation (Overlapping) Working Circle [Podu (O) WC]**”. **1086.00ha** of forest land has been allotted to this overlapping working circle.

19.2 General constitution of working circle:

The forest area under podu cultivation in active stage or kept idle to be cultivated in some year in rotation i.e. “Rotational Idle Period” are included in this overlapping working circle. The area allotted to this overlapping working circle is furnished at Table No 19.1 below.

**Table No 19.1 Area Assigned To Podu Reclamation (O) Working Circle**

Sl No	Block	Compt.	Area for management	Podu Reclamation (O) WC
	BJP Range			
1	Gadgadei		218.0103	17.0
2	Kanjipani		724.9460	50.0
3	Khajurimundi		180.6000	20.0
4	Mundala		432.0270	50.0
	S.Total		1555.583	137.00
	Telkoi Range			
5	Tamanga		1362.6424	10.0
	Total RF		2918.2257	147.0000
	PRF			
	BJP Range			
6	Bayakumutia		118.0045	5.0
7	Champey		363.8651	20.0
8	Gonasika		334.3871	80.0
9	Gouda champei		447.3693	60.0
10	Lunaghar-I		131.6830	20.0
11	Lunaghar-II		360.9440	50.0
12	Raiguda		489.3750	60.0
	S.Total		2245.628	295.00
	Keonjhar Range			
13	Khajuribani		3575.4201	15.0
	Telkoi Range			
14	Renda		1282.4329	4.0
	Total PRF		7103.481	314.00
	PF			
	BJP Range			
15	Guptaganga		38.9050	10.0
16	Kalanda (Kha)		94.4965	65.0
	Total PF		133.4015	75.0
	DPF			
	BJP Range			
17	Katira		483.7163	20.0
18	Pandadhar-Bayakumutia		259.439	20.0



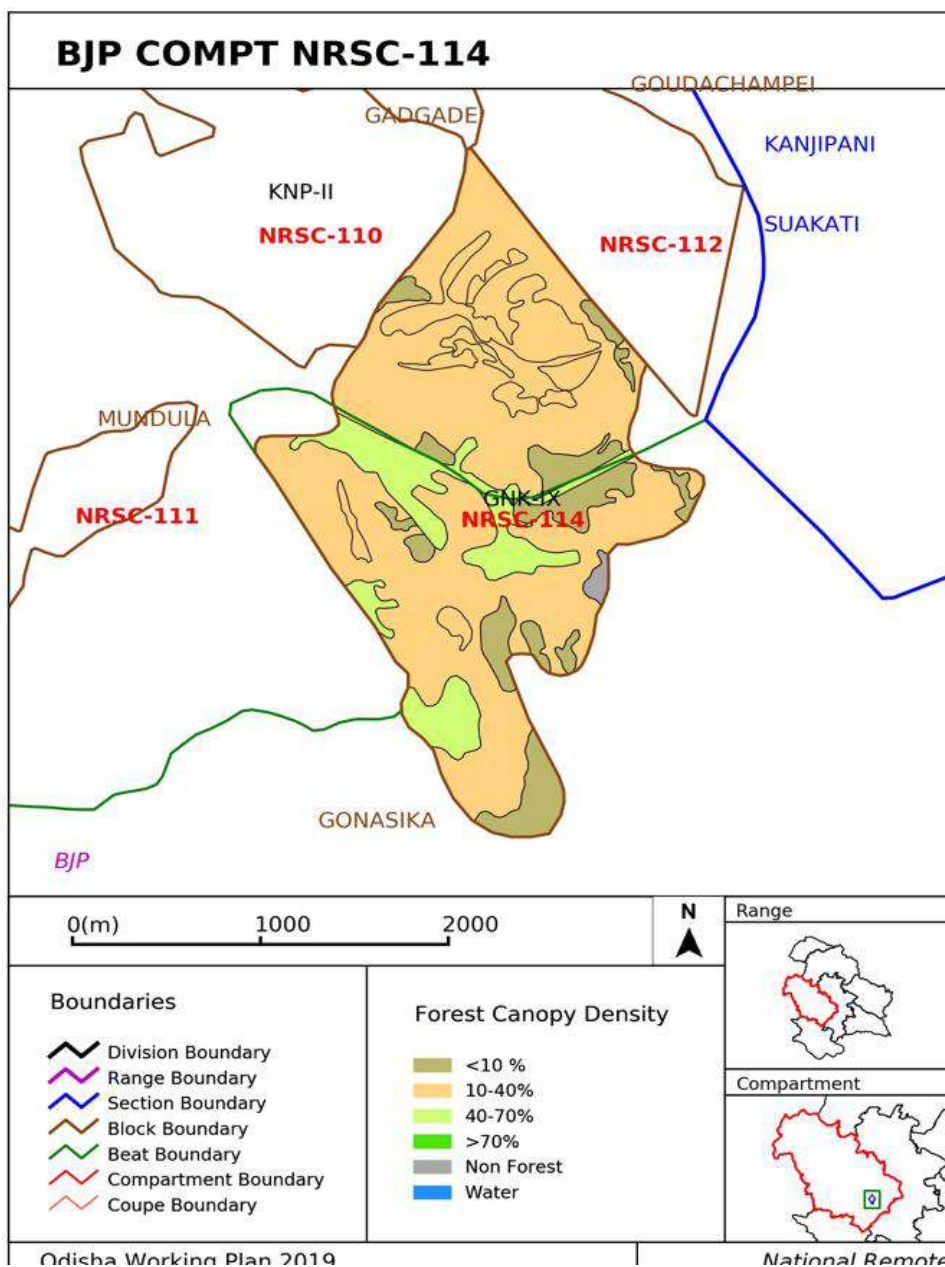
19	Kakharua		1240.073	275.0
20	Khandadhar		1956.448	85.0
21	Kuanr		2080.692	150.0
	Total DPF		6020.3683	550
	G.total		16175.4762	1086.0000

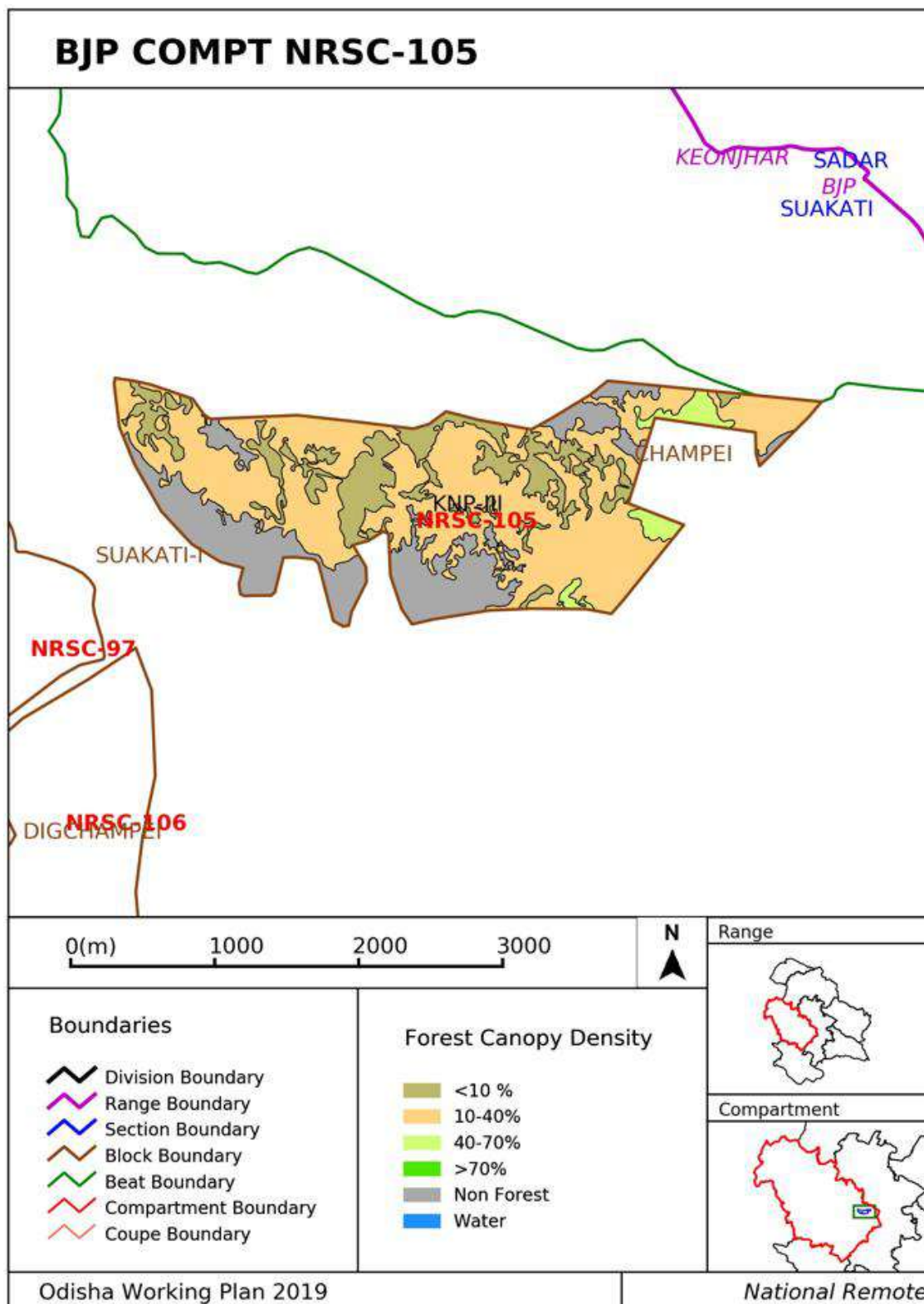
19.2.1 ABSTRACT of area under Podu Reclamation(O)WC**Table No 19.2 Abstract of area assigned to SCR(O)WC.**

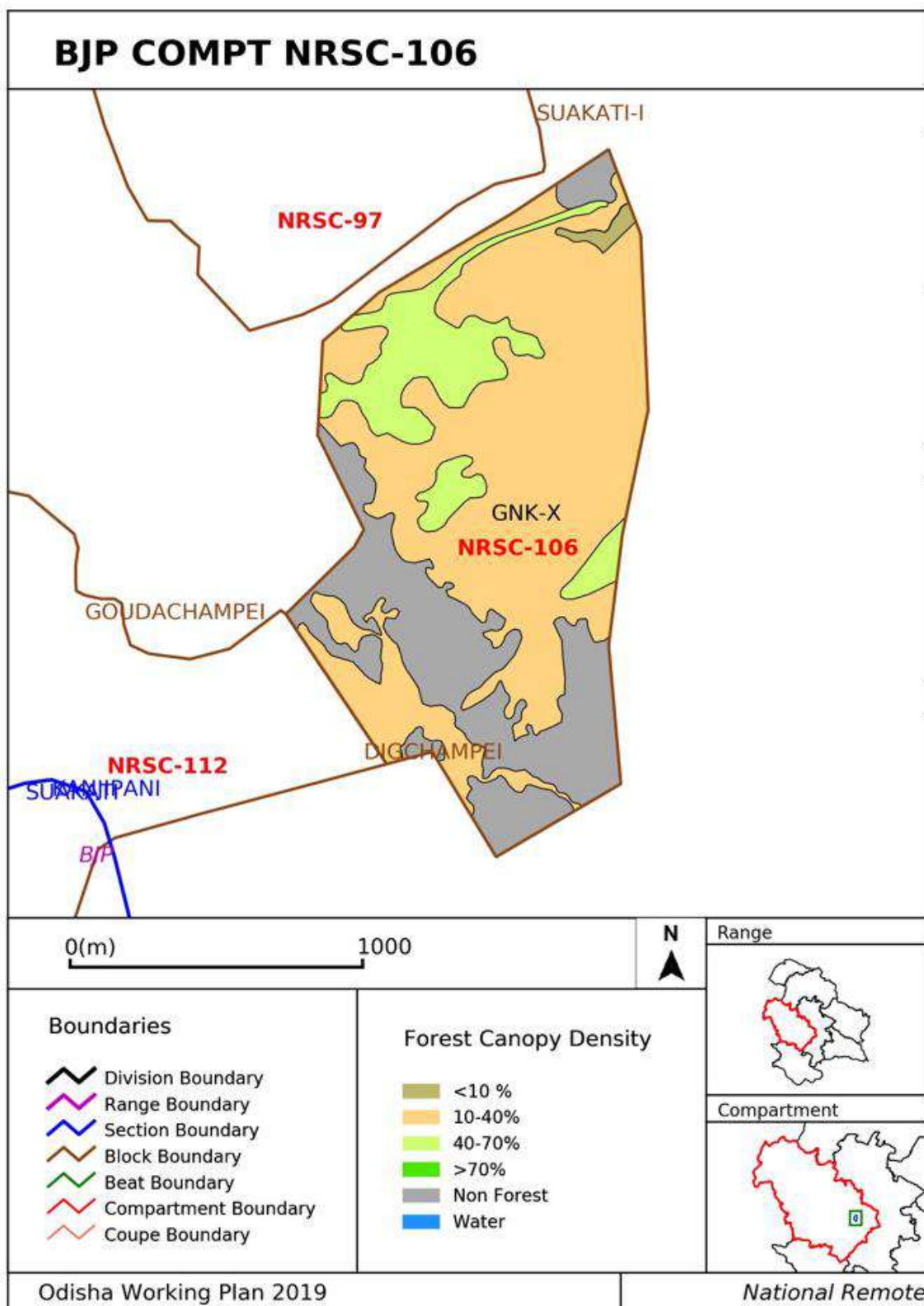
Range	RF	PRF	PF	DPF	Total	Percentage
BJP	137.00	295.00	75.00	550.00	1057.00	97.33
Keonjhar		15.00			15.00	1.38
Telkoi	10.00	4.00			14.00	1.29
Total	147.00	314.00	75.00	550.00	1086.00	100.00

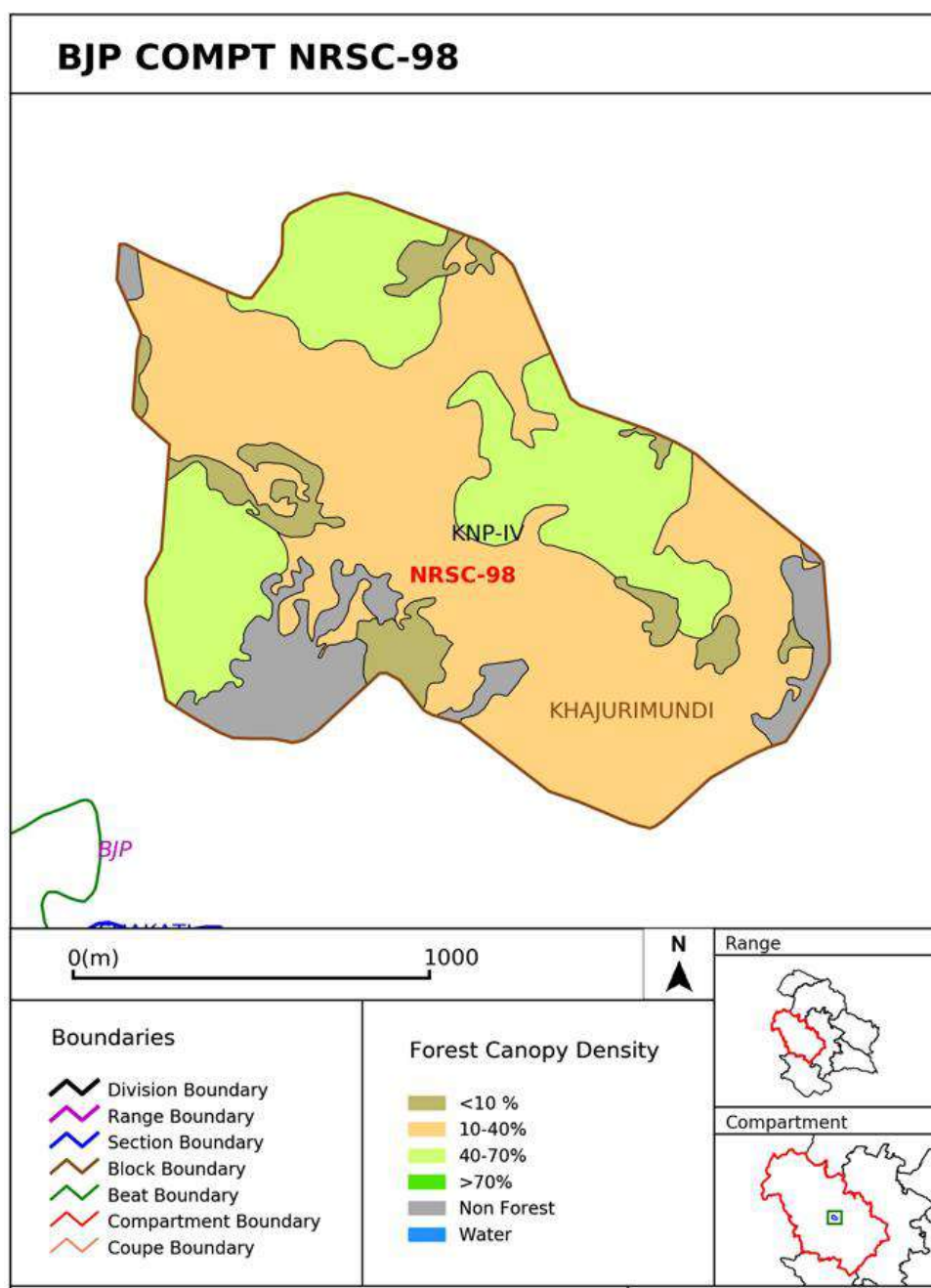
19.3 General characteristics of vegetation:

The area is part of RF / PRF/PF/DPF mostly moist and Dry deciduous Forest. The area has been cleared since long and now devoid of any tree growth to be named. It is mostly on hill slopes and more than 30° in most of the cases. Remnants of high stumps, burning sign are visible and give an ugly look. Tillage practice is not in accordance with Soil Conservation advisory. Sign of Soil erosion quite visible. In rotational idle land scrub / weeds are observed and provide soil cover to an extent of 20%. The stock map of the corresponding Compartment as prepared by NRSC is produced below to have a fair knowledge of Podu affected area.









On Stock map of these blocks depicted above indicates vast area under Non Forest. The stock map presents an awful situation.

19.4 Podu Reclamation Series:

The assigned area to this working circle has been divided to Seven Podu Reclamation Series for effective implementation of the prescription.

Table No 19.3 Constitution of Podu Reclamation Series – Keonjhar Division



Sl No	Name of Series	Range	Forest Block	Comp. No	Area in Ha	Series Total in ha
1	Mundala Podu Reclamation Series (MPRS)	BJP	Gadgadei RF		17.00	137.00
			Kanjipani RF		50.00	
			Khajurimundia RF		20.00	
			Mundala RF		50.00	
2	Champey Podu Reclamation Series (CPRS)	BJP	Bayakumutia PRF		5.00	125.00
			Champey PRF		20.00	
			Gonasika PRF		80.00	
			Lunaghar-I PRF		20.00	
3	Raiguda Podu Reclamation Series (RPRS)	BJP	Gouda Champey PRF		60.00	170.00
			Lunaghar-II PRF		50.00	
			Raiguda PRF		60.00	
4	Khadadhar Podu Reclamation Series (KHPRS)	BJP	Guptaganga PF		10.00	160.00
			Kalanda(Kha) PF		65.00	
			Khandadhar DPF		85.00	
5	Kakharua Podu Reclamation Series (KKPRS)	BJP	Kakharua DPF		275.00	275.00
6	Kuanr Podu Reclamation Series (KNPRS)	BJP	Katira DPF		20.00	190.00
			Pandadhar-Bayakumutia DPF		20.00	
			Kuanr DPF		150.00	
7	Khajuribani Podu Reclamation Series (KJPRS)	Keonjhar	Khajuribani PRF		15.00	29.00
		Telkoi	Tamanga RF		10.00	
			Renda PRF		4.00	
	Total				1086.00	1086.00

19.5. Blocks, Compartments and JFM area:

The area included in this working circle is distributed in 21 forest blocks as indicated in Table no 19.1 above. These areas are not covered under JFM Resolution and not assigned to any VSS.

19.6 Special objectives of Management:

The basic objectives of this working circle are as follows.

- To reclaim the podu ravaged forest area and bring it to tree cover.



- ii. To encourage agro forestry model where it is not possible to evict the cultivator completely.
- iii. To educate the cultivator on advance tillage methods, need for cultivation on terrace along with tree planting.
- iv. To provide inputs to have cultivation on Shed for a better Agro Silviculture practices.
- v. To provide a helping hand to cultivator to reduce dependence on shifting cultivation and adopt alternate livelihood practices including Horticultural plantations.
- vi. To take steps to check further extension of Podu in the division.
- vii. To assist the tribal cultivator to settle the rights under "Forest Rights Act" if eligible.

19.6.1 Analysis of the crop:

The area is devoid of any tree growth. Cultivation during rains is noticed. High Land paddy, Maize, Pulses are mostly cultivated by the podu cultivator. After two three season of cropping, he abandoned the area for another patch which may be a fresh area or abandoned area of back years of 3 / 4 year. Now the land is having weeds, grasses and eroded to some degree.

19.6.2 Silvicultural system:

The land is to be reclaimed by **"Agro Forestry Model with appropriate Soil & Moisture Conservation to have sustained productivity."**

19.6.3 Rotation period.

There is no harvesting proposal for the area assigned to this working circle. Hence there is no Rotation Period prescribed. The assigned area is to be reclaimed within the Plan Period i.e. within 10 year cycle.

19.6.4 Harvestable diameters:

There is no provision for harvesting. Hence no harvestable diameter / Girth are prescribed. The seedlings those will be planted up under Agro Forestry Model will be nurtured for speedy soil cover.

19.6.5 Reducing factors and reduced areas:

There is no reducing factor / area as the entire area is mostly devoid of any tree growth and enduover is to cover the soil with tree species.

**19.6.6 Reclamation Cycle:**

The assigned area is proposed to be reclaimed within 10 years. There is possibility of damage of seedlings planted by the cultivator. Hence each area reclaimed is to be reviewed & improved in five year interval.

19.6.7 Division into Reclamation Section:

The reclamation work is partly motivational and partly physical improvement of the area. The motivational Part is a continuous process which will be taken up constantly, continuously at all level of administration. The physical intervention the area is sub-divided in to Reclamation Section. Each Reclamation series is sub-divided to ten sections and the aim is to reclaim the entire area in Plan period. In case of difficulties in reclaiming the area through tree planting, the administration may take initiative to cover the area in subsequent year till the aim is achieved and area is reclaimed.

19.6.7.1 Mundala Podu Reclamation Series (MPRS)**Table No 19.4 Section of Mundala Podu Reclamation Series (MPRS)**

Name of Series	Range	Year of Operation	Section	Name of Forest	Comp. No	Area assigned	Series area
Mundala Reclamation Series (MPRS)	BJP	2022-23	MPRS-I	Gadgadei	Part	9.00	9.00
		2023-24	MPRS-II	RF	Balance	8.00	8.00
		2024-25	MPRS-III	Kanjpani	1 st (P)	18.00	18.00
		2025-26	MPRS-IV	RF	2 nd (P)	17.00	17.00
		2026-27	MPRS-V		Balance	15.00	15.00
		2027-28	MPRS-VI	Khajurimu	Part	10.00	10.00
		2028-29	MPRS-VII	ndia RF	Balance	10.00	10.00
		2029-30	MPRS-VIII	Mundala RF	1 st (P)	18.00	18.00
		2030-31	MPRS-IX		2 nd (P)	17.00	17.00
		2031-32	MPRS-X		Balance	15.00	15.00
	Series Total					137.00	137.00

**19.6.7.2 Champei Podu Reclamation Series(CPRS)****Table No 19.5 Champei Podu Reclamation Series(CPRS)**

Name of Series	Range	Year of Operation	Section	Name of Forest	Comp . No	Area assigned	Series area
Champey Podu Reclamation Series(CPRS)	BJP	2022-23	CPRS-I	Bayakumuti a PRF		5.00	5.00
		2023-24	CPRS-II	Champey PRF	Part	10.00	10.00
		2024-25	CPRS-III		Balan ce	10.00	10.00
		2025-26	CPRS-IV	Gonasika PRF	1 st (P)	16.00	16.00
		2026-27	CPRS-V		2 nd (p)	16.00	16.00
		2027-28	CPRS-VI		3 rd (P)	16.00	16.00
		2028-29	CPRS-VII		4 th (p)	16.00	16.00
		2029-30	CPRS-VIII		Bal.	16.00	16.00
		2030-31	CPRS-IX	Lunaghar-I PRF	Part	10.00	10.00
		2031-32	CPRS-X		Bal.	10.00	10.00
	Series Total					125.00	125.00

19.6.7.3 Raiguda Podu Reclamation Series (RPRS)**Table No 20.6 Section of Raiguda Podu Reclamation Series (RPRS)**

Name of Series	Range	Year of Operation	Section	Name of Forest	Comp. No	Area assigned	Series area
Raiguda Podu Reclamation Series (RPRS)	BJP	2022-23	RPRS-I	Gouda	1 st (P)	18.00	18.00
		2023-24	RPRS-II	Champrei PRF	2 nd (p)	18.00	18.00
		2024-25	RPRS-III		3 rd (P)	18.00	18.00
		2025-26	RPRS-IV		Balance	6.00	18.00
				Lunaghar-II PRF	1 st (p)	12.00	
		2026-27	RPRS-V		2 nd (P)	19.00	19.00
		2027-28	RPRS-VI		Balance	19.00	19.00
		2028-29	RPRS-VII	Raiguda PRF	1 st (P)	15.00	15.00
		2029-30	RPRS-VIII		2 nd (p)	15.00	15.00
		2030-31	RPRS-IX		3 rd (p)	15.00	15.00
2031-32	RPRS-X	Balance	15.00		15.00		
	Series Total					170.00	170.00

**19.6.7.4 Khandadhar Podu Reclamation Series (KHPRS)****Table No 20.7 Section of Khandadhar Podu Reclamation Series (KHPRS)**

Table No 20.7 Section of Khandadhar Podu Reclamation Series (KHPRS)							
Name of Series	Range	Year of Operation	Section	Name of Forest	Comp. No	Area assigned	Series area
Khandadhar Podu Reclamation Series (KHPRS)	BJP	2022-23	KHPRS-I	Guptaganga PF		10.00	10.00
		2023-24	KHPRS-II	Kalanda(Kha) PF	1 st (P)	16.00	16.00
		2024-25	KHPRS-III		2 nd (p)	16.00	16.00
		2025-26	KHPRS-IV		3 rd (p)	16.00	16.00
		2026-27	KHPRS-V		Balance	17.00	17.00
		2027-28	KHPRS-VI	Khandadhar DPF	1 st (P)	17.00	17.00
		2028-29	KHPRS-VII		2 nd (p)	17.00	17.00
		2029-30	KHPRS-VIII		3 rd (p)	17.00	17.00
		2030-31	KHPRS-IX		4 th (P)	17.00	17.00
		2031-32	KHPRS-X		Balance	17.00	17.00
	Series Total					160.00	160.00

19.6.7.5 Kakharua Podu Reclamation Series (KKPRS)**Table No 19.8 Section of Kakharua Podu Reclamation Series (KKPRS)**

Table No 19.8 Section of Kakharua Podu Reclamation Series (KKPRS)							
Name of Series	Range	Year of Operation	Section	Name of Forest	Comp. No	Area assigned	Series area
Kakharua Podu Reclamation Series (KKPRS)	BJP	2022-23	KKPRS-I	Kakharua	(1 st P)	27.50	27.50
		2023-24	KKPRS-II	DPF	(2 nd P)	27.50	27.50
		2024-25	KKPRS-III		(3 rd P)	27.50	27.50
		2025-26	KKPRS-IV		(4 th P)	27.50	27.50
		2026-27	KKPRS-V		(5 th P)	27.50	27.50
		2027-28	KKPRS-VI		(6 th P)	27.50	27.50
		2028-29	KKPRS-VII		(7 th P)	27.50	27.50
		2029-30	KKPRS-VIII		(8 th P)	27.50	27.50
		2030-31	KKPRS-IX		9 th P	27.50	27.50
		2031-32	KKPRS-X		Balance	27.50	27.50
	Series Total					275.00	275.00

**19.6.7.6 Kuanr Podu Reclamation Series (KNPRS)****Table No 20.9 Section of Kuanr Podu Reclamation Series (KNPRS)**

Table No 20.9 Section of Kuanr Podu Reclamation Series (KNPRS)							
Name of Series	Range	Year of Operation	Section	Name of Forest	Comp. No	Area assigned	Series area
Kuanr Podu Reclamation Series (KNPRS)	BJP	2022-23	KNPRS-I	Katira DPF		20.0	20.00
		2023-24	KNPRS-II	Pandadhar-Bayakumutia DPF		20.00	20.00
		2024-25	KNPRS-III	Kuanr DPF	1 st (p)	19.00	19.00
		2025-26	KNPRS-IV		2 nd (p)	19.00	19.00
		2026-27	KNPRS-V		3 rd (p)	19.00	19.00
		2027-28	KNPRS-VI		4 th (P)	19.00	19.00
		2028-29	KNPRS-VII		5 th (P)	19.00	19.00
		2029-30	KNPRS-VIII		6 th (P)	19.00	19.00
		2030-31	KNPRS-IX		7 th (p)	18.00	18.00
		2031-32	KNPRS-X		Balance	18.00	18.00
Series Total						190.0	190.0

19.6.7.7 Khajuribani Podu Reclamation Series (KJPRS)**Table No 20.10 Section of Khajuribani Podu Reclamation Series (KJPRS)**

Table No 20.10 Section of Khajuribani Podu Reclamation Series (KJPRS)							
Name of Series	Range	Year of Operation	Section	Name of Forest	Comp. No	Area assigned	Series area
Khajuribani Podu Reclamation Series (KJPRS)	Keonjhar	2022-23	KJPRS-I	Khajuribani PRF	1 st (p)	3.00	3.00
		2023-24	KJPRS-II		2 nd (p)	3.00	3.00
		2024-25	KJPRS-III		3 rd (p)	3.00	3.00
		2025-26	KJPRS-IV		4 th (P)	3.00	3.00
		2026-27	KJPRS-V		Balance	3.00	3.00
	Telkoi	2027-28	KJPRS-VI	Tamangara RF	1 st (p)	3.00	3.00
		2028-29	KJPRS-VII		2 nd (p)	3.00	3.00
		2029-30	KJPRS-VIII		Balance	4.00	4.00
		2030-31	KJPRS-IX	Rendara PRF	Part	2.00	2.00
		2031-32	KJPRS-X		Balance	2.00	2.00
	Series Total					29.00	29.00

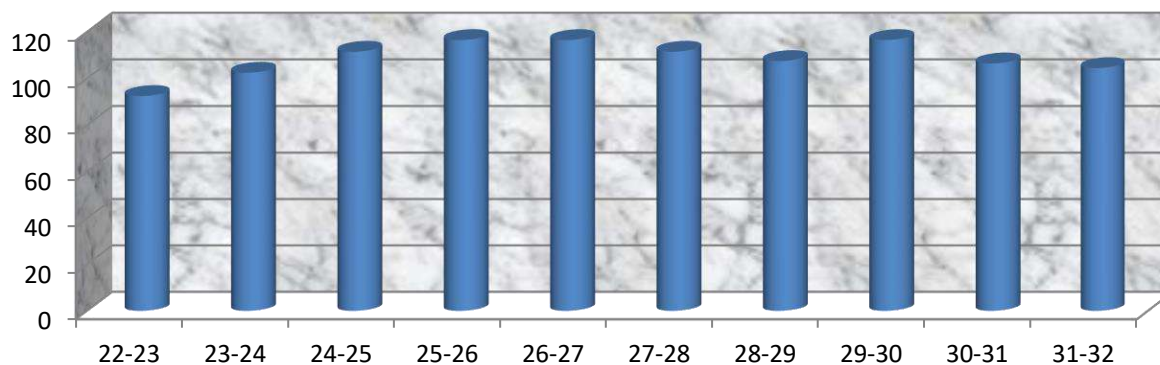


19.6.7.8 ABSTRACT of Podu Reclamation Sections:

Table No 19.11 ABSTRACT of Podu Reclamation Sections

Name	Area allotted (in ha)										Total
	22-23	23-24	24-25	25-26	26-27	27-28	28-29	29-30	30-31	31-32	
Mundala	9.00	8.00	18.00	17.00	15.00	10.00	10.00	18.00	17.00	15.00	137.00
Champey	5.00	10.00	10.00	16.00	16.00	16.00	16.00	16.00	10.00	10.00	125.00
Raiguda	18.00	18.00	18.00	18.00	19.00	19.00	15.00	15.00	15.00	15.00	170.00
Khandadhar	10.00	16.00	16.00	16.00	17.00	17.00	17.00	17.00	17.00	17.00	160.00
Kakharua	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	275.00
Kuanr	20.00	20.00	19.00	19.00	19.00	19.00	19.00	19.00	18.00	18.00	190.00
Khajuribani	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	2.00	2.00	29.00
Total	92.50	102.50	111.50	116.50	116.50	111.50	107.50	116.50	106.50	104.50	1086.00

Annual working area in ha



19.6.8 Calculation of the yield:

It is a reclamation Process. No yield is expected. Hence no yield is calculated for this series.

Expected outcome: It is expected to check further clearance of forest for podu cultivation. The cultivator will stick to the land now under cultivation. A permanent tree cover will be created. Soil erosion will be minimized. Modern agricultural practices in hill region will be imbibed by the farmers.

19.6.9 Table of Reclamation:

The area assigned to each Series / Each Section is to be reclaimed in the assigned year. The area is marked on management map (1:50000) Scale Survey of India Topo map. Year wise area assigned has been indicated in Table No 19.11 above.

19.6.10 Method of Reclamation:

The area assigned to this working Circle is either under active podu cultivation or in idle stage to be cultivated in subsequent year by cultivator.

The following procedure is to be adopted for reclamation of Podu Ravaged area.

19.6.10.1 Demarcation of the area to be reclaimed:

The assigned area is to be normally demarcated in the field for ease identification and subsequent treatment. The area may be demarcated with reference to management map of the Plan.

19.6.10.2 Listing of individual involved in podu cultivation:

The area so demarcated may be cultivated by many tribal farmers. The first step is to list the farmers occupying the land for podu or previously was under occupation and now abandoned. At first instances, they may not come forward and disclose their name. The forester / Guard may take the villagers to confidence and collect the name of person occupying the area. The help of existing VSS of the village, if any may be taken in to confidence after a general discussion in the VSS general body meeting / Executive Body Meeting.

19.6.10.3 Motivation Process:

Motivation is a confidence building process. The podu cultivator should have confidence on Forest staff and fear of taking over the land should be dispelled from the beginning. The cultivator should be assured to have full rights over agricultural products from the land. He should made understand that tree species and agricultural crop which is mostly shed tolerance species are to be allowed to grow hand in hand. By the process the land fertility will remain for more years on sustainable basis. Rotational cultivation will not be required in future. This concept is required to be driven in to the mind of the cultivator.

19.6.10.4 Plantation in Agro -Forestry Model with involvement of the Cultivator,

After motivation, the area is to be brought under plantation under Agro-Forestry Model. Spacing of 1mx1m with 3m gap . 1mx1m is the recommended spacing for first growing



species. 3mx3m with 4m gap spacing for horticultural tree crop like Mango, Jack Fruit, Lemon, Citrus species are recommended. In the interspaces cultivation of Turmeric, Zinger, Pineapple and to some extent maize is recommended. Planting should be along the contour and line to line staggered.

a) Forestry Species

Trees with light crown are to be preferred. To make it attractive to the farmer, fruit bearing trees which can give return in 3 to 5 year period is to be preferred. Grafted Mango, Tamarid, Lemon, Amla, Ber and citrus are preferred species.

b) Choice of Agricultural Crop that can be grown:

The species which can grow under partial shed are preferred. Palua, Turmeric, Zinger, Pineapple with assured income to the farmers are to be considered. Consultation with Agricultural / Horticultural officials may be taken up in this matter.

19.6.10.5 Soil & Moisture Conservation

The area under Podu cultivation is mostly in high slope area (Degree of Slope normally more than 30°) initially small **benches / terraces of 1m-2m width is advised. Rills / Gullies may also be reclaimed** through general soil conservation measures. Planting of grasses on bonds also recommended. Vegetative Check dam, Brush wood check dams are always preferred. Always low cost natural measures with local available materials are preferred over masonry structural measures.

19.6.11 Funding mechanisim:

Normal Plantation targets of State Govt.budgets/ MGNREGA / CAMPA may be implemented in this assigned area. The family members of the cultivator will be only engaged as labour for the plantation and its upkeeping. For agricultural crop assistance from other district level schemes may be tapped through District Collector.

19.6.12 Associated regulations and measures:

As most of the cultivators are tribal, efforts to be made to grant title under FRA,2006. The forest staff should assist them to get the benefit and in the process, confidence building process will get strength.





CHAPTER- 20

NON -TIMBER FOREST PRODUCE (OVERLAPPING)

WORKING CIRCLE

20.1 Name of working circle:

The Non Timber Forest Produces (NTFP) including Medicinal & Aromatic Plants (MAP) is mostly seen in moist forests of Telkoi, Patna and Ghatgaon Range of the division. Besides Char, kendu, Kusuma, myrobalance, Siali leaves, Kendu leaf, Bana haldi, Satabari, Sarpagandha and Honey are available to a greater extent in this division. For management of Kendu leaf, separate divisions i.e. Keonjhar Kendu leaf Division is looking after it exclusively. For management of rest of the NTFP available in the division this **Non-Timber Forest Produce (Overlapping) Working Circle [NTFP (O) WC]** has been constituted. The entire forest area excluding those of erstwhile Social Forestry Plantation and area declared as PF due to its small and scattered in nature has been assigned to this Working Circle. The area assigned is **141223.2031ha**.

20.2 General constitution of working circle:

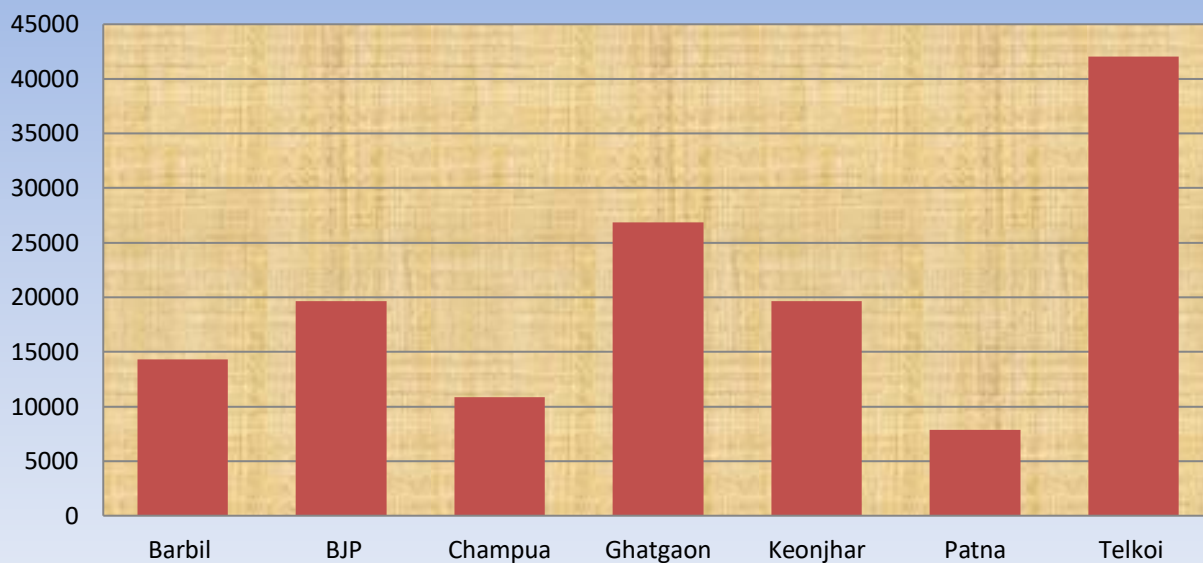
The natural forest area bears many Herbs / Shrubs / Medicinal & Aromatic Plants. The man made forest i.e. Village Forests, Protected Forests hardly bears NTFP items except those are of planted up. The forests assigned to this Working Circle are all Reserved Forests, All PRF, and DPF of the Division. The range wise area assigned to this working circle is as in Table No 20.1

Table No 20.1 Area assigned to NTFP (O) WC: Keonjhar Division

Range	RF	PRF	DPF	Total	%	JFM
Barbil	13793.2551		518.2300	14311.4851	10.13	586.0000
BJP	2742.3730	5920.6116	11009.6682	19672.6528	13.93	4364.8380
Champua	9912.8311	463.3400	483.8673	10860.0384	7.69	4079.5760
Ghatgaon	26588.8095		250.1693	26838.9788	19.00	6707.4170
Keonjhar	16063.0325	3575.4201		19638.4526	13.91	8145.3270
Patna	7656.6000	31.0200	161.4343	7849.0543	5.56	3385.2359
Telkoi	36142.2023	4974.8109	935.5279	42052.5411	29.78	8383.6870
Total	112899.1035	14965.2026	13358.8970	141223.2031	100.00	35652.0809

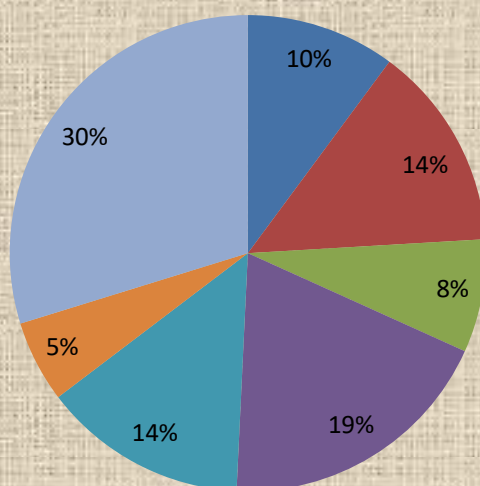


Area Assigned to NTFP(o) Working Circle



Area assigned to NTFP(O) Working circle

■ Barbil ■ BJP ■ Champua ■ Ghatgaon ■ Keonjhar ■ Patna ■ Telkoi



**20.3 General characteristics of vegetation:**

The forests of Keonjhar Division are mostly Moist Deciduous Sal Forests and partly Dry Deciduous Mixed Forests. Moist forests are rich in herbs / shrubs of medicinal value, Aromatic in nature, Mushrooms, Siali leaf, Sal leaf etc. The dry forests are rich in fruits, berries, flowers of importance of commerce in NTFP items. In Keonjhar Division important NTFP species available are enlisted at Table No 20.2

Table No 20.2 Important NTFP species and parts for use.

Sl. No	Local Name	Botanical Name	Parts Used	Uses
1	Arjuna	Terminalia arjuna	Bark & Fruits	Tannin for leather, Medicinal
2	Asan	Terminalia tomentosa	Bark	Tassar cocoons, Medicinal
3.	Amba	Mangifera indica	Roots bark, seed kernel	Fruit is edible, medicinal,
4.	Ambada	Spondias pinnata	Roots, barks, fruits seeds	Medicinal
5	Anla	Emblica officinalis	Root bark leaves fruits	Fruit is Edible, Medicinal
6	Arakha	Calotropis gigantea	Whole plant	Medicinal
7	Aswasthha	Ficus religiosa	Bark, shoots, fruits seeds	Medicinal, Rope making, Fruits for animals.
8	Anchhu	Morinda tinctoria	Roots and leaves	Medicinal
9	Bandhan	Ougeinia oojeinensis	Bark	Medicinal
10	Bara	Ficus bengalensis	Root bark leaves buds latex	Rope making, Medicinal, Fruits for Birds and Animals
11	Bela	Aegle marmelos	Roots, leaves & fruits	Fruit is Edible, Medicinal
12	Bhalia	Semecarpus anacardium	Fruits	Medicinal
13	Bichhuati	Tragia involucrate	Roots and leaves	Medicinal
14	Baidanka	Mucuna pruriens	Roots, leaves, seeds and hair	Medicinal
15	Bana haladi	Curcuma aromatica	Rhizomes	Medicinal
16	Baula	Mimusops elengi	Bark flowers fruits seeds	Fruit is edible, Medicinal
17	Begunia	Vitex negundo	Whole plant	Medicinal
18	Babul	Acaccia nilotica	Bark, Gum, Fruits	Calico-printing, dyeing sizing material for silk, cotton, Medicinal, Tannin for leather.
19	Bahada	Terminalia bellirica	Bark and Fruits	Fruit edible for animals, Medicinal, Tannin for leather.
20	Bhuin anla	Phyllanthus niruri	Whole plant	Medicinal



21	Bhuinnimba	Andrographis panicul	Whole plant	Medicinal
22	Banakhajuri	Phoenix sylvestris	Fruits	Medicinal
23	Barakoli	Ziziphus mauritiana	Whole plant	Fruit is edible, Medicinal
24	Bhersunga	Murraya koenigii	Roots, bark and leaves	Medicinal
25	Banatulasi	Ocimum americanum	Leaves and seeds	Medicinal
26	Char	Buchnanania lanzan	Roots and fruits	Fruit is Edible, Medicinal
27	Chhatian	Alstonia scholaris	Barks and leaves	Medicinal
28	Chakunda	Cassia tora	Leaves and seeds	Medicinal
29	Champa	Michelia champaca	Whole plant	Perfumes, Medicinal
30	Duba ghassa	Cynodon dactylon	Whole plant	Medicinal
31	Dimiri	Ficus hispida	Bark and fruit	Fruit is Edible, Medicinal
32	Dudura	Datura fastusa	Whole plant	Tannin for leather, Medicinal
33	Dhanantwari	Cymbopogon citratus	Whole plant	Medicinal
34	Dhatki	Woodfordia fruticosa	Flowers	Medicinal
35	Dhaura	Anogeissus latifolia	Roots bark leaves seeds Gum	Medicinal, Sizing paper printing
36	Eucalyptus	Eucalyptus indica	Leaf	Oil , Medicinal
37	Genduli	Sterculia urens	Gums	Gum is edible Confectionaries
38	Gohira	Acacia leucophloeia	Barks	Medicinal
39	Gayasha	Leucas aspera	Leaves, flowers	Medicinal
40	Guluchi	Tinospora cordifolia	Stem	Medicinal
41	Gambhari	Gmelina arborea	Whole plant	Fruit for animals, Medicinal
42	Gangasiuli	Nyctanthes arbortristi	Leaves, flowers seeds	Medicinal
43	Ghikuanari	Aloe vera	Leaf juice	Medicinal
44	Harida	Terminalia chebula	Fruits	Tannin for leather, Medicinal
45	Hinjala	Barringtonia acutangula	Roots, leaves, fruits	Medicinal
46	Hadabhanga	Vitis quadrangularis	Whole plant	Medicinal
47	Jamu	Syzygium cumini	Bark, leaves and fruits	Fruit is Edible, Medicinal
48	Jayasanda	Litsia glutinosa	Fiber	Medicinal,
49	Jari	Ficus microcarpa	Roots, bark and leaves	Medicinal
50	Karanja	Pongamia pinnata	Whole plant	Oil & Medicinal
51	Kathhachampa	Plumeria rubra	Root, leaves and latex	Medicinal
52	Kochila	Strychnos nuxvomica	Bark, leaves and seeds	Fruit is edible- birds, Medicinal
53	Kendu	Diospyros melanoxylon	Fruits and leaves	Fruit is Edible, Leaves Bidi
54	Kaincha	Abrus precatorius	Roots, leaves and seeds.	Medicinal
55	Kainthha	Limonia feronia	Bark, fruits and gums	Medicinal
56	Kamala-gundi	Mallotus philippensis	Glandular hairs of the fruit	Medicinal



57	Khair	Acacia catechu	Bark and heart wood	Pan industries Medicinal
58	Kantamaris	Amaranthus spinasus	Whole plant	Medicinal
59	Kanteikuli	Flacourtia indica	Roots, leaves and fruits	Medicinal
60	Kurein	Holarrhena antidysent	Bark, seeds and leaves	Medicinal
61	Kusum	Schleichera oleasa	Bark and oil	Fruit Edible, Oil, Medicinal, soap
62	Kumbhi	Careya arborea	Bark, leaves and fruits	Medicinal
63	Kunkum	Bixa orellana	Roots, bark and seeds	Medicinal
64	Lantana	Lantana camara	Whole plant	Medicinal
65	Lajkuli	Mimosa pudica	Roots and leaves	Medicinal
66	Lodha	Symplocus racemosa	Bark	Medicinal
67	Mahula	Madhuca Indica	Flower and Fruits	Edible Oil, Fruits, country liquor
68	Mohalimba	Melia composite	Whole plant	Medicinal
69	Mai	Lannea coromondelic	Bark and leaves	Medicinal
70	Mohakal	Trichosanthes anguin	Roots and fruits	Medicinal
71	Mundi	Mitragyna parvifolia	Roots, barks and leaves	Medicinal
72	Mohul	Madhuca indica	Bark, fruits and seeds	Medicinal
73	Neem	Azadirachta indica	Bark, leaves, seeds	Oil & Medicinal
74	Nageswar	Mesua ferrea	Flowers	Oil & Medicinal
75	Palasa	Butea monosperma	Root	Rope making
76	Piasal	Pterocarpus marsupiu	Heartwood and gum	Medicinal
77	Panasa	Artocarpus heterophyl	Roots leaves fruits seeds	Edible fruit, Medicinal
78	Poksungha	Ageratum conyzoides	Roots and leaves	Medicinal
79	Palas	Butea monosperma	Bark, seeds and gums	Medicinal
80	Phanaphana	Oroxylum indicum	Roots leaves fruits seeds	Medicinal
81	Raktachita	Plumbago rosea	Roots	Medicinal
82	Rithha	Sapindus laurifolia	Roots, bark and fruits	Herbal Shampoo, Soap, Medicinal
83	Sal	Shorea robusta	Leaves, Bark, fruits resin.	Tannin, Medicinal, Edible Oil, Leaf plates, Agarbati, Varnish
84	Siris	Albizia lebbek	Bark, flowers and seeds	Medicinal
85	Sissoo	Dalbergia sissoo	Roots, leaves, bark heart wood	Medicinal
86	Sunari	Cassia fistula	Whole plant	Medicinal
87	Satabari	Asparagus racemosus	Tuberous roots	Medicinal
88	Semul	Bombax ceiba	Roots, gum, bark and fruit.	Cotton , Medicinal
89	Salai	Boswellia serrata	Bark, gum and resin	Pleasant smell- burnt, Medicinal



90	Sahada	Streblus asper	Roots Bark, leaves latex	Medicinal
91	Siali	Bauhinia vahlii	Fiber	Binding KL, Rope making
92	Siju	Euphorbia antiquor	Roots juice	Medicinal
93	Tentuli	Tamarindus indica	Roots, fruits and seeds	Fruit is Edible, Medicinal

20.4 Management Unit:

For management purpose each range is considered as a Unit. Accordingly the Division is divided to seven units. The Unit and area under each unit is furnished below (Table No 20.3).

Table no 20.3 Constitution of Management Unit			
Sl No	Range / Unit	Area assigned to management Unit (in ha)	Percentage
1	Barbil	14311.4851	10.13
2	BJP	19672.6528	13.93
3	Champua	10860.0384	7.69
4	Ghatgaon	26838.9788	19.00
5	Keonjhar	19638.4526	13.91
6	Patna	7849.0543	5.56
7	Tekoi	42052.5411	29.78
	Total	141223.2031	100.00

20.5 Blocks, compartments and JFM area:

The total area in each unit and JFM area is furnished at Table No 21.1 above. Out of total area assigned to this working circle i.e. 141223.2031 ha, 35652.0809 been assigned to VSS which constitutes about 24.45 % of the area. The range wise position is furnished below. (Table No 20.4)

Table No 20.4 Management Area and JFM involvement				
Sl no	Range	Total are in the Unit	JFM area assigned	Percentage
1	Barbil	14311.4851	586.0000	1.64
2	BJP	19672.6528	4364.8380	12.24
3	Champua	10860.0384	4079.5760	11.44
4	Ghatgaon	26838.9788	6707.4170	18.81
5	Keonjhar	19638.4526	8145.3270	22.85
6	Patna	7849.0543	3385.2359	9.50
7	Tekoi	42052.5411	8383.6870	23.52
	Total	141223.2031	35652.0809	100.00

20.6 Special objectives of Management:

The special objectives of management are as follows.

- To educate VSS / JFM Committee and Gram panchyat about scientific collection methods of NTFP on a sustainable basis.



- ii. To educate primary collectors of NTFP about contribution of NTFP towards their livelihood and share of income from NTFP.
- iii. To educate VSS / Primary collectors about propagation of various herbs / shrubs / climbers and how to improve the stock in forest both quality and quantity.
- iv. To enhance abundance of NTFP species in forest through regulatory mechanism in non-assigned VSS areas / VSS areas.
- v. To conserve and protect the depleting natural medicinal plant resources in the forest area.
- vi. To encourage local community for ex-situ / in situ conservation of NTFP & medicinal plants through VSS.
- vii. To generate self employment and livelihood support for the forest fringe dwellers.
- viii. To develop and disseminate scientific harvesting, processing and storage techniques relating to NTFP products.
- ix. To share market information to primary gatherers.
- x. To impart training on value addition

20.6.1 Analysis of the crop:

No systematic study has been made to assess the potentiality of NTFP species wise. However on general observation, the area is rich in Sal leaf, Siali Leaf & Fiber. , Kendu, Chara, Bahada, Harida, Anla, Kusum, bana Haladi, Mango, Jack Fruit, Honey, Wax, Siali Leaf & Fibre, Sal seeds, various barks and tubers. It is desired to have a complete study and documentation of available NTFP and MAP in the region. The availability of NTFP is in a declined trend all over the division with depletion of forest resources.

20.6.2 Silvicultural system:

No silvicultural System is prescribed for management of NTFP species found in the forests. It is proposed to manage the NTFP resource through

- Regulated collection & trading with Value addition by regular training.
- Impart training on Scientific Collection.
- Improve growing Stock by checking biotic interference.
- In-situ & Ex-situ Conservation.

20.6.3 Collection Cycle:

The NTFP like fruits / leaves, tubers, etc are normally collected in an annual cycle depending on its maturity and requirement/ utility. Honey, wax, mushrooms are widely collected depending upon availability & season. Many MAP (Medicinal & Aromatic) Plants are collected as and when required throughout the year.



20.6.4 Harvesting Period:

Various NTFP Species are collected at different stages of flowering to fruiting / tender to matured leaf, Barks and tubers etc The Calendar of collection / harvesting of NTFP species is furnished below.

Sl	Name	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
1	Amla												
2	Arrow root												
3	Bahada												
4	Banatulsi seeds												
5	Bel												
6	Broom grass												
7	Cashew nut												
8	Char seed												
9	Dantari bark												
10	Dhatki flower												
11	Genduli gum												
12	Gum												
13	Harida												
14	Hill broom												
15	Honey												
16	Honey wax												
17	Jatropha seed												
18	Kamal gundi												
19	Karanja seed												
20	Kendu fruits												
21	Kendu leaf												
22	Khair												
23	Khajuri leaves												
24	Kochila seed												
25	Kurei fruit												
26	Kusum seed												
27	Lemon grass												
28	Lodha bark												
29	Mahua flower												
30	Mahua seed												
31	Mango												
32	Mango												



	kernel												
33	Marking nut												
34	Mushroom												
35	Neem seed												
36	Phen phena bark												
37	Sabai grass												
38	Sal resin												
39	Sal seed												
40	Semal cotton												
41	Siali fibre												
42	Siali fibre												
43	Siali leaf												
44	Sunari Bark												
45	Tentuli												
46	Thatch grass												

20.6.5 Division into Management Section:

For collection & marketing of NTFP, the Gram Panchyats are regulating the collection, Registration of Primary gatherer etc at Panchyat Level as per NTFP Policy and Orissa Gram Panchayats (Minor Forest Produce Administration) Rules 2002. For forest point of view no further section has been suggested. Hence Range is taken as an administration & execution unit.

20.6.6 Calculation of the yield:

Except Kendu leaf there is no record to indicate the quantum of NTFP that can be collected from the division. It is difficult to assess the yield that can be harvested without causing harm to trees / wildlife and regeneration of the species.

20.6.7 Collection Sequence.

The collation of NTFP is particularly a time bound operation. The part of the tree herbs / shrubs that are use full for any purpose determines the collection sequence. The time schedule for various items has been furnished 19.6.4 above.

20.6.8 Collection procedure as per Rules.

Orissa Gram Panchayats (Minor Forest Produce Administration) Rules 2002 The state government made these rules in November 2002, which has following salient features. ·



- The GP shall have the power to regulate procurement and trading of MFP, whether produced in government lands and forest areas within the limits of Grama or collected from the Reserved Forests and brought into the Grama.
- Priority would be given to the VSS and its members for collection and trading of MFP.
- Price fixation would be done by the Panchayat Samiti (PS) in September and would be circulated to different offices of district administration and to all the GPs. The Gram Sabha would ratify prices fixed and necessary changes can be made based on the local needs. If Panchayat Samiti fails to fix the price then the District Collector would call a meeting of PS preferably in October to fix up the minimum procurement prices.
- The trader registered to procure MFP from the GP shall furnish monthly return and also annual return on a prescribed format. The GP shall furnish an annual return on the procurement and sale to the Forest Range Officer.
- In case of violation of payment of minimum procurement prices by the registered traders, the Sarapanch shall conduct an inquiry and then it shall be discussed in the GP meeting and then GP shall resolve to cancel the registration of the trader.
- If the trader after cancellation of the registration continues to procure MFP from the GP area then the Sarapanch or Secretary shall lodge complaint before the DFO. The MFP seized by the DFO from the trader shall be publicly auctioned and the sale proceeds thereof be deposited under the appropriate head of account under the Orissa Forest Act.
- If a trader is engaged in procurement of MFP without registering with the GP then the Sarapanch or Secretary shall lodge complaint before the DFO for taking appropriate action.
- Process of Price fixation of NTFP The government has a system of fixation of minimum price for procurement of MFP in order to protect the tribal and forest dwelling communities from exploitation. The fixation of minimum procurement price was started in 1971 by the Agriculture and Cooperation Department. The price was then fixed at the district level. During the last 30 years there have been many changes in the structure and mechanism of price fixation in the state.
- Now there are two different types of price fixation mechanisms in Orissa. For the nationalised items there is an advisory committee at the state level to decide the prices (started in 1982) and for other produces, which are under the control of Gram Panchayat, the Panchayat Samitis have been empowered in November 2002 to fix up the minimum procurement prices. Till 1997 a committee under the chairmanship of the District Collector fixed prices at the district level and the concerned Revenue Divisional Commissioner was approving these prices.
- Usually by the end of September every year the committee was supposed to fix up the prices, which would remain in force till next September.



- In 1997 the Welfare Department fixed the prices of NTFP at the state level especially keeping the operation of TDCC in mind. It continued till 2000. After the transfer of ownership rights to Gram Panchayat in 2000 the mechanism for fixation of price was to be done by the GPs.
- In November 2002 the government finally declared that the minimum procurement prices for NTFP would be fixed at the Panchayat Samiti level, which is being followed.
- The prices would be fixed in September in a meeting attended by the DFO, representatives of TDCC, OFDC and TRIFED. Once the prices are being fixed it would be discussed in Gram Sabha and Gram Panchayat to approve it. The GP can also make some changes in the prices based on the local needs. If the Panchayat Samiti fails to fix up the prices then the District Collector would call for a meeting to fix up the prices. Price fixation has always remained as a matter of concern.
- The registered traders should give a monthly report of the volume of different NTFP collected, sold and transferred to other places to the concerned GPs and the trader would also submit an annual return. Each GP has to submit an annual report to the Forest Range Officer.
- Secondly, GP has the authority to reprimand the traders who are found to be paying less than the minimum procurement price fixed by the Government. The concerned Sarapanch will carry out an inquiry if there is a complaint in this regard.
- The GP has the ownership right over MFP it can't seize the MFP procured by an illegal trader. This would be seized by the DFO and the sale proceeds would not come to the GP as it would go to the government.

20.6.8.1 Scientific Collection Procedure:

Collection procedure for a sustainable harvest is most important in scientific management. The collection procedure varies for different parts of trees / plants. An attempt has been made to categorize the NTFP items depending upon parts of utility and method of collection. These are as follows.

Many times, while collecting NTFP items, the local inhabitants do not use proper scientific method. The setting fire in the forest floor for collecting Sal seed, cleaning beneath Mohua trees by setting fire for collecting Mohua flowers, lopping of branches bearing seeds and fruit uprooting the plants bearing useful roots and tubers, complete debarking of trees having barks of commercial importance etc are the examples of unscientific exploitation. The items shall be collected without causing any harm to the trees and plants yielding them. Following scientific methods are suggested for collection of various NTFP items.



i. Leaf:

Leaf is the vital part of a plant. Photosynthesis takes place in the leaf. Hence removal of leaves reduce production of food materials for the plant. Only matured leaves can be removed if necessary. In many cases tender leaves are useful as a NTFP e.g. Sal leaf, Siali leaf, Palas leaf etc in that case leaves can be collected by plucking the leaf alone. In no case a branch can be sacrificed to collect leaf easily. In a year not more than 1/3rd of the leaf in a branch can be collected in different spell. This will not hamper the growth of the plant.

ii. Bark:

Bark of a plant is the protecting cover against external injury and against pathogens. Removal of bark of a tree / plant exposes it to external diseases. The debarking of trees yielding bark of commercial importance, viz, Lodha, Medha, Phenfena, Arjun, Asan, and Ashok etc is to be done at least atleast 3 feet above the ground so as to prevent injuries from fire, microbes and white ants. The debarking should be confined to the arms reach only for preventing damage to tender barks and juvenile buds. It is to be confined to one face only and should not exceed more than 1/3rd of surface of the bole. The remaining portion of bole should be left untouched so as to maintain continuity of the cambium. However, in view of the PCCF, Orissa instructions vide memo No. 10144 (31) dt.24-04-91, the lease for barks are to be discontinued on silvicultural grounds.

iii. Fruits / Seeds:

Fruits and Seeds are means of propagation of most of the species. Collection of Fruits / seeds should be taken up when the fruits are matured. In no case immature fruits should be collected as the desired result / medicinal value is not obtained from an immature fruits / seeds. All fruits should not be collected as there will be no seed / fruits for further propagation. For collection of fruits / seeds, it is observed that the branches containing ripe and green fruits are cut down and carried to home for selective plucking. This is the most destructive practice being followed. The following points may be bear in mind while collecting fruits / seeds.

- Only Ripe fruits to be collected.
- No lopping of branches containing the fruits.
- Tree branches to be shacked vigorously so that ripe fruits will fall. Then it can be hand pricked.
- If the fruits are small then collect the panicle / bunch having matured fruits above 75%.
- Clean the forest floor by a broom for ease collection from ground rather setting fire to have a clean floor.
- Leave at least 1/3rd of fruits on the tree for seed dispersal by animals / birds for future regeneration.



iv. Flowers:

Flowers of many plants are required for medicinal / Dye purpose. Dhatki, Sankha puspa (Aparajita), Palas, Ashok etc are collected. Mahua Flower is also collected in huge scale for alcohol and Cattle feed. While collecting flowers the following precautionary measures required to be taken.

- Some flowers fall freely from trees just after few hours of blooming. In such case collect the same from ground i.e. Mahul. Some mahua flowers shall be left on ground every day for wild animals.
- Some flowers remain attached to calyx for a long time. In that case, collect the flower handpicked climbing the tree.
- In cases of very small flowers, the entire inflorescence may be collected. It should be collected from the tree crown here and there not in a continuous fashion.
- Not more than 1/3rd of flowers should be removed from tree as it will mature to fruit / seed and held its propagation.
- Always remember that flower / fruits/ seeds are the future crop of the forest and its collection shall be limited leaving 2/3rd of the crop for future regeneration.

v. Tubers / Roots / Rhizomes:

Tubers / Roots / Rhizomes of herbs / shrubs / climbers are used for medicinal and for food purpose. Primary collectors dig out the Tubers / Roots / Rhizomes and throw the plant to die. The primary collectors shall be trained to take the lower part of the tuber. Rhizomes and top of the tuber which is used for propagation should be replanted in the same pit duly compacted to give rise a new plant for the next season. After planting, the debris are required to be removed from the site so as to save the tuber / rhizome from fire.

vi. Gum and resin:

Now availability of Gum and resins has been reduced. Still then Sal resins are being collected in many parts of the division. While collecting gums and resins, no deep cut shall be given to the trees yielding them. Artificial incision made over trunk should not be too large and deep to adversely affect the growth of trees. Intensive tapping for gums and resins is to be avoided as it may lead to damage and death of trees. The blazing will be done in staggered manner and not haphazardly. The shape of blaze should be triangular with angles pointing towards the ground. The initial blaze should be given at the breast height.

i. Honey & Wax:

Collection of Honey & Wax by tribal is an age old practice. The method adopted is very destructive and many Bee group are destroyed in the process. Sometimes bee hives were torched with naked fire killing most of the bee. Honey is extracted by squeezing the entire



comb by hand, which leads to accumulation of dirt in the honey. The honey collectors are required to be trained to collect honey by using slight smoke, removing the honey from the comb by using extractor. Then the comb shall be placed appropriately for use by the bee workers.

The forest fringe villagers should be educated about use of insecticides in agricultural crop and damage caused to bee / other useful insects.

ii. Mushrooms:

Mushrooms are collected from forest floor during rainy season. Mushrooms are usually spread through spores. Not more than 705 of the mushroom should be collected from forest floor so as to have a better collection during the season.

20.6.9 Measures to Improve Production of NTFP Items:

In all the rehabilitation areas NTFP yielding species are to be given due importance. Efforts are to be made to improve regeneration of NTFP yielding species in all forest blocks. As per the site requirement, the proportion of fruit bearing and NTFP yielding species are to be encouraged. The growth of existing NTFP yielding species is to be boosted by taking suitable silvicultural measures. The NTFP yielding species are not to be felled unless dead and uprooted. Over exploitation of seeds of various important NTFP yielding species is to be prevented for encouraging natural regeneration. The following points may be kept in mind to improve NTFP status in forest.

- Harvest / collect NTFP items by trained local collectors. Extensive training may be organized by the department. This is the only way to save NTFP resource in forests.
- Over exploitation is to be prevented. During collection period, forest staff should remain vigilant.
- Items of NTFP and period of Collection may be displayed at vintage points and VSS members are made aware of the fact.
- Steps to be taken to avoid unhealthy competition for collection. This leads to premature collection, cutting of branches even felling trees for collection of fruits.

20.6.10 Regeneration:

Regeneration of NTFP species in forests will improve quality collection. For inducing regeneration of NTFP species both in-situ conservation and ex-situ conservation is suggested.

20.6.10.1 In-situ Conservation:

The forest blocks of Telkoi Range, Ghatgaon Range and Keonjhar Range and part of BJP Range bear good NTFP species. It is recommended to have in situ conservation plots for good seed production, future propagation and will act as store house of NTFP Species of the



locality. The area needs to be closed to grazing and strict fire protection measures and no collection for five years will substantially enhance NTFP availability in the area and locality.

20.6.10.2 Ex-situ Conservation:

Under Ex situ conservation it is proposed to have plantations of important NTFP species which became rare and endangered in the locality. It is proposed to cover at least **100 ha** of plantation of following species in different patches of Tekoi, Ghatgaon and BJP Range.

- a) *Ashok (Saraca indica)*
- b) *Cane (Saccharum officinarum)*
- c) *Harida (Terminalia chebula)*
- d) *Anla (Emblica officinalis)*
- e) *Genduli (Sterculia urens)*
- f) *Sunari (Cassia fisula)*
- g) *Guluchi (Tinospora cordifolia)*
- h) *Satabari (Asparagus racemosus)*
- i) *Siali (Bauhinia vahlii)*

20.6.10.3 Demonstration Plots:

In order to educate the public / baidyas and students Demonstration plots of climbers having medicinal value is required to be developed within forests of Telkoi, Ghatgaon, Keonjhar close to visiting places on limited scale. A ten hectare demonstration plot may be developed in one compartment suitable and near to Ghatgaon, Badghagara.

20.6.11 Associated regulations and measures:

per **the Orissa Grama Panchayats (Minor Forest Produce Administration) Rules, 2002**, collection of most of the NTFP is vested with the Grampanchyat. The Rule is at **Annexure-XVII and** NTFP policy of 2000 rule is attached as **Annexure-XVIII**.The provisions may be followed for all purpose relating to NTFP (Minor forest Produce).





CHAPTER -21

WILDLIFE (OVERLAPPING) WORKING CIRCLE [WL(O)WC]

21.1 Name of Working Circle:

Wildlife is an integrated part of forest management. The National Forest Policy 1988 has emphasized the need to conserve Wild Life and their habitat. Wildlife management is the management process influencing interactions among and between wildlife, its habitats and people to achieve predefined impacts. It attempts to balance the needs of wildlife with the needs of people using the best available science. Wildlife management is interdisciplinary that deals with protecting endangered and threatened species and subspecies and their habitats, as well as the non-threatened agricultural animals and game species. The Wildlife Management program emphasizes both applied and basic research in wildlife ecology, management, education and extension.

Wildlife management takes into consideration the ecological principles such as carrying capacity of the habitat, preservation and control of habitat, reforestation, predator control, re-introduction of extinct species, capture and reallocation of abundant species and management of “desirable” or “undesirable” species.

In order to have a basic management approach this working circle has been constituted i.e. **Wildlife (Overlapping) Working Circle**. All forest blocks (RF, PRF, and DPF) included for management are also included in this working circle. The total area assigned to this Working Circle is **141223.2031ha**.

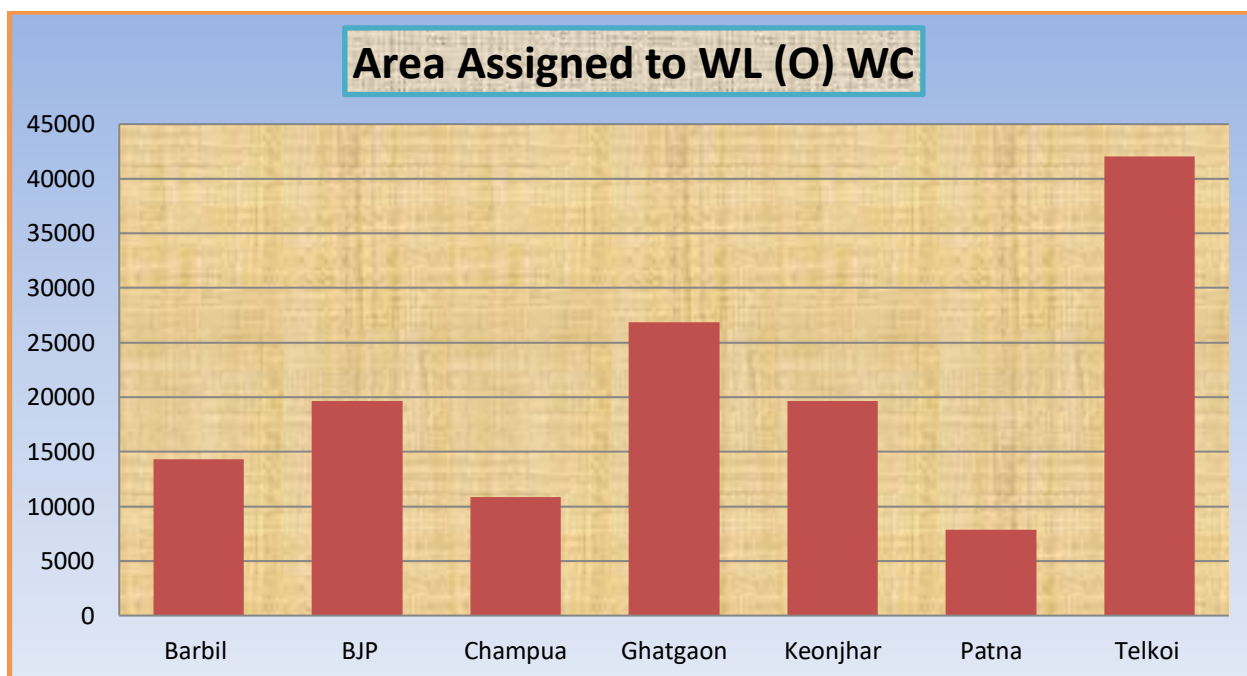
21.2 General constitution of working circle:

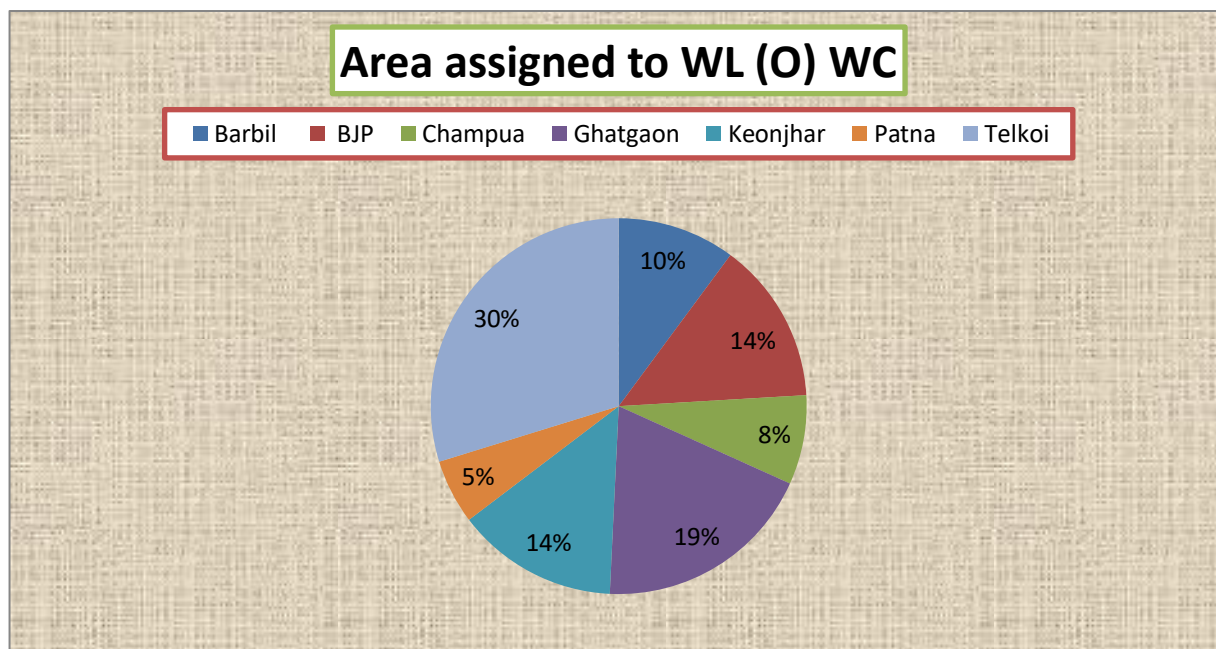
The natural forest area is the niche for the Wild animals. Due to presence of Karo-Karampada Elephant Corridor and Telkoi Pallahara the movement of animals is normally experienced in Badbil, Champua and BJP Range, Telkoi and Ghatgaon Range. The Singbhum Elephant Reserve of Jharkhanda state is adjacent to Keonjhar Division Barbil & Champua Range. Migration of Elephant from Singbhum west to Keonjhar division is frequent and in a large scale. The forests assigned to this Working Circle are all Reserved Forests, All PRF, and DPF of the Division. The range wise area assigned to this working circle is as in Table No 21.1



Table No 21.1 Area assigned to Wildlife (O) WC : Keonjhar Division

Range	RF	PRF	DPF	Total	%	JFM
Barbil	13793.2551		518.2300	14311.4851	10.13	586.0000
BJP	2742.3730	5920.6116	11009.6682	19672.6528	13.93	4364.8380
Champua	9912.8311	463.3400	483.8673	10860.0384	7.69	4079.5760
Ghatgaon	26588.8095		250.1693	26838.9788	19.00	6707.4170
Keonjhar	16063.0325	3575.4201		19638.4526	13.91	8145.3270
Patna	7656.6000	31.0200	161.4343	7849.0543	5.56	3385.2359
Telkoi	36142.2023	4974.8109	935.5279	42052.5411	29.78	8383.6870
Total	112899.1035	14965.2026	13358.8970	141223.2031	100.00	35652.0809





21.3 General characteristics of vegetation:

The forests of Keonjhar Division are mostly Moist Deciduous Sal Forests and partly Dry Deciduous Mixed Forests. The forests are of all age classes with other fodder species for animals. Due to proximity to river Baitarani many rivulets flowing in the forests meet the requirement of water to animals. Badghagara Irrigation Project attracts many birds / wild animals / amphibians to the surrounding forests. Probability of sighting of elephant in any forests of Champua, Badbil and Telkoi are very high. Other animals / birds available in the division have been described under Chapter 3 of this plan.

21.3.1 Special features:

There are 14 elephant corridors in the state out of which two important corridors are in Keonjhar division. These are as follows.

Table No 21.2 Elephant Corridors of keonjhar Division.

S/no	Name of the Corridor	Extends over Districts	Name of the Divisions	Length of corridor(km)	Width of corridor (km)	Total area(Sq.km)
5	Telkoi-Pallahara INTER-DISTRICT	Keonjhar; Angul	Keonjhar, Deogarh	30.4	0.2 - 0.6	13.24
6	Karo (Keonjhar)-Karampada (Saranda, Jharkhand) INTERSTATE	Keonjhar, (Jharkhand)	Keonjhar	15	0.3 - 2.3	17.3

a) Karo- Karampada Elephant Corridor:

This corridor connects Karo and Sidhamatha Reserve Forests of Keonjhar Forest Division of Odisha with Karampada Reserve Forest of Saranda Forest Division of Jharkhand state. Elephants move through hilly terrain and mining dominated landscape. Currently elephant movement occurs between Karo and Karampada Reserve Forest through Haramotto-Kolhapunduli-Jhandiburu-Nawagaon-Karampada. Elephant movement has also been reported near Kiriburu Hill Top and Arjun Ladha mine near Jhirina nallah. The foothills of Karo RF are ideal for elephant movement and if a part of SAIL mining area is left for the corridor and restored then there is a possibility of usage of foothills to move between Karo and Karampada RF.



Habitat quality: A total of 23 plant species were found in sampled area of 0.16 Ha. Of these

Seven species were palatable food species of elephant. Maximum frequency was found in *Shorea robusta* (42), followed by *Anogeissus latifolia* (11), *Terminalia tomentosa* (10), *Diospyros melanoxylon* (10) and *Symplocos racemosa* (4). Maximum average GHB was found in *Lanneacoromandalica* (168 cm), *Buchanania lanzan* (97 cm), *Pterocarpus marsupium* (92 cm), *Ailanthus excelsa* (89 cm) and *Shorea robusta* (71.84 cm). Maximum average height was found in *Lanneacoromandalica* (16.76 m), followed by *Shorea robusta* (14.61 m), *Terminalia bellirica* (13.34 m), *Ailanthus excelsa* (12.8 m) and *Syzygium cumini* (12.8 m). Wood cutting and logging signs were found high indicating severe pressure on the vegetation quality. *Lantana camara* invaded the corridor forming large expanse of open areas. The proportions of ground cover were found as barren ground (71.25%), shrub (24.06%), herb (2.81%) and grass (1.88%).



Forest/Landuse

1. Reserved Forest
2. Mines
3. Factories/industries
4. Human settlements
5. Roads

Other ecological importance

1. Parts of Garhjat Hills
2. Elephant Range: East-Central India
3. Elephant Reserve Name and No.: Baitarani ER (No. 6) under Proposal; Singhbhum ER (No. 2)

2)b) Threats

1. Mines: Bolani mine of SAIL and Arjun Ladha mine located between Kiriburi town and Haramotto village has totally blocked the elephant movement through the foothills.

2. Beneficiation Plant in Haramotto: Construction of a beneficiation plant in Haramotto village located in prime elephant movement area has hindered elephant movement and could severely affect elephant movement in future.

3. Human settlement: Biotic pressure (fuel wood, sal leaves etc.) Haramotto, Kolhapunduli, Base Camp, Kiriburu Hill Top, Kiriburu Town, Nawagaon, Bhangaon and Karampada situated in and around the corridor.

i) Socio – economic details

A total of 5 villages are located in and around the corridor. Of these, Haramotto and Kolhapunduli villages are located in the important elephant movement area and were considered for detailed survey. We surveyed a total of 15 families in Haramotto and Kolhapunduli villages. All surveyed households have agriculture land but more than 80% of which left uncultivated. Employment in nearby mines and factories leads to less cultivation in Haramotto. Villagers of Kolhapunduli depend on cultivation and also on daily labour work. All sampled households collect fuel wood and NTFP from the corridor forest. All respondents reported existence of human-elephant conflict but intensity of conflict has been decreasing over time. Decreased intensity of conflict is attributed to less cultivation by majority of respondents, and some believed decrease in elephant population and impact of mines and factories in the nearby areas. All respondents in both the villages except one in Haramotto showed positive response toward elephant conservation and their faith on elephants remained unchanged.

Corridor dependent villages

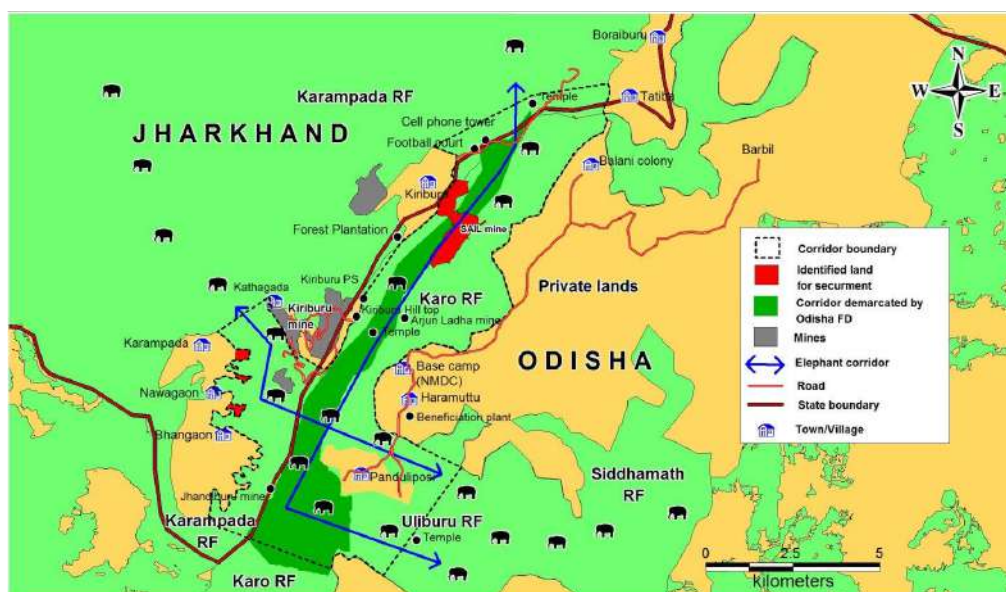
Haramotto, Kolhapunduli, Kiriburu Hill Top, Kiriburu Township, Bhangaon, Nawagaon, Karampada

ii) Human – Elephant conflict:

Elephant death and Human Kill are being reported sometimes in the corridor area. Villagers reported elephant attack claimed four person lives in Kolhapunduli village during the last 10 years. Crop damage by elephants has been decreasing over the years as a result of less cultivation as well as less elephant movement.

Conservation Plan

1. The corridor should be notified by the State Forest Department and legally protected under appropriate law and actions to prevent illegal mining and construction, diversion of forestland for non-forestry and developmental activities in the corridor.
2. Some mining areas may be immediately reclaimed and steps may be initiated to restore the corridor and to bridge the fragmentation of the corridor.
3. Secure private lands in Karampada and Nawagaon in consultation with villagers.
4. Construction of Beneficiation plant in Haramotto village should be reconsidered.
6. Adequate and timely ex-gratia support to people affected by elephants.
7. Undertake eco-developmental activities in the surrounding villages (Haramotto and Kolhapunduli) to reduce dependency on corridors of the forest.
8. No mining be allowed between Jhandiburu and Kiriburu mines.



b) Telkoi-Pallahara Elephant corridor:

This corridor is of 30.4 km with an width of 0.2km To 0.4 km. Number of forest blocks from Telkoi Range (Keonjhar Division) and Khamar Range / Pallahara Range (Deogarh Division) are coming within this 30 km long corridor. The corridor bears good vegetation and least disturbance as on today. It is liked by elephants. The NH 159 segmented the corridor. The



entire length of corridor may be protected and villagers may be motivated to have a friendly approach.

c) Elephant Conservation Issues:

The factors impinging on conservation of elephants in Odisha fall under two distinct categories.

a. Activities like hunting for tusks and killing by villagers in retaliation for depredation caused by single elephants or herds;

b. Diversion of forest lands, mainly for mining of forest land, encroachment, and shifting cultivation leading to loss/ decline/fragmentation/degradation of elephant habitat.

d) Strategy and Action Plan:

- I. Constitution of 'Elephant Reserves' by including the contiguous elephant habitats, ranges and the corridors between them. (Baitarani ER).
- II. Evolving appropriate management of the designated 'Elephant Reserves' and other Elephant Habitats and conservation of the traditional migratory paths.
- III. Measures to minimise the problem of crop-raiding, house damage and killing of humans.
- IV. Management of problem elephants or 'Problem Populations' by means of capture/ translocation/ domestication and other methods. Public awareness is the best way to combat and reduce man- animal conflict.
- V. Adoption of 'Animal Welfare' measures. Domestication and use of elephants for tourism, patrolling, etc have to be done carefully without subjecting the elephant to undue stress and ensuring proper upkeep and care of the animals.
- VI. Improvement of the quality and security of the life of the human population who share any elephant habitat and its resources for daily living.
- VII. Research on aspects of elephant conservation.
- VIII. Education and awareness campaign.
- IX. Setting up of veterinary units for medical attention to sick elephants in each Elephant Reserve.
- X. Training of mahouts and elephant managers.
- XI. Regional Wild Life Management Plan to be scrupulously is implemented.

21.4 General characteristics of Fauna available:

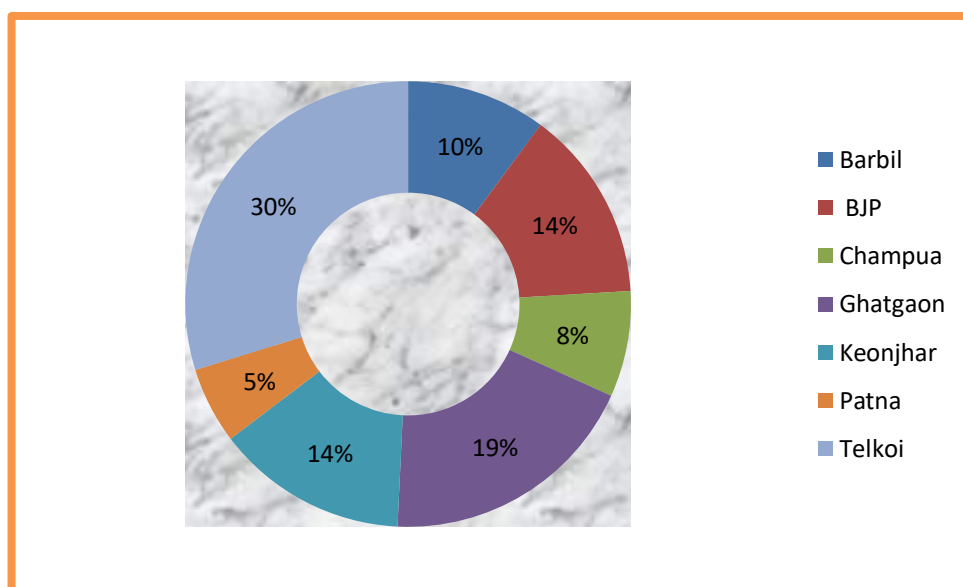
Elephant is the focus animal of the division. Leopards are also live in dense forests of the division. Other carnivours and hervivourous animals are seen in abundance to good concentration in this division. Due to proximity to Baitarani River, Bada Ghagara and other wet lands within the division, aquatic life in wild, avifauna, winter birds are observed.



21.5 Management Series and JFM areas:

For management purpose the Range is being considered as a Unit. As such Division has been divided in to seven management Units as detailed below. (Table No 21.3)

Table No 21.3 Area assigned to various Management unit					
Range	RF	PRF	DPF	Total	%
Barbil	13793.2551		518.2300	14311.4851	10.13
BJP	2742.3730	5920.6116	11009.6682	19672.6528	13.93
Champua	9912.8311	463.3400	483.8673	10860.0384	7.69
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Patna	7656.6000	31.0200	161.4343	7849.0543	5.56
Telkoi	36142.2023	4974.8109	935.5279	42052.5411	29.78
Total	112899.1035	14965.2026	13358.8970	141223.2031	100.00



21.5.1 Blocks, Compartments and JFM area:

The area assigned to Wildlife (O) Working Circle has been assigned to VSS for protection and management. The area assigned to VSS under JFM Resolution is at Table No 21.4

**Table No 21.4 Area assigned & JFM area in WL (O) WC: Keonjhar division.**

Range	RF	PRF	DPF	Total	%	JFM
Barbil	13793.2551		518.2300	14311.4851	10.13	586.0000
BJP	2742.3730	5920.6116	11009.6682	19672.6528	13.93	4364.8380
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Telkoi	36142.2023	4974.8109	935.5279	42052.5411	29.78	8383.6870
Total	112899.1035	14965.2026	13358.8970	141223.2031	100.00	35652.0809

21.6 Special objectives of Management:

The special objectives of management are in line of general objectives of Working Plan. All objectives under Elephant Reserve are also objectives of this working Circle. Besides the above other objectives are as follows.

- To Conserve, Protect and improve existing wild life and their habitat.
- To enhance bio-diversity and Wild Life population in the region.
- To involve people in management of Wildlife & associate them in preventing crime against Wild animals.
- To build up scientific knowledge on wildlife resources of the region.
- To train personnel at various levels for conservation and management of wildlife.
- Carry out research relevant to management including the development of techniques appropriate to Indian conditions especially to this locality.
- To educate people about wildlife and need for their conservation.
- To prevent sporadic and strategic crime against wild animals / birds.
- To protect Life and properties of public against animal depredation.

21.6.1 Concentration of Fauna.

The probability of sighting of animals etc in various forest blocks indicates the concentration of Fauna. The sighting frequency is furnished below. (Table No 21.5)

**Table No 21.5 Probability of sighting animals in different blocks.**

Range	Forest Block	Wild animals and birds	Rarely seen
Barbil	Karo, Sidhmath	Elephant, wild boar, black bear, spotted deer, mouse deer	Jackal, Sambar, barking deer, porcupine, mouse deer, monitor lizard, fishing cat, civet cat, hyena,
Champua	Baitarani-A, Baitarani-B, Mooney, KalikaprasadJadipada, Nayagarh	Elephant, wild boar, black bear, spotted deer, Egrets, Kingfisher, Pelicans, Gadwall, Indian Ponds Heron, King Fisher, Large Whistling Duck, Little Cormorant.	Jackal, Sambar, barking deer, porcupine, mouse deer, monitor lizard, fishing cat, civet cat, hyena,
BJ&P	Siddhamath DPF	Elephant, wild boar, black bear, spotted deer, Mouse deer Bar-Headed Goose, Great Crested Grebe, Indian Ponds Heron, Indian Stocks, Little Cormorant, Little Egret, Waterfowl, White breasted water hen, White Stork.	Jackal, Sambar, barking deer, porcupine, mouse deer, monitor lizard, fishing cat, civet cat, hyena,
Ghatagaon	Kalimati RF, Barabanka RF	Elephant, wild boar, black bear, spotted deer, Black Stork, Bronze - winged jacana, Cattle Egret, Common Sandpiper, Great Cormorant, Indian Ponds Heron, Indian Shag, King Fisher, Lesser Whistling Duck, Little Cormorant, Little Egret, Geese, Storks, White breasted Kingfisher, White breasted water hen	Jackal, Sambar, barking deer, porcupine, mouse deer, monitor lizard, fishing cat, civet cat, hyena,
Keonjhar	Nalapanga RF, Sidhamatha RF, Nayagarh RF, Naranpur RF, Khajuribani RF, Raghunathpur RF, Nayagarh RF,	Elephant, wild boar, black bear, spotted deer, jackal, sambar, barking deer, porcupine.	Leopard, mouse deer, monitor lizard, fishing cat, civet cat, hyena, monkeys (both Pati and hanu), fox, armedilo etc.
Patna	Atei, Padmapur RF, Patna RF,	Elephant, wild boar, black bear, spotted deer, jackal, sambar, barking deer, porcupine,	Leopard, mouse deer, monitor lizard, fishing cat, civet cat, hyena, monkeys (both Pati and hanu), fox etc
Telkoi	Bandhanjhari RF, Saleikena-siriabahal RF	Leopard, mouse deer, monitor lizard, fishing cat, civet cat, hyena, monkeys (both Pati and hanu), fox, armedilo etc Egret, Great Cormorant, Little Grebe, Little Cormorant, Little Egret	Leopard, mouse deer, monitor lizard, fishing cat, civet cat, hyena, monkeys (both Pati and hanu), fox, armedilo etc

21.6.2 Management Approach:

For management of wildlife the basic elements are outlined as follows.



Management of wildlife depends on certain elements such as public support and awareness to protect wildlife and their habitats.

- a) **Public Participation:** It is necessary to make local people realise and accept the idea and importance of wildlife protection. Public interaction can help in making local people responsible and cooperate in enforcement of wildlife management laws and regulations. Their feedback should also be taken for effective functioning of wildlife management.
- b) **Public Awareness:** People should understand the concept of conservation of natural resources. The wildlife managers and other responsible persons should held public discussions, shows, and talks and should also take help of other media like newspapers, magazines, radio and television to make people aware about the basic concepts behind wildlife management. This can stop people from exploiting natural resources, which is the major threat to wildlife and their habitats
- c) **Education:** The role of education in pubic awareness programs is very important. There should be environmental subjects based on wildlife conservation in school and college curricula. The well-educated and trained specialists on environmental and forest issues should participate in public training and interact with people and solve their queries to make them more responsible towards their wildlife management duties.
- d) **Nature Interpretation Centres:** Nature interpretation centres may include setting up of educational camps or exhibition in nearby regions of wildlife importance.
- e) **Coordination:** Wildlife management is operated at four basic levels – local, state, national and international. Overall coordination for animal conservation, propoagation and management is essential.

In general, the following guiding Principle may be adopted.

The general management practices involves

- a) Improvement of existing habitat and Development of new habitat for any species found in the locality.
- b) Preservation of existing wetlands.
- c) Adequate Fire Protection Measures.
- d) Providing a conducive and safe breeding zone for existing animals.
- e) Protect nesting of migratory Birds in Mahanadi River and Hirakud Reservoir.
- f) Provide water to animals during summer.
- g) Create & maintain grass lands.
- h) Remain vigilant against poaching of animals by live electric wire and loops.

- i) Take legal action against poachers.
- j) Public education / awareness camps on wild animals.

21.6.3 Methods of Treatment:

21.6.3 (i) Improvement of Habitats:

Special habitats are biological in origin and provide habitat functions for small Wild animals. They include snags, snag recruits, den trees, down wood, isolated large old trees, trees with fluting boles, buttresses, lianas, some significant species of fruit bearing trees and shrubs. These special habitats have been neglected in the past. Care should be taken while implementing the prescription of the Plan to maintain these special habitats.

a) Snags:

As a thumb rule, maintain at least the 5 tallest and largest diameter snags per hectare, in a well distributed design in all silvicultural treatments. Retained snags need to appear in the compartment history. These are vital for a variety of primary hole-nesting birds like Woodpeckers and Barbets, which are colonized by secondary hole-nesters like Hill Mynas, Rollers, and Owlets etc during subsequent years.

Snag Recruits:

Likewise maintain 5 snag recruits per hectare. These are dying trees, mostly affected by heart rot fungus but not quite dead. They can be recognized by their external symptoms. All such trees, which are being retained, need to be reflected in the compartment histories. These, along with snags provide a very good substrate for epiphytic orchids, birds and insects.





Down Wood:

Many species require or use down wood (fine and coarse woody debris) as habitat. Where forestry has been practiced for several rotations large proportions of these species are considered threatened. Key attributes determining the suitability of down wood as habitat are decay stage, tree species, and size, specifically diameter. Both quantity and distribution of suitable down wood influence species' presence and abundance.

In felling operations, among the rejects, apart from lops and tops, large size irregular shaped hollow logs often feature. Being uneconomical they usually remain on site, or are



converted into fuel wood. Such large sized woody material provides critical ecological functions in support of maintenance of vegetation and animal diversity, besides serving the functions of cover and microhabitat for several species. The largest size hollow logs, or rejects for any reason need to be maintained at the rate of at least three logs per hectare, and as far as practicable evenly distributed. These should suitably find place in the compartment history.





b) Large Old Trees:

These would naturally occur in low densities. The Ficus species should not be counted among these, since Ficus is not felled even otherwise. Large old trees of different species as and when encountered need to be reserved in any felling or tending operation. These retained trees (2 to 4 per ha) need to be entered in the compartment histories and serve as daytime roosts or nesting sites for birds, large owls of Bubo species.

c) Trees with Fluting Boles, Buttresses and Holes:

These are expected to occur in very low densities represented by a small number of species. They provide significant microhabitat functions for small mammals like the Mouse Deer and reptiles. One such trees at least, the largest possible, needs to be retained per hectare and entered on the compartment history.

d) Lianas and Tangled Climbers:

Climber cutting operation is a standard practice, which has been prescribed in all Working Circles. However lianas provide significant habitat functions in support of mobility of arboreal animals, and depending on animal species, serve as resting and escape cover for primates. They are equally important for arboreal small carnivores, some rodents and lizards. A climber with tangles is especially important. It is recommended that woody well distributed tangled climbers all over the area may be retained & entered in the compartment histories.

e) Fruit Bearing Trees and Shrubs:

In all operations keeping fruit bearing tree species in felling or tending operations is the standard practice. Species providing fruits to local human inhabitants and Wild Life are to be retained / nursed and propagated. The information on human use is probably complete but the same cannot be said to Wild Life. The species liked by animals/ birds needs to be elaborately listed by local observation and distribution needs to be recorded.

f) Roosting or Nesting Trees:

All trees which are known to support nesting colonies of water birds or roosting congregations of raptors or other birds need to be retained. This is crucial especially with reference to vultures, which are critically endangered along with Pallas's Fishing Eagle and White-bellied Sea Eagle, which have become very rare in this tract. It helps migratory birds along Rivers / creeks etc.

g) Maintenance of Creaks:

From forests nallas are flowing to rivers and MIP projects. During full reservoir level back water from reservoir remain for 3/ 4 months on these nalla within the forest area. Such nalla / creaks are required to be maintained so that water is retained on nalla for a longer period.

**h) Maintenance of Wet lands:**

Wetlands are breeding grounds of reptiles, birds etc. Day by day wetlands are vanishing due to land filling / construction etc. Many wetlands are under administrative control of Revenue department. Initiative is to be taken by the forest department to map the wetlands through Satellite imagery and GPS. The list of such wetlands needs to be approved by the District administration and maintenance of such wetlands may be regulated by the Forest department. The maintenance involves

- Demarcate extent of wetland.
- Partial de-silting of wetland.
- Allow growth of submerged weeds palatable to birds to some extent.
- Allow fish fauna / snails/ crabs to breed & grow naturally.
- Prevent fishing, poaching of birds in the designated wetland.

i) Creation & Maintenance of Grass Land:

The common wildlife species available in the division are herbivorous. They also support carnivores to sustain on their prey base. Day by day grass lands are reducing posing a stress time for herbivorous. It is highly required to create and maintain grass lands inside forest blocks, Village forests, river banks, near wetlands and swampy areas. This will boost the concentration of food base for herbivorous vis a vis carnivores.

j) Providing water to animals:

The forest blocks are mostly of hilly terrain and water impounding within forest area is poor. During summer, provision of water inside the forests is important. Hence creation of water holes / Water body and impounding of water through check dams is suggested.



k) Improvement of Elephant Corridors:

It is required to improve the existing corridors so as to allow safe passage of animals. As large area of privately owned lands is involved or corridor lands are settled by weaker sections of society, it is not possible to displace them from the corridors. Corridors can only be strengthened through making adequate provisions for safe guarding people's lively hood, especially in tribal dominated tracts of the division Economic incentives or adequate financial package are necessary to persuade people to maintain wildlife friendly land use that would allow movement of elephants. Steps also to be initiated to divert the linear projects those fragment the habitat and corridors. A comprehensive Corridor management plans is required to be prepared in consultation with the villagers, wildlife experts and silviculturist. The elephant corridor management plan may focus on the basic matters outlined below

- a) Villages within the Corridors and its population;
- b) The land use pattern with special thrust on Agricultural practices;
- c) Forest blocks and extent of area and its proportion;
- d) Liner infrastructures within the corridors and its effect on movement of elephants/animals;
- e) Mining and other industrial growth within the corridors;
- f) Possibility of change of cropping pattern and introducing agro forestry practices;
- g) Complete tracking of elephants by squad and with the help of modern technology, dronecamera etc.;
- h) Improve tree cover/elephant liked fodders in forest blocks coming in corridors.

21.6.4 (i) Providing Protection:

It is of paramount importance to provide adequate protection to available fauna / migratory birds and elephants/ tiger / leopard. Adequate protection measures are required. Deployment of squad, construction of watch tower and patrolling are suggested measures for protection of Wildlife.

21.6.4(ii) Detail study of Animal behaviour & scientific Documentation:

Detail study of various animal behaviours / life cycle, reason for dwindling population and effect of increase in human interface is required in depth with a scientific approach. Periodical documentation is also stressed upon.



21.6.4(iii) Creation of Public awareness & public participation in management:

For better management and co-habitation with animals, required public awareness is required. It is proposed to conduct awareness camps with villagers, School Children and other functionaries including voluntary organizations.

21.6.4(iv) Reduction of Human- Wildlife Conflict:

The Humman- wildlife conflict is in a rising trend in Champua, Barbil and BJP range due to increased Mining activities. Disturbances in Karo- Karampada Elephant Corridor due to mining by SAIL has **“Made the corridor disturbed”**. The movement of elephant in this region has been influenced by River Baitarani, Rail Corridors, Road network and rapid Mining & Industrialization. In order to reduce Man- animal conflict and crop depredation the following measures are suggested.

- i. Change in cropping pattern,
- ii. Development of elephant corridors at least of 500 m identifying the land in field.
- iii. Development of water sources & availability of clean water to animals.
- iv. Motivating People “not to disturb” elephants / other animals.
- v. In case of Crop raiding, not to drive them out which results in more damage and human causality.
- vi. Immediate compensation to victims of crop raiding. / Kill & injury.

21.6.5 Threat to wild animals & Suggested Mechanism:

The threats to wildlife have been dealt with at length in chapter-3. Some of important threats are

- a) Annual Fire and loss of Ground Flora.
- b) Fragmentation of Habitat by rampant mining in Barbil, Champua and BJP Range.
- c) Rapid industrialization due to mining and ancillary units.
- d) Heavy biotic interference and intrusion by domestic animals (Cattle/ Goat/ Sheep)
- e) Transmission of contagious diseases from domestic cattle to Wild animals.
- f) Poaching by putting nets/ loops and live electric wires.
- g) Hunting of birds.
- h) Public irritation against crop damage.

In order to handle the situation it is proposed to

- Prevent forest fire with the help of VSS/ Public.
- Equip the forest staff with modern fire fighting tools.
- Have intelligence network deep inside the forest especially close to Sanctuary.



- Make public aware about ill effect of loss of bio diversity and loss of threatened flora and fauna.
- Enforce provisions of the wildlife (Protection) Act, 1972.
- Take help of Wildlife Crime Investigation burro in Inter District Organized Crimes.

21.6.6 Measures being implemented:

The Divisional Forest Officer, Keonjhar is implementing approved Site Specific Wildlife Conservation Plan being funded by various Mining / Industrial Projects. Steps like improvement of habitat by crating water body, Planting of Fruit bearing species, Solar fencing, Bee fencing, Augmenting patrolling system, deployment of Gajasathi to have a watch over elephant movement, Commissioning early warning system, Watch through Drone camera, strengthening secret information system Etc.

In order to help farmers to protect their crop Machans being constructed in villages, watch towers, Fire protecting measures are ensured.

Plantations on the corridor has been taken up.

In the recent past Project Elephant Division of MoEF&CC, Government of India has made a critical observation on mining vis a vis Elephant corridors. The observation is furnished below for reference.

“The comments of Project Elephant are as follows:

- 1) The State Government of Odisha had submitted a proposal seeking prior approval of Government of India, under section 2 of Forest Conservation Act, 1980. The proposal was placed before FAC in its meeting held on 23.1.2020 and the FAC inter alia recommended seeking comments from the Project Elephant Division of this Ministry.
- 2) The elephant is a Schedule I species and also a National Heritage animal. Therefore, highest degree of protection has been accorded under the provisions of the Wildlife (Protection) Act, 1972.
- 3) The letter from FC Division states that movement of wild elephants is often witnessed in the proposed area. The forest area within the lease area falls under elephant habitat zone 2 as mentioned by ORSAC, Bhubaneswar. This itself prove that the proposed mining area is an important elephant habitat.
- 4) In this regard, a letter was sent to CWW, Odisha on 16th April 2020 for seeking comments on the status of elephant habitats and movements of elephants in the proposed lease area, Comments of the State Forest Department of Odisha was also received and the same is enclosed for information.
- 5) As per report received from the State of Odisha, elephant movements were noticed along with other wild animals in the proposed mining site. Villages like Handibhanga,



Jamupani, Dubuna, Purunadihi, Basantpur, Naibuga, Kaijhor, Patakudar, Nedigotha, Saradapank, Katupali etc. are situated inside and around the mining lease of Dubuna-Sakaradihi iron and Manganese mines and compensation have been paid for crop and properties damage by wild elephants in these villages. These show the presence of elephants and intensity of Human Elephant conflicts in the proposed mining area.

- 6) The proposed lease area is adjacent to the Karo-Karmapada Elephants Corridor identified in the Elephant Task force, “Gajah” report of MoEF &CC and Mayurbhanj Elephant Reserve. Further, the elephants are reportedly moving through the proposed mining area. Considering the fact that elephants are long ranging animals, the movements of elephants through the proposed mining areas should be viewed seriously. Therefore, the securing elephant corridor is important for mitigation of HEC in the high HEC prone area.
- 7) Ministry of Environment, Forests and climate change constituted high level Elephant Task Force in 2010 and have identified critical elephant corridors in the country. The Elephant Task force report suggested the following points for securing corridors.
 - a. Creation of community or Conservation Reserve,
 - b. Declaring the corridor as high priority ecologically sensitive, Area under Environment Protection Act 1986 with maximum regulation of ecologically destructive activity.
 - c. Declaring corridor land as Reserved forest or Protected Forest under Indian Forest Act,
 - d. Community Forests under the Forest Right Act,
 - e. Increase boundary of existing protected area and make corridor part of the existing PA.

The Ministry of Environment, Forest and Climate Change has already requested State Government to secure the priority elephant corridors as mentioned in the Gajah Report 2010.

- 8) The Task Force Report (2010) also states that mining, especially open cast mining has dealt a severe blow to elephant conservation in the country, especially in Central India where most of elephants areas in Singhbhum, Keonjhar, Mayurbhanj, Dhenkanal, Angul and Phulbani have been severely fragmented leading to increased HEC and movement to adjoining states of Chhatisgarh and west Bengal
- 9) The Task Force also recommended that the mining leases in Elephant Reserve should be reviewed. In areas that are not Elephant Reserve but used by Elephants, lease should be viewed with caution.
- 10) The Hon’ble Supreme Court of India, in its orders dated 9th August, 12th July and 24th October 2018 on the WP 487 of 1996 in the matter A. Rangarajan and Ors vs Union Of India directed Tamil Nadu Government to stop all the activities in the Segur elephant Corridor area of Nilgiri for allowing free movement of elephants. This shows the



importance given by the Hon'ble Supreme Court to the issue of securing corridor for movement of elephants in the country.

- 11) Hon'ble Supreme Green Tribunal vide its order dated 14th Novemeber, 2018 in the writ petition no 246 of 2018 Pradip Kumar Bhuyan & Ors Vs Union of India & Ors Directed the Ministry of Environments, Forest and Climate Change to look into the issue by declaring all elephant corridors all over the country as Eco Sensitive zones by exercising its power under Environment Protection Act, 1986.
- 12) The Hon'ble Supreme court in writ petition (C) no 275 of 2015 titled Vidya Athreya and another vs Union of India & others by its order dated 19.01.2018 had directed the Standing Committee of NBWL to consider the suggestions made by the petitioners including the securing of elephant corridors to minimize human elephant conflict. The members of the committee were of the view that state governments should be requested to expedite their action on the Ministry's advisory. Members also advised that State Governments should explore the feasibility of declaring such corridors as Eco Sensitive Zones in case it is not possible to secure the corridors by acquisition of lands in these corridors. The final report has been submitted to the Hon'ble Supreme court of India.
- 13) As per the elephant population estimation (2017), the State of Odisha has the highest number with 1976 elephants (63%) in the East Central region. The state of Odisha has also very high Human Elephant conflicts with 778 human beings and 205 elephants getting killed due to human elephant conflicts in the State of Odisha in the last 10 years(2009 to 2019).
- 14) Considering the above facts and also the report of DFO, Keonjhar, the proposed mining activities may lead to escalation of the Human Elephant conflicts in the area (villagers in the mining areas already suffering due to HEC) and may also further endanger the lives of people and elephants in the area. Hence, FC Division may appraise the FAC, all these facts related to the proposed mining area, especially the elephants habitat, Human conflict status, reported elephant movements in the area and proximity of the site to an important elephant corridor(Karo-Karampada corridor) and possibility of further escalation of the the human elephant conflict in the area.; the decisions of Hon'ble Supreme court; National Green Tribunal etc related to securing elephant corridors, so that FAC may take a well considered decision on the proposal of the mining of Dubna-Sakradihi area in Keonjhar District of Odisha."



21.6.6 Associated regulations and measures:

In order to combat against transmitted diseases from domestic cattle, regular cattle immunization program in forest fringe villages is required. Grazing though prohibited in forests, it could not be enforced. It can only be checked if grass land could be developed outside forest area.

The attitude of public towards wildlife is required to be moulded to a conducive atmosphere. The mother earth is **“for all living creatures both Plant & Animals”**. This principle is to be adopted universally.





CHAPTER-22

JOINT FOREST MANAGEMENT (OVERLAPPING) WORKING CIRCLE [JFM(O)WC]

22.1 Joint Forest Management Working Circle:

Joint Forest Management often abbreviated as **JFM** is the official and popular term in India for partnerships in forest management involving both the state forest department and local communities. The policies and objectives of Joint Forest Movement are detailed in the Indian comprehensive National Forest Policy of 1988 and the Joint Forest Management Guidelines of 1990 of the Government of India.

Joint forest management is concept of developing relationships between fringe forest groups and forest department on the basis of mutual trust and jointly defined roles and responsibilities for forest protection and development. Odisha remains the first to pass the first resolution for JFM. At present, the JFM Resolution 2011 is the basis on which forests are assigned as follows.

“The forests of the State to be covered under this Resolution shall be grouped into the following two categories:

- (a) Reserved Forests, Protected forests, Village forests, Revenue forests etc. Not covered under Protected Areas.
- (b) Protected Areas (National Park and Sanctuaries) excluding Core Areas, and Mangrove Wetlands.

The Committee constituted for the first category of forests will be known as **Vana Surakshya Samiti (VSS)** while the Committee constituted for the second category will be known as **Eco-Development Committee (EDC)**. To have a common approach for Joint Forest management this Working Circle has been constituted and named as “**Joint Forest Management (Overlapping) Working Circle**” abbreviated as **JFM (O) WC**.

22.1.2 Salient Features of Joint Forest Management:

Joint Forest management encourages the development of partnerships between local people and forest department to manage forest resource jointly. It provides a communication structure for consultation and negotiation between forest Department and forest users and provides legalized access for the local communities to forest lands. JFM encourages local people to protect forest areas in order to prevent free grazing of livestock and to assist in preventing illegal activities by outsiders. JFM assures local people that a certain proportion of the intermediate and final harvests from forest lands will accrue to them.



22.2 General Constitution of Working Circle:

The main principle of JFM is to motivate the forest communities to protect the forest from over exploitation so that it meets the subsistence needs of the rural poor. JFM represents a significant shift in India's forest policy that balances community and government interest while remaining sensitive to local conditions, institutions and forest dependence. With this background, the JFM Resolution has outlined the category of Forests that has been assigned or to be assigned to VSS / EDC. The scope is spelled out as follows.

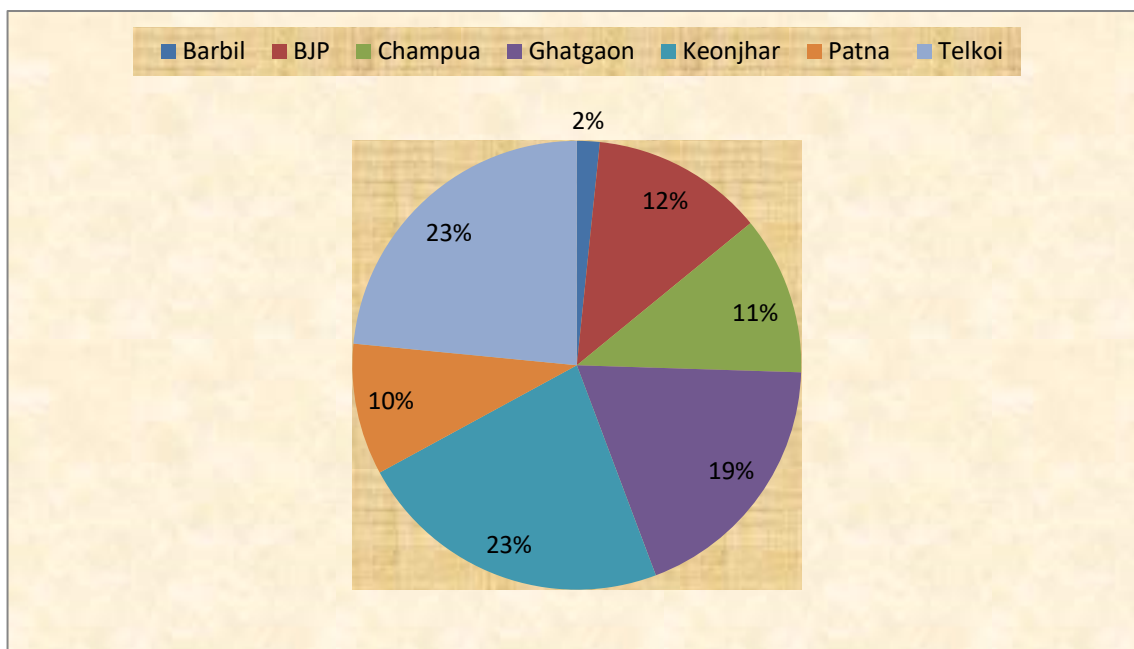
Area that can be assigned to VSS may be Reserved Forests, Protected forests, Village forests, Revenue forests etc. not covered under Protected Areas.

Area that can be assigned to EDC may be Protected Areas (National Park and Sanctuaries) excluding Core Areas, and Mangrove Wetlands.

At present 636 VSS has been constituted as per JFM Resolution and functioning as per Resolution 1993 / 2011, The Forests assigned to various VSS have been indicated in Chapter 13. The abstract of area assigned to VSS is furnished at Table No 22.1

Table No 22.1 Area assigned to VSS (Keonjhar Division)

Range	No of VSS	RF	PRF	PF	DPF	Total	Percentage
Barbil	27	586.0000	0.0000	0.0000		586.0000	1.64
BJP	97	916.1100	1350.2350	83.0000	2098.4930	4447.8380	12.45
Champua	84	3731.1760	298.4000	0.0000	50.0000	4079.5760	11.42
Ghatgaon	100	6707.4170	0.0000	0.0000	0.0000	6707.4170	18.77
Keonjhar	123	7609.9970	535.3300	0.0000		8145.3270	22.79
Patna	90	3225.2020	31.0200	0.0000	129.0139	3385.2359	9.47
Telkoi	115	7183.9970	801.0100	0.0000	398.6800	8383.6870	23.46
TOTAL	636	29959.8990	3015.9950	83.0000	2676.1869	35735.0809	100.00



Besides VSS constituted, there are VFC constituted under Odisha Village forest Rules, 1985 for management of Village forest declared u/s 30 of the Odisha Forest Act, 1972. The no. VFC constituted is 355. The range wise VFC is as follows.

Table No 22.2 Range wise VFC

Range	No of VFC	Area assigned in ha
Barbil	3	16.604
BJP	14	103.558
Champua	114	843.317
Ghatagaon	12	74.418
Keonjhar	58	437.47
Patna	130	1041.088
Telkoi	24	161.866
Total	355	2678.341

22.3 General characteristics of Vegetation:

The forests assigned to JFM (VSS) are mostly forest fringe area and categorized as Degraded Forests. The crop density varies from 30% to 70% and bears a good crop mostly of Eucalyptus, Acacia, San Chakunda, Bamboo etc in SFP plantations and Sal with its associates in natural forests. In some places Teak has also been planted.

All PF are of planted areas with timber species of importance. The growth pattern varies with age and nature of species.



22.4 Felling Series / Cutting Section and JFM Area:

The JFM assigned area is an Overlapping Working Circle. The forests assigned to respective independent working Circle will be applicable. Mostly the forests are assigned to Selection Working Circle, Improvement Working Circle, Rehabilitation Working Circle, Plantation Working Circle and Protection Working Circle.

22.5 Blocks, Compartments and JFM Area:

The area, allotted to different VSS is depicted on the Management Map (Topo Map of 1:50000 Scale). The list of VSS area assigned is furnished in Chapter 8 of this plan.

22.6 Special Objectives of Management:

The special objectives of Management of this Working Circle are as follows.

- i) To restock the degraded Forests through community participation.
- ii) To ensure protection, regeneration and management of the forest wealth through a participatory approach.
- iii) Mass Awareness campaign and motivation to the villagers is to be spread to every forest fringe village.
- iv) To make the people and Forest Department equal partners in management process.
- v) Demarcation and Survey of the area allotted under V.S.S.
- vi) Artificial regeneration in the degraded forest area is to be taken up to restore the barren and blank area.
- vii) Soil and Moisture Conservation Measures have to be adopted in the VSS assigned area and preparation of micro-plan to each VSS.
- viii) To reduce the dependency on forest, income generating activities are to be created.
- ix) The other Department involve in peoples participatory aspects like Agriculture, Horticulture, Soil Conservation, veterinary; Health, mass education etc. have to be involved to achieve all-round socio-economic development of the village.
- x) To develop VSS as an institution at local level to manage **“Natural Resource”**.
- xi) To have special thrust on **“Fringe Forest Management.”**

22.6.1 Analysis of the crop:

The Forests assigned to VSS are mostly degraded in nature except plantations under various schemes like Forest Development Agency (FDA) and Social Forestry Project (SFP) Plantations. Crop varies from natural forest to monoculture like Eucalyptus. Crop Density also varies from 30% in case of natural forest to 70% in plantations.



22.6.2 Silvicultural System:

The VSS area is under overlapping working circle. It overlaps with Selection Working Circle, Improvement Working Circle, Rehabilitation Working Circle, Plantation Working Circle and Protection Working Circle. The silvicultural system prescribed to these working circles will be followed as applicable. The Micro Plan of VSS is required to be revisited after approval of this working plan so as to accommodate the prescriptions of the working plan. The overall prescription of Micro plan shall be in line of prescriptions of this working Plan. In case of any contradictory prescription in micro plan is made by any VSS, the working plan prescription will supersede the micro plan prescription.

22.6.3 Method of Execution:

1. Demarcation of VSS Area:-

Demarcation of area assigned to VSS is very important task. The demarcation of area is to be done with pillar posting. It helps to give a specific identity to the VSS and to motivate them to protect and to avoid dispute between the villages. A uniform system may be adopted over the entire division while demarcating the VSS area.

A five year cycle for demarcation should be drawn up and it may be made mandatory for all Section Foresters / Range Officers to complete the demarcation process as scheduled. A special drive for it is essential.

2. Preparation of Micro-plan:-

Micro-plans should be prepared for each VSS irrespective of whether money for implementation is available or not. The micro-plan should be prepared keeping in view the overall prescription of the concerned Working Circle. Prescription like prescribed exploitable girth class of different species of the final harvest, specific marking rules, limiting the final yield with due emphasis conservation measures and biotic pressure etc. should be followed while preparing the micro-plan. The yield in the area assigned to the VSS should be calculated with due consideration to safeguard against erosion, illicit felling and other biotic pressure. The Plantation and Soil and Moisture Conservation Measures is to be undertaken and effort should be taken to obtain funds from different sources and while preparing the Micro-plans, PRA exercise are to be followed. Other tools like GIS and MIS can also be taken in to account. The detail process has been provided in the JFM Resolution-2011 Para -10. The same should be followed. In case of village forest, the management plan shall be prepared as per Rule 11 of the Odisha Village Forest Rule, 1985 (as amended vide F.F. and A.H. Deptt Notification No 27109 Dt. 17.11.1989)

3. Plantation & Choice of Species.



In many of the VSS assigned area due to protection by villagers some species have attained harvestable situation. After harvesting, the area may be planted up. The Choice of Species may be carefully decided so as to suit the soil condition and requirement of the villagers.

Whenever plantation exist in VSS allotted area, these plantation should be thinned and pruned as per requirements. (Prescription under Plantation Working Circle may be the guiding principle) Sweeping of floor of the plantations and twigs should be avoided since it affects the cycling of nutrients. Grazing and fire protection should be provided to all plantations. In natural vegetation area where crop is approaching established stage regulated grazing may be allowed after discussion in the VSS. These prescriptions should serve as a guideline while preparing the micro-plan in these areas.

4. Incentive Schemes for the VSS

The following incentive based activities shall be introduced under the Joint Forest Management (JFM) in order to increase village participation.

- (i) Entry Point Activities (E.P.A.)** in other words called Community Development Works (CDW) which includes small community infrastructures such as water tanks, rural roads/community halls as desired by the villagers which attract people's attention to the forest development activities. Forest/water conservation related activities as well as non-forest activities can also be selected for CDW based on the needs of each VSS. CDW shall be selected based on the Rapid Rural Appraisal (RRA)/Participatory Rural Appraisal (PRA) and incorporated in the Micro Plan prepared by the VSS. The implementers of these activities should start preferably before the plantation and other activities take place. The JFM Committee is required to collect user's fee for the assets provided by the CDW. EPAs are part of the community mobilization process taken up in the respective villages at the initial stage of project implementation. EPA will be selected in a well facilitated participation manner.
- (ii) Income Generation Activities (I.G.A.)** shall be identified at the micro planning stage. However, the local NGOs shall be required to provide inputs with regards to the marketability potential of the goods to undertake the IGAs by Self Help Groups (SHG) existing within a VSS. It is confirmed that IGA are not restricted in the forest related activities but any potential IGA activities are to be encouraged based on the agricultural, horticultural and forestry etc. produces are concerned. The value addition in the produces may be encouraged with handholding, capacity building and market linkage supports provided by the NGOs. Each Self Help Groups (SHG) may be provided. Revolving Fund supports from JFM Committee on loan basis to



undertake the Income Generation Activities. Prior to beginning of IGAs a market research will be undertaken by the group of specialists from specialized market research organization. It will look at a macro level market environment as well as field level situations in close collaboration with the NGOs assigned to the community. A final shortlist of potential options of project areas based IGAs for forest dependents and other poor communities will be assessed through the market research study for implementation to the IGAs. IGA will be implemented by the Self Help Groups through the help of Revolving Fund loans provided to the JFM Committee.

(iii) The Basic Livelihood Improvement Activities: Under such component, the fulfilment of basic human needs to make the local people capable for participating in JFM activities are to be prioritized during the micro planning process in the community. The provision of incentives to the local people towards the information dissemination on environmental protection and basic livelihood improvement activities. The following activities may be facilitated in the community on priority basis.

- a) Medical & Health Camps in convergence with the Govt. PHC/Hospitals.
- b) Prevention and Control of Vector & Water Borne Diseases.
- c) Reproductive and Child Health Care through providing seeds to VSS for kitchen garden.
- d) Non Formal Education Centres in the VSS for drop outs to school going.
- e) Promotion of Fuel Efficient Devices in convergence with OREDA.

(iv) Capacity Building Programmes: To enable VSS to manage the respective JFM areas, organizations and forests a standard JFM Management Manual in Odia will be prepared. Different trainings modules also to be prepared by the consultant agencies for imparting trainings to the JFM Committee in the following thematic areas.

- (a.) Maintenance and submission of records, reports and bills to forest departments at VSS level.
- (b.) Financial management, budgeting and book keeping.
- (c.) Duties and responsibilities of the General Body and Executive Body
- (d.) Conflict resolution mechanism.
- (e.) Forest protection and management arrangements.
- (f.) Sustainable harvesting management for different forest products.
- (g.) Beneficiary management within the community.
- (h.) Exposure trips/ exchange visits.



- (v) **VFDF (Village Forest Development Fund):** A financial establishment is essential for the VSS activities to be sustained. Provisions of budget for EPA, Revolving Fund for Income Generation Activities and Basic Livelihood Improvement Activities should be made under the Forest Department for implementation of a scheme. VSS will contribute to a Village Forest Development Fund by raising money from user fees for the asset created under EPA, penalty for illegal actions, interest from bank savings and sales for the forest products. The budget provided by the Forest Department for EPA, IGA & Livelihood Improvement Activities should be utilized only for the original designed objectives of a scheme while VFDF could be flexibly used according to the needs of the VSS. Provision of Corpus Fund may also be arranged under a scheme for strengthening of the JFM, VFDF. It suggested that at least 50% of the savings of the VFDF should be allocated for maintenance of the forest area after completion of the scheme.
- (vi) **Formulation of Micro Planning:** A Micro Planning is a comprehensive document to guide the VSS in pursuing all forest management for its JFM area, community development and institutional development and other intervention under a scheme designed. The VSS will be responsible for formulation of their Micro Plan which will be assisted by the contracted NGOs/Experts and the forest division concerned. PRA for resource assessment for analysis will be conducted for this purpose. Micro Planning is vital for any JFM Committee for ensuring their participation at different levels of implementation of a scheme.
- (vii) **Engagement of specialized agencies for input support to JFM**
1. For Micro Planning Preparation- Local NGOs
 2. For capacity building of JFMC- Local NGOs
 3. For IGAs- Specialized IGA Support Agencies
- (viii) **Training camps for VSS Members.**

The JFM Resolution-2011, Para-9, the role of Forest department has been defined. The role includes

- To assist in capacity building of VSS / EDC members on different aspects offorest management, planning, silviculture, nursery technology, forest laws, accounting, book keeping, micro-enterprise development, value addition and processing of NTFPs etc.
- To provide technical help to the VSS / EDCs in preparation and implementation of the Micro plan/ annual work programme.



To fulfill the responsibility in this aspect, it is recommended that the DFO, may arrange training camps for 2/3 days duration for VSS members where plantations/ Rehabilitation and harvesting operation is likely to be taken during the same year / coming year. It may be made an annual feature and included in the work schedule of the division.

22.6.4 Usufruct Sharing Mechanism:

The Joint Forest Management Resolution 2011 Para 11 elaborately deals with usufruct sharing. The Para is reproduced for immediate reference.

“11. Usufruct sharing:

(i) The VSS / EDC shall be entitled to the usufructuary benefits from the assigned forests as under:—

(a) Usufructs like fallen leaves, fodder grasses, thatch grass, broom grass, fencing materials, brushwood, fallen lops, tops and twigs to be used as fuel shall be available to the members free of cost.

(b) All intermediate yields in the shape of small wood, poles, firewood etc as maybe obtained as a result of silvicultural operations and bamboo harvested in VSS / EDC assigned area shall be made available to the VSS / EDC members in a manner as may be decided by EC. If sold at a price, the funds so obtained shall be deposited in the VSS / EDC account.

(c) In case of Kendu leaves and specified forest produce other than bamboo, if any, the VSS will have the right to collect the same from the assigned forest but these items will be disposed of as per the prevailing provisions of Government and practices.

(d) While maintaining the forest cover in perpetuity, if any major harvest or final felling occurs in the assigned forest, the same shall be taken up by the forest department as per the prescription of the working plan/ duly approved micro plan. In case of natural calamities, harvesting of wind-fallen trees shall be treated as final harvest. Priority will be given to the members of the VSS / EDC for salvaging and harvesting work. Valuation of the produce so obtained shall be done and information shared with the VSS / EDC and the produce will be sold / disposed of by the forest department or by agents of the forest department. The VSS / EDC will receive 50% share of the sale price after deduction of proportionate harvesting cost and this will be deposited in the “VSS account”. The VSS may also opt for 50% of the forest produce so harvested if it is for their bona fide domestic use and they agree to pay the proportionate cost of harvesting.

(e) In case of village woodlots created and maintained by the VSS / EDC on non-forest land, all usufructs including interim and rotational harvests shall go to the VSS / EDC.



(f) In the event of a natural calamity occurring in the village there may be a demand for house building materials and other forest produce from the assigned forest. In such cases, the VSS / EDC may go for harvesting the required quantity of timber or other forest produce as a deviation to the Micro Plan, with due approval of the Divisional Forest Officer concerned.

(ii) The EC shall be responsible for the distribution of the usufructuary benefits equitably among the members of the VSS. Need of the group or community, who do not have any livelihood support other than depending on the forests, should be specially considered.

(iii) In cases where member/ a group of members of the VSS /EDC play a major role in the collection of intelligence, detection and seizure of illegal forest produce in transit the concerned VSS/EDC shall be entitled to the prescribed percentage of the sale price of the forest produce as per Rule 4 (3) of the Orissa Rewards for Detection of Forest Offences Rules, 2004. Such amount shall be deposited by the DFO in the "VSS account/EDC account" after disposal of the seized produce following due procedure of law."

In case of Village Forest created during Social Forestry Project, the sharing mechanism will be as per Rule -9 of the Village Forest Rule, 1985. The rule reads as follows.

"9. Sharing of Forest Produce:

(1) The beneficiaries shall on payment, as prescribed under Rule 13, be entitled to the forest produce from the village forest for their bona fide use or consumption. The beneficiaries shall obtain necessary permit under Rule 8 in case of their bona fide use or consumption. The Committee will be entitled to sell part of the forest produce for generating funds for management and regeneration of the village forests and the buyer shall obtain necessary permit under the Rule 8 for transportation of the village forest produce.

(2) The Committee shall be responsible for the proper distribution of all available forest produce from the village forest amongst the beneficiaries for their bona fide use or consumption on the basis of one equal share for each kitchen as far as possible. The Committee shall maintain a record of distribution of the forest produce and all the distributions made before a particular meeting shall be reviewed in the said meeting of the Committee.

22.6.5 Rights and Concessions:

Rights and Concessions in this Working circle shall be regulated in accordance with the provision of the relevant gazette notification of the respective forest blocks and the Government of Odisha policy with regard to JFM. Community rights as allowed under The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act,



2006 will also be honoured. The provisions of the Odisha Village Forest Rule, 1985 will also be followed for allowing the rights and concession to villagers.

22.6.6 Scope of expanding JFM Working Circle:

(i) Out of 146208.6626 ha of forest area under management fold, 35735.08909 ha has been assigned to different JFM committee (VSS) which workout to be 24.41% of the forest area. There is ample scope to increase the area under JFM. At present “**AJY -Aama Jungal Yojana**” is being implemented which provides an avenue to expand area under JFM.

(ii) There are many forested area under the administrative control of Revenue department. The JFM resolution 2011 has extended its purview to manage Revenue Forests in a **Joint Forest Management** approach. Where PRI (Panchyat Raj Institutes) are interested in management of such forests, the same may be taken for management under VSS.

22.6.7 Evaluation of Performance & Incentive:

The incentive to VSS / VFC or any other group is always drive the group in a positive direction. It encourages the villagers for better participation. The Principal Chief Conservator of Forests, Odisha Bhubaneswar has formulated a set of parameters for evaluation of performance of VSS. The Government also rewards the VSS every year either on “World Forest day” or World Environment day in state level functions. The evaluation is being carried out on ten important criteria and each point is evaluated out of 10 mark scale. The criteria's are

- a. Extent of Forest area under effective control, Protection and management of VSS.
- b. Regularity & frequency of holding meetings of General Body and Executive committee of the VSS, proper attendance in those meetings, deliberation of vital issue and record keeping.
- c. Improved status of Forest Protection.
- d. Quality of control exercised by the VSS on day- to- day management of the forest.
- e. Resolution of conflict.
- f. Sustainable collection of NTFP.
- g. Effective preservation & control of Forest Fire.
- h. Reduction of day- to- day dependency on Forest Produce.
- i. Effectiveness in implementation of afforestation, soil moisture conservation measures and silvicultural operation.
- j. Equity and gender equity.

Similarly the Divisional Forest Officer shall under take motivation cum evaluation camps and reward the VSS / NGO/ Staffs for their contribution for Joint Forest Management.



22.6.8 Associated Regulations and Measures:

(i) The JFM area is mostly covered either plantations or degraded forest area intended to regenerate the area through Aided Natural Regeneration. Plantation area will be managed through clear felling with Standard followed by planting. During planting period till its establishment, control of Grazing is of paramount importance. In the Village Forest Rule, 1985, elaborated provisions have been made for Control of Grazing. Rule 10 of the Odisha Village Forest Rule is reproduced below for reference and guidance.

“Rule 10(1) The Committee shall regulate grazing in the village forest by alternately closing and opening of areas for such period as it may deem proper and by such methods as it may adopt:

Provided that the provisions in the Orissa Forest (Grazing of Cattle) Rules, 1980 shall, as far as possible may be adopted to regulate such grazing.

(2) The Committee shall have the power to impound the cattle that enter the village forest contrary to these rules.

(3) Pasture development and fodder cultivation in Gochar lands within the limits of the village may be taken up by the Committee in accordance with schemes drawn up by the Sub-Collector or the Divisional Forest Officer, or the Soil Conservation Officer in that regard, For implementing the schemes, the Committee shall ensure that every household owning cattle has access to the benefit of the scheme.”

The same principle may be extended to the VSS area / area worked out under National Afforestation Program by Forest Development Agency. The Divisional Forest Officer shall declare the plantation area, Regeneration area closed to Grazing at least for three years from year of plantation. After third year Rotational Grazing may be allowed depending upon growth Pattern of plantations.

(ii) Auditing / accounting of VSS Account.

The accounting procedure for VSS has been well defined in the JFM Resolution. The accounts of VSS involved in FDA program, AJY are regularly maintained and audited. In case of other VSS, the Secretary of VSS shall make it a point to update the Account and get audited annually. It will increase the interest of VSS and transparency in VSS Executive Committee activities.

In VFC constituted during Social Forestry Project may not have their own account. The Secretary of VFC may open an account jointly as in line of Rule 12 of the Odisha Village Forest Rules-1985 and in line of JFM Resolution-2011 & up to date amendments.



(iii) Regular Meeting of EC/ General body:

In many VSS / VFC monthly meeting of EC and Annual Meeting of General body is found to be irregular. The Secretary of VFC / VSS shall make a point to convey / conduct regular meeting of VSS / VFC in his jurisdiction.





CHAPTER-23

TOF Working Circle

23.1 Name of working circle:

The Forest area in Keonjhar Division is about 30.91% of Geographical area. Out of the forest area recorded around 16.57% area is of DLC Land / Revenue Forest. Besides the forests, under administrative control of Forest department about 311.11 Sq.KM is of Revenue forests (16.57 % of the Geographical area) remain outside the management purview. Plantations are being raised under various schemes like Forest Development Agency, Mahatma Gandhi National Rural Employment Guarantee Act (MANREGA), CAMPA, Farm Forestry, Avenue Plantations etc. Hence its management is of equal importance. In order to provide a management strategy for these plantations / natural forests, it is proposed to constitute “**ToF Working Circle**”. Total area allotted is 2007.540ha and 576.00 RKM Avenue Plantation.

23.2 General Constitution:

The TOF are integrated contribution of Plantations Raised outside the conventional Forest area by Forest Department, Horticultural plantation and other department, Plantations raised by private individuals in their fellow land and back yard, Agro Forestry practices, Avenue Plantations and Institutional Plantations.

The plantations raised during last plan period outside the Forest area are included in this Working Circle. The total area planted is 2007.540 ha and 576.00 RKM Avenue Plantation.

Under Farm Forestry program 57.285 lakh seedlings have been distributed and it is estimated that 3642.8 ha area might have been planted up out of these seedlings distributed.

These three categories of Plantations i.e. Plantations outside the forest area under Misc. Plantation, Teak Plantation and Avenue Plantation will be considered for ToF management. The revenue forests though contribute to TOF to a greater extent, a general guideline will be prescribed for its management.

23.2.1 Plantations outside the Forest area.

The plantations raised outside the forest area comes to 2007.54 (Misc- 1817.54 & Teak Plantation- 190.00ha). The year wise Plantation raised and assigned to this Working Circle for management are at Table No 23.1, 23.2 and 23.3 for Miscellaneous plantation, Teak Plantations, Avenue Plantations respectively.

**Table No 23.1 Miscellaneous Plantations Raised Outside the Forest Area under various schemes.**

Sl. No.	Year	Range	Location Block/ Compt	Area in Ha. (AR)
1	2007-08	Barbil	Nuagaon	48.00
2	2009-10	BJP	Baitani Bhuinya	12.46
3	2008-09	BJP	Bargoda	55.00
4	2007-08	BJP	Bargoda	176.30
5	2010-11	BJP	Golabandh-Raidiha	45.00
6	2010-11	BJP	Golabandh-raidiha	82.84
7	2010-11	BJP	Narasinghapur	25.60
8	2013-14	BJP	Panasuan	35.00
9	2009-10	BJP	Talaraigada	70.00
10	2008-09	Champua	Basantpur & Naibuga	50.00
11	2013-14	Champua	Lease Area	1.66
12	2016-17	Champua	Lease Area	4.63
13	2011-12	Champua	Mining Area	0.31
14	2011-12	Champua	Mining Area	0.71
15	2011-12	Champua	Mining Area	29.60
16	2008-09	Ghatgaon	Kundapitha	2.56
17	2011-12	Keonjhar	Kasira Patna KF	15.00
18	2011-12	Champua	Sarai KF	15.00
19	2012-13	Champua	Sarai KF	30.00
20	2013-14	Champua	Sarei KF	30.00
21	2015-16	Ghatgaon	Kundapitha	15.00
22	2015-16	Champua	Gambhaia	10.00
23	2015-16	Keonjhar	Mathuramandali	15.00
24	2015-16	Telkoi	Golabandha	20.00
25	2016-17	Keonjhar	Pithagola	20.00
26	2016-17	Champua	Dalki	15.00
27	2016-17	Ghatgaon	Kundapitha	10.00
28	2016-17	Ghatgaon	Masinabilla	10.00
30	2016-17	Champua	Godhuli	20.00
31	2010-11	Champua	Jamudalak KF	20.00
32	2010-11	Champua	Kankadajudi K.F	30.00
33	2010-11	Keonjhar	Panasia KF	62.00
34	2010-11	Patna	Gopinathpur KF & VF	33.23
35	2007-08	BJP	Dumurinali KF	10.00
36	2007-08	BJP	Nippo VF	10.00
37	2007-08	BJP	Uchamandi VF	10.00
38	2007-08	BJP	Uperraidiha VF	10.00
39	2016-17	Keonjhar	Pattulikotha KF	5.00



41	2014-15	Patna	Rajanagar	20.00
42	2014-15	Telkoi	Hingulasahi	5.00
43	2014-15	Champua	Bankia VF	6.50
44	2014-15	Champua	Godhuli VF	6.50
45	2015-16	Champua	Jamudalak	6.50
46	2014-15	Ghatgaon	Kundapitha VF	20.00
47	2014-15	Ghatgaon	Tikira	10.00
48	2013-14	Keonjhar	Padmapur VF	35.00
49	2014-15	Patna	Jumein VF	10.00
50	2014-15	Patna	Tribindha VF	12.00
51	2015-16	Telkoi	Akul KF	16.25
52	2014-15	Telkoi	Akul KF	13.00
53	2015-16	Telkoi	Samakuda KF	6.25
54	2014-15	Telkoi	Similipal K.F	25.00
55	2014-15	Telkoi	Sinkulabahal K.F	25.00
56	2015-16	Telkoi	Talapada KF	50.00
57	2008-09	BJP	Banspal	7.00
58	2010-11	BJP	Bayapandadar DPF	5.00
61	2010-11	BJP	Kumundi	5.00
62	2010-11	BJP	Taramakanta DPF	5.00
63	2010-11	BJP	Tarmakanta DPF	5.00
64	2010-11	Keonjhar	Baiganposi	9.00
65	2010-11	Patna	Bada Dhanurjaypur	4.00
66	2009-10	Patna	Bada Dhanurjaypur DPF	7.00
67	2010-11	Patna	Chemena KF	40.00
68	2010-11	Patna	Musakhori KF	25.00
70	2010-11	Patna	Mushakhori KF	20.00
71	2010-11	Patna	Mushakhori KF	35.00
72	2010-11	Patna	Nuangaon	35.00
73	2010-11	Patna	Paitamaja KF	25.00
74	2010-11	Patna	SaharpadaKF	25.00
75	2009-10	Telkoi	Barhagad DPF	30.00
76	2008-09	Telkoi	Barhagad DPF	70.00
77	2010-11	Telkoi	Nuagaon DPF	7.00
78	2016-17	Barbil	Anseikala	10.00
79	2016-17	Barbil	Jagudidhara	5.00
80	2016-17	Barbil	Karansahi (Bileipada)	10.00
81	2009-10	Telkoi	Ahigola KF	10.00
82	2017-18	Barbil	Balita	4.00
83	2019-20	BJP	Karuagoda	7.00
84	2019-20	Patna	Kothaghar	10.00
85	2019-20	Patna	Erendei	10.00



86	2019-20	Patna	Ankura	10.00
87	2019-20	Patna	Kapundi	5.00
88	2019-20	Patna	Udayapur	5.00
89	2019-20	Champua	JRLI (Jaroli)	2.294
90	2020-21	BJP	Upaer Birikala	3.228
91	2020-21	Ghatgaon	Sagadia	10.00
92	2020-21	Patna	Baunsuli VSS	5.00
93	2020-21	Barbil	Putugaon KF near Baitaranii River	10.00
94	2020-21	Keonjhar	Balabhadrapur	10.00
95	2020-21	BJP	Bayapandadhar	10.118
Division Total			Total	1817.54

Table 23.1A: Year Wise Abstract of Plantation (Misc)

Year	Area in Ha	Year	Area in Ha
2007-08	264.3	2014-15	153.00
2008-09	184.56	2015-16	139.00
2009-10	129.46	2016-17	109.63
2010-11	543.67	2017-18	4.00
2011-12	60.62	2019-20	49.294
2012-13	30.00	2020-21	48.346
2013-14	101.66	Total	1817.54

23.2.2 Teak Plantations:

Teak Plantations raised outside the Forest management area during out going plan period is at Table 23.2 below

Table No 23.2 List of Teak Plantations (TOF)

Sl No	Year	Range	Location	Area in Ha
1	2008-09	Telkoi	Barhagarh DPF	70.00
2	2009-10	B & JP	Kuanra DPF	50.0
3	2009-10	Telkoi	Barhagarh DPF	30.0
4	2010-11	Patna	Chemena KF	10.0
5	2010-11	Patna	Chemena KF	10.0
6	2010-11	Patna	Chemena KF	20.0
	Total			190.0

**23.2.3 Avenue Plantation (TOF)****Table No 23.3 List of Avenue Plantation Keonjhar Division.**

Sl No	Year	Range	Location Block/ Compt	Avenue in RKM
1	2013-14	Patna	Kendeiposi-Patna RD Road	20.00
	2013-14(Total)			20.00
2	2014-15	BJP	Baragoda-Taramakanta	20.00
3	2014-15	Champua	Balibandh-Hundula	10.00
4	2014-15	Telkoi	Telkoi-Halpudi	4.00
5	2014-15	Telkoi	Telkoi-Panasanasa	11.00
	2014-15(Total)			45.00
6	2015-16	Ghatgaon	Dhangadiha - Barachakulia	3.60
7	2015-16	Ghatgaon	Rajpat- Manata- Tara	7.60
8	2015-16	Ghatgaon	Haladharpur - Medinipur	8.80
	2015-16(Total)			20.00
9	2016-17	Champua	Bholabeda (Gurubeda)	4.00
10	2016-17	Champua	Sana Kalimati	4.00
11	2016-17	Champua	Jaypur, Jamitra, Kamalpur	12.00
12	2016-17	Ghatgaon	Badajamposi-Bhimkund	4.00
13	2016-17	Ghatgaon	Dubulabeda-Balipokhari	16.00
14	2016-17	Keonjhar	Chak Nuasahi to Basudevpur	8.00
15	2016-17	Patna	Rajnagar to Childa	10.00
16	2016-17	Patna	Kendeiposi to Baunsuli	10.00
17	2016-17	Patna	Kundala-Patna	10.00
18	2016-17	Patna	Billa to Duaghat	10.00
19	2016-17	Telkoi	Damadargauni to Tentulikhunti	6.00
20	2016-17	Telkoi	Dubulapal to Chandrasekharpur	8.00
21	2016-17	Telkoi	Kaliahata to Rekuti	10.00
22	2016-17	Telkoi	Deuldiha to Akul	16.00
	2016-17(Total)			128.00
23	2017-18	Champua	Jajaposi - Jyotipur	10.0
24	2017-18	Champua	Jyotipur-Silipung	10.0
25	2017-18	Patna	Tangarpada- Poipani	20.0
26	2017-18	Ghatgaon	Baneswar-Khuntapada	10.0
27	2017-18	Ghatgaon	Kundapitha-Rengalbeda	10.0
28	2017-18	Telkoi	Kaliahata- Bramhanikans	8.0
29	2017-18	Telkoi	Kaliahata-Karangapal	8.0
30	2017-18	Telkoi	Rugudi-Kakudiamba	8.0
31	2017-18	Telkoi	Katarapali-Dimiria	6.0
32	2017-18	Telkoi	Damodargouni-Jansanpur	6.0
33	2017-18	Telkoi	Golabandha- Namposi	4.0



34	2017-18	BJP	Singhpur-Kuskala	8.0
35	2017-18	BJP	Kuskala-Chandposi	10.0
36	2017-18	Champua	Kasipal - Chipinda	12.0
37	2017-18	Champua	Malda - Kasia	8.0
	Total 2017-18			138.00
38	2018-19	Telkoi	Kudbil-Tangiri	10.0
39	2018-19	Telko	Jagmohanpur-Tungurubahal	6.0
40	2018-19	Champua	Radhikadeipur-Jally	10.0
41	2018-19	Champua	Jally-Nandapur	10.0
42	2018-19	Ghatgaon	Katarabeda-Bholabeda	10.0
43	2018-19	Patna	Jharbeda-Jajaposi	10.0
	2018-19	Total		56.00
44	2019-20	Telkoi	Deuladiha to Ragada	14.00
45	2019-20	Telkoi	Udayagiri to Karadangi	14.00
46	2019-20	Keonjhar	Bauripada to Sendkap	6.00
47	2019-20	Keonjhar	Chandposi to Rutisila	10.00
48	2019-20	Ghatagaon	Poijamuda Chhaka to Palabani Sahi	10.00
49	2019-20	Patna	Khiretangir to Hiraposi	10.00
50	2019-20	Patna	Putulia-Khajuripani	10.00
	2019-20	Total		74.00
51	2020-21	BJP	Kanjipani to Gonasika	10.0
52	2020-21	Keonjhar	Budhakhaman to Panasia	10.0
53	2020-21	Keonjhar	Padmapur to Hatikucha	10.0
54	2020-21	Keonjhar	Rutisila to Badabarbeda	5.0
55	2020-21	Patna	Dhanbeni to Saharpada	20.0
56	2020-21	Patna	Saradhapur to Bhanrpur	20.0
57	2020-21	Telkoi	Podanga to Kantalsuan	10.0
58	2020-21	Telkoi	Kateniposi to Biripal	10.0
	2020-21	Total		95.0
	Div. Total			576.00RKM

23.3 General constitution of working circle:

The area allotted to this Working circle consists of threetypes of Plantation i.e. Misc. Plantation, Teak plantation and Avenue Plantation. In case of miscellaneous Plantation, Teak plantations all long term rotation species like Teak, Phasi, Sisoo, Asan are planted. The survival in case of Teak is about 85% and in other cases survival is around 75%. The growth Status varies depending upon age of plantation. Plantations raised during 2010-11 to 2018-19 are considered as established. Rest of plantations are expected to be established within the plan period.

**23.4 General characteristics of vegetation:**

The plantations included for management under this working Circle are timber species, fruit bearing species with an expectation to create a man made forest to provide green cover to barren land in a long run. Avenue plantations have been taken up to have an aesthetic value and to provide shed to passerby. As Joda – Barbil- Koida area has been considered as “Critically Polluted Area”, all plantations including avenue plantations is expected to check air pollution and arrest dusts originating from transportation of ore. No yield is expected from these plantations during this plan period.

23.5 Treatment series/ sections and JFM areas:

For management convenience three Treatment Series are constituted i.e. Keonjhar TOF Series, Teak TOF Imp. Series and Keonjhar Avenue Series. The area assigned to each series is as follows (Table no 23.4)

Table No 23.4 TOF Series Constitution – Keonjhar Division			
Sl No	Name of Treatment Series	No of Sites	Area in ha / RKM
1	Keonjhar TOF (KTOF)	95	1817.54
2	Teak TOF Imp. Series(TTOF)	6	190.0
2	Keonjhar Avenue Series (KAS)	58	576.00
	Total		2007.54 ha+ 576 RKM

23.5.1 Treatment Section

For execution convenience each series is divided to 10 sections assigned to be worked in each year.

Keonjhar TOF Series (KTOF):

Table No 23.5 Sections of Keonjhar TOF Series						
Name of Series	Year of Operation	Section No	Range	Location	Area in ha	Section Total
Keonjhar TOF Series (KTOF):	2022-23	KTOF-I	BJP	Baitani Bhuinya	12.46	188.76
			BJP	Bargoda	176.30	
	2023-24	KTOF-II	BJP	Bargoda	55.00	182.84
			BJP	Golabandh-Raidiha	45.00	
			BJP	Golabandh-raidiha	82.84	
Keonjhar TOF Series	2024-25	KTOF-III	BJP	Panasuan	35.00	161.60
			BJP	Talaraigada	70.00	
			Champua	Basantpur & Naibuga	50.00	



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(KTOF):	2025-26	KTOF-IV	Champua	Lease Area	1.66	182.87
			Champua	Lease Area	4.63	
			Champua	Mining Area	0.31	
			Champua	Mining Area	0.71	
			Champua	Mining Area	29.60	
			Ghatgaon	Kundapitha	2.56	
			Keonjhar	Kasira Patna KF	15.00	
			Champua	Sarai KF	15.00	
			Champua	Sarai KF	30.00	
			Champua	Sarei KF	30.00	
			Ghatgaon	Kundapitha	15.00	
			Champua	Gambhaia	10.00	
			Keonjhar	Mathuramandali	15.00	
			Telkoi	Golabandha	20.00	
Keonjhar TOF Series (KTOF):	2026-27	KTOF-V	Keonjhar	Pithagola	20.00	143.0
			Champua	Dalki	15.00	
			Ghatgaon	Kundapitha	10.00	
			Ghatgaon	Masinabilla	10.00	
			Champua	Godhuli	20.00	
			Champua	Jamudalak KF	20.00	
			Barbil	Nuagaon	48.00	
Keonjhar TOF Series (KTOF):	2027-28	KTOF-VI	Champua	Kankadajudi K.F	30.00	195.23
			Keonjhar	Panasia KF	62.00	
			Patna	Gopinathpur KF & VF	33.23	
			BJP	Dumurinali KF	10.00	
			BJP	Nippo VF	10.00	
			Patna	Paitamaja KF	25.00	
			Patna	Saharpada KF	25.00	

Keonjhar TOF Series (KTOF):	2028-29	KTOF-VII	Keonjhar	Pattulikotha KF	5.00	222.00
			Patna	Rajanagar	20.00	
			Telkoi	Hingulasahi	5.00	
			Champua	Bankia VF	6.50	
			Champua	Godhuli VF	6.50	
			Champua	Jamudalak	6.50	
			Ghatgaon	Tikira	10.00	
			Keonjhar	Padmapur VF	35.00	
			Patna	Jumein VF	10.00	
			Patna	Tribindha VF	12.00	
			Telkoi	Akul KF	16.25	



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Keonjhar TOF Series (KTOF):	2029-30	KTOF-VIII	Telkoi	Akul KF	13.00	167.6
			Telkoi	Samakuda KF	6.25	
			Telkoi	Barhagad DPF	70.00	
			Telkoi	Similipal K.F	25.00	
			Telkoi	Sinkulabahal K.F	25.00	
			Telkoi	Talapada KF	50.00	
			BJP	Banspal	7.00	
			BJP	Bayapandadar DPF	5.00	
			BJP	Narasinghapur	25.60	
			Telkoi	Barhagad DPF	30.00	

Keonjhar TOF Series (KTOF):	2030-31	KTOF-IX	BJP	Kumundi	5.00	190
			BJP	Taramakanta DPF	5.00	
			BJP	Tarmakanta DPF	5.00	
			Keonjhar	Baiganposi	9.00	
			Patna	Bada Dhanurjaypur	4.00	
			Patna	Bada Dhanurjaypur DPF	7.00	
			Patna	Chemena KF	40.00	
			Patna	Musakhori KF	25.00	
			Patna	Mushakhori KF	20.00	
			Patna	Mushakhori KF	35.00	
			Patna	Nuangaon	35.00	
	2031-32	KTOF-X	Telkoi	Nuagaon DPF	7.00	183.64
			Barbil	Anseikala	10.00	
			Barbil	Jagudidhara	5.00	
			Barbil	Karansahi (Bileipada)	10.00	
			Telkoi	Ahigola KF	10.00	
			Barbil	Balita	4.00	
			BJP	Karuagoda	7.00	
			Patna	Kothaghar	10.00	
			Patna	Erendei	10.00	
			Patna	Ankura	10.00	
			Patna	Kapundi	5.00	
			Patna	Udayapur	5.00	
			Champua	JRLI (Jaroli)	2.294	
			BJP	Upaer Birikala	3.228	



			Ghatgaon	Sagadia	10.00	
			Ghatgaon	Kundapitha VF	20.00	
			Patna	Baunsuli VSS	5.00	
			Barbil	Putugaon KF near Baitaranii River	10.00	
			Keonjhar	Balabhadrapur	10.00	
			BJP	Bayapandadhar	10.118	
			BJP	Uchamandi VF	10.00	
			BJP	Uperraidiha VF	10.00	
			Total		1817.54	1817.54

Teak TOF Imp. Series

Table No 23.6 Sections of Teak TOF Series (TTOF)						
Name of Series	Year of Operation	Section No	Range	Location	Area in ha	Section Total
Teak TOF Imp. Series (TTOF)	2022-23	TTOF-I	0	0	0	0
	2023-24	TTOF-II	Telkoi	Barhagarh DPF	25.0	25.0
	2024-25	TTOF-III	Telkoi	Barhagarh DPF	25.00	25.00
	2025-26	TTOF-IV	Telkoi	Barhagarh DPF	20.00	20.00
	2026-27	TTOF-V	B & JP	Kuanra DPF	25.0	25.0
	2027-28	TTOF-VI	B & JP	Kuanra DPF	25.0	25.0
	2028-29	TTOF-VII	Telkoi	Barhagarh DPF	30.0	30.0
	2029-30	TTOF-VIII	Patna	Chemena KF	10.0	10.0
	2030-31	TTOF-IX	Patna	Chemena KF	10.0	10.0
	2031-32	TTOF-X	Patna	Chemena KF	20.0	20.0
		Total			190.0	190.0

Keonjhar Avenue Series (KAS)

Table No 23.7 Sections of Keonjhar Avenue Series; Keonjhar division						
Name of Series	Year of Operation	Section	Range	Name of Avenue Plantation	Length in RKM	Section Total in RKM
Keonjhar Avenue Series (KAS)	2022-23	KAS-I	Patna	Kendeiposi-Patna RD Road	20.00	50.0
			BJP	Baragoda-Taramakanta	20.00	
			Champua	Balibandh-Hundula	10.00	
	2023-24	KAS-II	Telkoi	Telkoi-Halpudi	4.00	55.0
			Telkoi	Telkoi-Panasanasa	11.00	
			Ghatgaon	Dhangadiha - Barachakulia	3.60	
			Ghatgaon	Rajpat- Manata- Tara	7.60	



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			Ghatgaon	Haladharpur - Medinipur	8.80	58.0
			Champua	Bholabeda (Gurubeda)	4.00	
			Champua	Sana Kalimati	4.00	
			Champua	Jaypur, Jamitra, Kamalpur	12.00	
	2024-25	KAS-III	Ghatgaon	Badajamposi-Bhimkund	4.00	
			Ghatgaon	Dubulabeda-Balipokhari	16.00	
			Keonjhar	Chak Nuasahi to Basudevpur	8.00	
			Patna	Rajnagar to Childa	10.00	
			Patna	Kendeiposi to Baunsuli	10.00	
			Patna	Kundala-Patna	10.00	
Keonjhar Avenue Series (KAS)	2025-26	KAS-IV	Patna	Billa to Duaghat	10.00	60.0
			Telkoi	Damadargauni to Tentulikhunti	6.00	
			Telkoi	Dubulapal to Chandrasekharpur	8.00	
			Telkoi	Kaliahata to Rekuti	10.00	
			Telkoi	Deuldiha to Akul	16.00	
			Champua	Jajaposi - Jyotipur	10.0	
	2026-27	KAS-V	Champua	Jyotipur-Silipung	10.0	58.0
			Patna	Tangarpada- Poipani	20.0	
			Ghatgaon	Baneswar-Khuntapada	10.0	
			Ghatgaon	Kundapitha-Rengalbeda	10.0	
			Telkoi	Kaliahata-Bramhanikans	8.0	
Keonjhar Avenue Series (KAS)	2027-28	KAS-VI	Telkoi	Kaliahata-Karangapal	8.0	58.0
			Telkoi	Rugudi-Kakudiamba	8.0	
			Telkoi	Katarapali-Dimiria	6.0	
			Telkoi	Damodargouni-Jansanpur	6.0	
			Telkoi	Golabandha-Namposi	4.0	
			BJP	Singhpur-Kuskala	8.0	
			BJP	Kuskala-Chandposi	10.0	

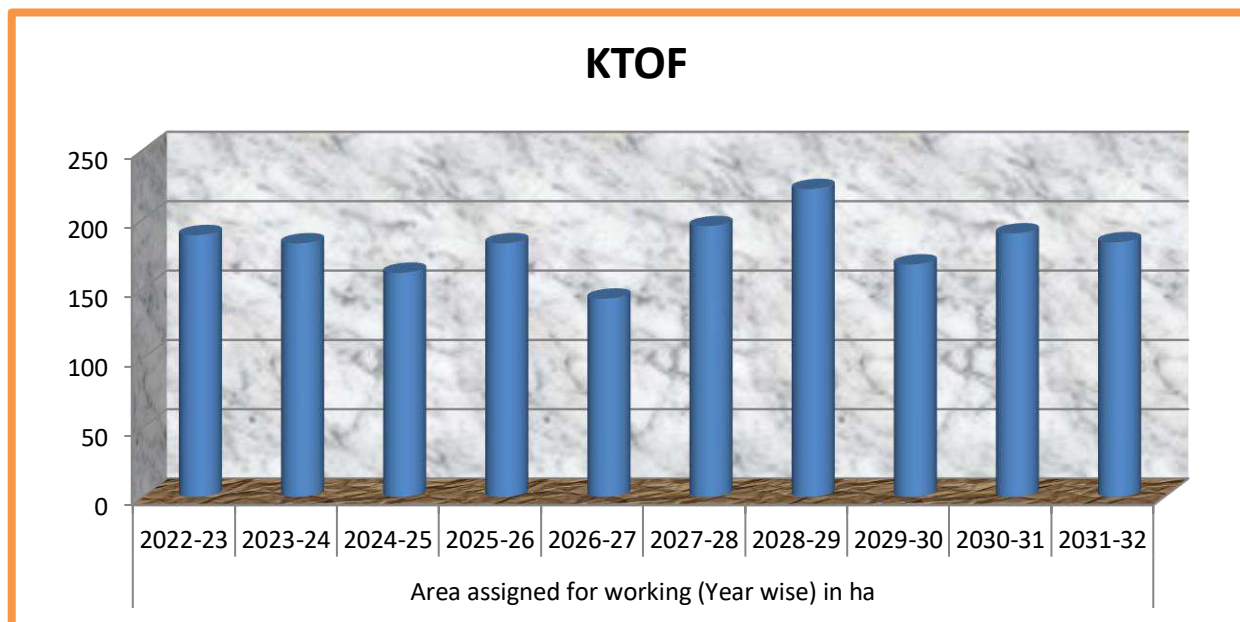


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			Champua	Malda - Kasia	8.0	
	2028-29	KAS-VII	Champua	Kasipal - Chipinda	12.0	58.0
			Telkoi	Kudbil-Tangiri	10.0	
			Telko	Jagmohanpur-Tungurubahal	6.0	
			Champua	Radhikadeipur-Jally	10.0	
			Champua	Jally-Nandapur	10.0	
			Ghatgaon	Katarabeda-Bholabeda	10.0	
	2029-30	KAS-VIII	Patna	Jharbeda-Jajaposi	10.0	64.0
			Telkoi	Deuladiha to Ragada	14.00	
			Telkoi	Udayagiri to Karadangi	14.00	
			Keonjhar	Bauripada to Sendkap	6.00	
			Keonjhar	Chandposi to Rutisila	10.00	
			Ghatgaon	Poijamuda Chhaka to Palabani Sahi	10.00	
Keonjhar Avenue Series (KAS)	2030-31	KAS-IX	Patna	Khiretangir to Hiraposi	10.00	55.0
			Patna	Putulia-Khajuripani	10.00	
			BJP	Kanjipani to Gonasika	10.0	
			Keonjhar	Budhakhaman to Panasia	10.0	
			Keonjhar	Padmapur to Hatikucha	10.0	
			Keonjhar	Rutisila to Badabarbeda	5.0	
	2031-32	KAS-X	Patna	Dhanbeni to Saharpada	20.0	60.0
			Patna	Saradhapur to Bhanrpur	20.0	
			Telkoi	Podanga to Kantalsuan	10.0	
			Telkoi	Kateniposi to Biripal	10.0	
	Total				576.0	576.0

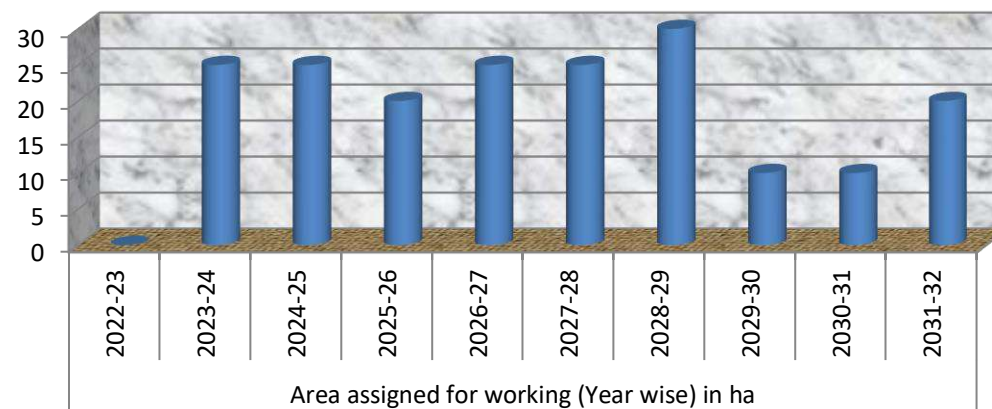
23.5.2 Abstract of TOF Series:

Table No 23.8 Abstract of TOF Series:												
Name of Series	Year of Operation											Unit
	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	Total	
KTOF	188.76	182.84	161.6	182.87	143	195.23	222	167.6	190	183.64	1817.54	In Ha
TTOF	0	25	25	20	25	25	30	10	10	20	190	
KAS	50	55	58	60	58	58	58	64	55	60	576	In RKM

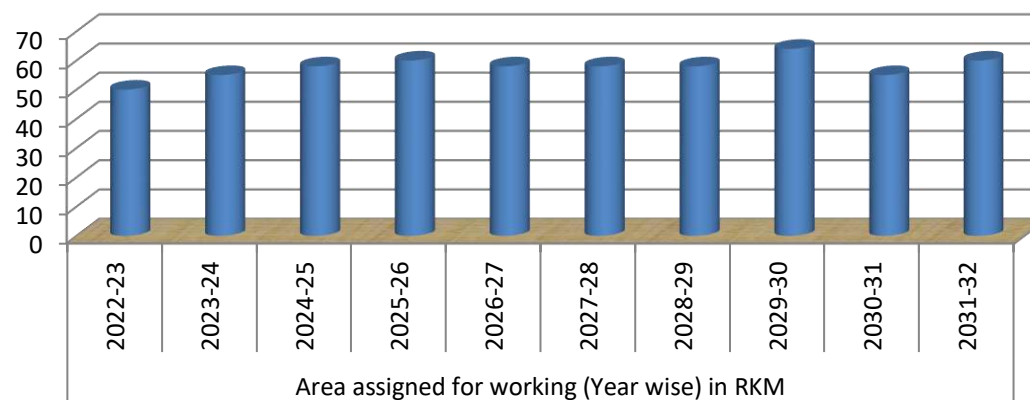




TTOF



KAS



23.5.3 Blocks, compartments and JFM area:

The area assigned to this TOF Working Circle involves three components i.e. plantation (Misc), Plantations (Teak) and Avenue Plantations. The plantations and Avenue plantations though not assigned to any VSS, the plantations have been raised on consultation with villagers as it is outside the Forest area.

23.6 Special objectives of Management:

The objectives of management are varied and depending upon category of plantations the special objectives TOF management & specific objectives are furnished as follows.

a) General Objectives:

- i. To increase tree cover of the district / division through planting outside the forest land.
- ii. To increase bio mass production by planting quick growing species.
- iii. To stabilize the loose soil through planting & protect catchment area of River Baitarani.
- iv. To ameliorate effects of Mining in "Critically Polluted area" i.e. Joda- barbil- Koira Region.
- v. To check air pollution and arrest dust particles originating due to transportation related activities.
- vi. To improve the aesthetic value along the road network.
- vii. To encourage Farm forestry to meet the demand of Raw materials of papermill.
- viii. To enhance the Economic Condition of People.

b) Of Teak Plantation.

- To enhance timber productivity of Forests,
- To enrich existing vegetation outside the forest area and meet the demand of timber especially timber required for furniture.

c) Of Avenue Plantations:

- To improve the aesthetic value of the landscape,
- To check dust pollution on roads and also act as noise barrier in the locality.
- To ameliorate the climate,
- To provide shade to passer-by,
- To provide habitat to birds / reptiles/ rodents.
- To add tree cover to bring the area within the standard norm i.e. 33% tree cover of the total geographical area.

d) Of Farm Forestry:

- To encourage public to have their own backyard plantation to meet their household requirement on firewood, fodder.
- To bring private land under tree planting.



- To supplement raw material availability for industries/ furniture woods.
- To make public less dependent on forests.

23.6.1 Analysis of the crop:

The assigned plantations are of following characters.

a) Mixed Plantations:

The crop planted within 2018-19 are considered as successful plantations & established with a survival rate of 75%. The average growth is of 4m-6m height with GBH 10-30cm. The first growing species are contributing to Top Canopy. About 10-15% of planted species are considered as suppressed. Natural growth of Sal and its associates like Asan, Kendu, Bahada, Harida, Amla, karada and grasses in open spaces. Plantations taken up in between 2019-20 to 2020-21 are in sapling stage.

b) Avenue Plantations:

The avenue plantations raised along the road side are mostly surviving (80%). Due to adequate protection by Tree Guard the average height has reached above 4m in general. Neem, Karanja, Sisoo, kadamba, are showing prominent growth. Jamun, Mango, Jack Fruit are of middle order growth less than 3m. Flowering species survival is in between 50-60%.

c) Farm Forestry:

The farm forestry adopted by Forest Department involves distribution of species other than Eucalyptus. It has enriched the back yard tree cover but not getting so popularity.

23.6.2 Silvicultural system:

Silvicultural System to be adopted is ***“Improvement of Stand by Silvicultural tending”***. Under this system all plantations will be treated for improving the quality of stands i.e. both height & Girth to bring the stand to more useful stage. Activities will be Thinning of appropriate Grade along with Soil & Moisture Conservation.

23.6.3 Rotation period:

The area assigned to this working Circle bears Teak and other Species. For Teak a rotation period of 100 years has been fixed. For other species found in TOF areas the rotation period fixed under Para 16.6.3 will be applicable. The same is reproduced at Table no 23.9 below

**Table No 23.9 Rotation Period for various species in Plantation**

Sl No	Species	Rotation Period in Year	Remark
1	Teak	100	In case of SFP Plantations Clear felling with Standard is being followed. Rotation period is applicable for Standards only.
2	Sisoo, Gambhari	100	
3	Eucalyptus, Other Soft wood, Acacia, Cassia etc	25	
4	Fruit bearing	As long as fruiting continues	
5	Timber species for Chariot construction	As per standard requirement of Temple management (Shree Jagannath Temple / Lingaraj Temple)	

23.6.4 Harvestable diameters:

There is no prescription for final harvest of any plantation. Harvestable diameter prescribed to be applicable for all purpose if so required. The same is produced below (Table No 23.10)

Table No 23.10 Harvestable Girth / Diameter of planted species.

Sl no	Species	Girth in cm	Diameter in cm	Remark
1	<i>Acacia auriculiformis</i> (Sunajhari)	90	29	
2	<i>Anacardium occidentale</i> (Cashew)			As long as Fruiting continues.
3	<i>Anogeissus acuminata</i> (Phashi)	150	48	
4	<i>Anthocephalus cadamba</i> (Kadamba)	150	48	
5	<i>Azadirachta indica</i> (Neem)	180	57	
6	<i>Bomax ceiba</i> (Simili)	150	48	
7	<i>Erythrina variegata</i> (Paladhua)	120	38	
8	<i>Gmelina arborea</i> (gambhari)	120	38	
9	<i>Melia azedarach</i> (Mahaneema)	120	38	
10	Fruit bearing species			As long as Fruiting continues.
11	Teak, Sisoo	120	38	

23.6.5 Reducing factors and reduced areas:

There is no yield expected from this working circle except interim harvest in shape of “**Thinning materials**”. No reduction factor / reduced area have been prescribed in this working circle.

23.6.6 Treatment Cycle:

The plan period is ten years. Hence a treatment Cycle of ten year is adopted for this working Circle.



23.6.7 Division into Sections.

Each plantation / block has been assigned to one Series and each series has been divided in to ten sections as described under Para- 23.5.

23.6.8 Calculation of the yield:

No final harvest is prescribed for any plantations included in this working circle. From teak plantation some poles of utility may be obtained. From other plantations no utilizable produce is expected. There is Teak plantation as a mixed species. During light grade thinning i.e. C Grade thinning 20 numbers of poles may be expected to be removed per hector for better enhancement of retained stems. From other plantated species no utilizable yield is expected.

23.6.9 Table of Treatment.

Each series constituted under Para 23.5 are sub divided to ten sections. Each section will be worked in the assigned year. The sections are given under Para 23.5.1. The abstract is produce at Table No 23.6 above for ready reference.

23.6.10 Method of executing the Treatment:

23.6.10.1 For Plantation (TOFS) Series:

The purpose of plantation in Barbil, Champua and BJP Range is to increase the tree cover to have balance on tree cover lost due to Mining activities. No thinning / harvesting is prescribed for all plantations under TOF in these three Ranges. In other four Ranges (Keonjhar, Ghahtgaon, Patna and Telkoi) various treatments as prescribed below will be implemented.

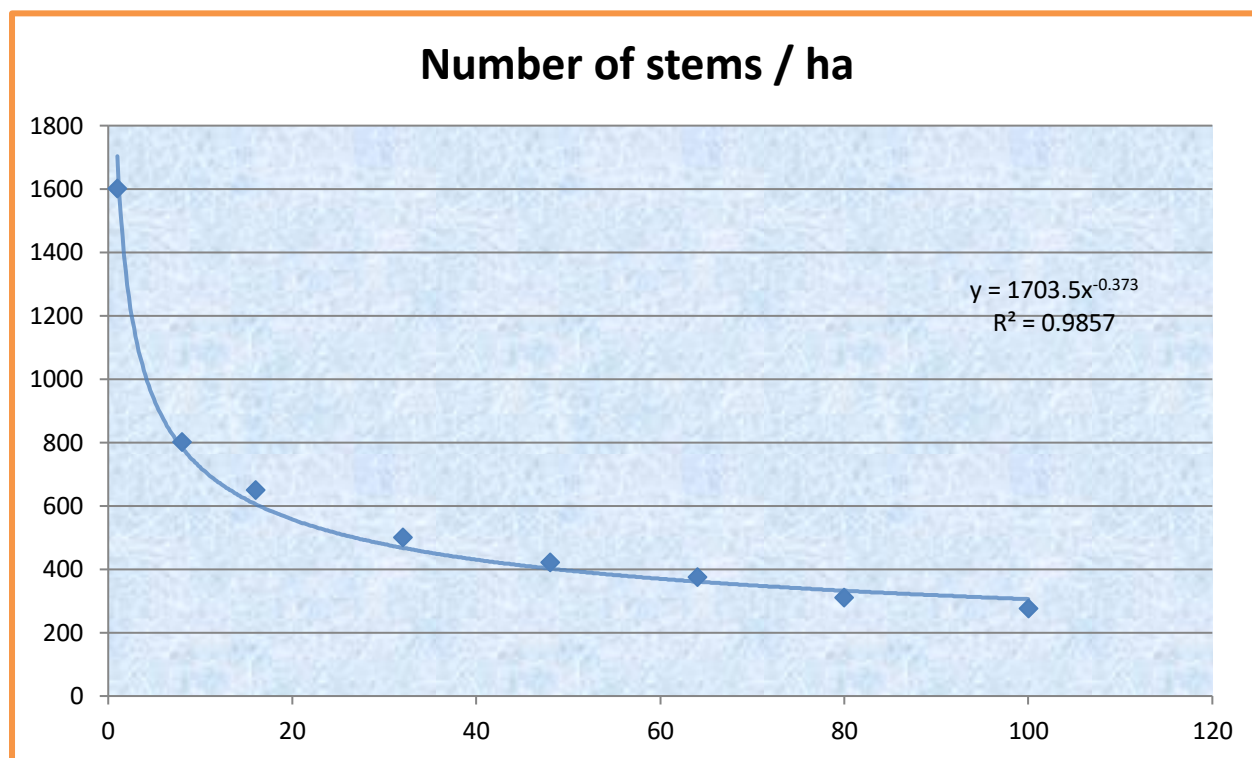
The following treatment is prescribed for plantations included under Plantation (TOFS) Series.

- The plantation area assigned to a particular year is to be re demarcated as per map available in Plantation Journal.
- Basing on Latitude / Longitude of cardinal points the map to be shown on Topo map (1:50000 Scale) and a copy in Plantation Journal.
- The growth Status like Average Height, Girth at Breast Height (GBH), Survival Percentage i.e. number of stems per hectare available may be recoded.
- The number of Stems per ha (Standard as per Age of the Plantation) is to be ascertained from this graph below or equation.



Table No 23.11 Stand Table for Plantation – Keonjhar Division

Age	Number of Planted trees	Age	Number of Planted trees	Remark
01	1600	48	420	Rotation age = 100 year
08	800	64	375	
16	650	80	310	
32	500	100	275	



$$y = 1703x^{-0.37}$$

Where y is the no of stem per ha and x is the age of plantation.

- C to D grade thinning is always recommended. In case the plantation is very congested then light thinning may be preferred over other thinning. Various thinning and principle is furnished for general guidance.

23.6.10.2.1 Thinning Practices

The objectives of taking of thinning are

- To improve the hygienic condition.
- To create best conditions of growth & obtain diameter growth of remaining trees.
- Salvage the anticipated losses of the merchantable volume.
- To obtain a desirable composition of crops.
- Retaining seed bearers.



- vi. Improvement in wood quality.
- vii. To obtain intermediate yield and increase net yield and financial out-turn.
- viii. Decomposition of raw hummus.
- ix. To reduce the risk of diseases and pests.

After thinning, the **results** expected are

- **Reduced competition in root and crown,**
- **Reduced weed growth,**
- **Improved quality of wood,**
- **Regulation of rate of growth,**
- **Increase seed production,**
- **Reduction in the net cost of growing,**
- **Reducing the risk of fire and diseases,**
- **Encouraging the advanced growth,**
- **Fulfilling the market demands.**

For undertaking thinning the following aspects are to be kept in mind.

- i) Before planning the nature and intensity of thinning preference between the intensity of thinning and quality of thinning should be decided.
- ii) The trees remaining after the thinning should be able to compensate for the loss in increment by trees removed in thinning.
- iii) There will be an optimum stocking for a given site and species.
- iv) For this individual trees are classified by height and size of crown and thinning is decided on the basis of which classes of trees are fit to be removed for maintaining the desired qualitative and quantitative nature of the thinning.
- v) The main purpose of the thinning is to release more space for future development of trees; the freedom of crown is the guiding factor for thinning purpose.
- vi) The retention of trees per unit should be decided first and then the number of trees to be removed should be marked accordingly.
- vii) The development of crown and stem are the deciding factor for sub-classification of the dominance classes of trees for the given site and species.
- viii) Tree classification in regular forests are done as under



23.6.10.2.2 Tree Classification based on height:

I) Dominant trees (D or D1)

It includes the trees that form the uppermost leaf canopy. They are the tallest trees that determine the top level of canopy they are also called pre-dominant trees.

II) Co-dominant trees (CD or D2)

These are shorter than dominant. About $5/6^{\text{th}}$ of the height of the dominant.

III) Sub-dominant trees (SD or D3)

They do not form part of the uppermost leaf canopy. Their height is about $3/4^{\text{th}}$ that of the tallest trees. They are also called dominated trees.

IV) Suppressed trees (S)

The height of the suppressed trees is about $1/2$ to $5/8^{\text{th}}$ of the height of the best trees. Suppressed trees grown below the crowns of the other trees in the stand. The leading shoots are over-topped by their neighboring trees or at least shaded on all sides by them.

V) Wolf trees (W)

The wolf trees are large, coarse and misshapen trees.

VI) Whips (Wh)

This class comprises bent over and badly leaning trees. Whips have tall, thin stems which are unstable and may cause damage to other trees when they sway.

VII) Dead, dying and moribund trees (m)

This category consists of trees that are dead or at the point of death.

VIII) Disease trees (k)

It includes trees that are infected with parasites and their growth is seriously affected due to infection.

IX) Reproduction or Regeneration (r)

It consists of recruits or regeneration.



X) Over mature or veterans.

23.6.10.2.3 Classification on the Basis of Crown

The crown spread may be taken as better indication than canopy position to understand growth potentialities of a tree. For this tree may be classification on the basis of the crown with average stem spacing as shown below:-

a) Spaced

Trees with free crown spreading having less than or equal to $3/4^{\text{th}}$ that of spacing.

b) Co-spaced

Trees with a free crown spread having $3/4^{\text{th}}$ to $1/2$ (50-75%) that of the available spacing.

c) Sub-spaced

Trees with the spread of free crown less than half but more than one-fourth $1/4^{\text{th}}$ of the spaced.

d) Mal-spaced

Trees with a very small spread of trees crown which is less than a quarter of the spaced.

e) De-spaced

Trees will no free crown with little vigor.

f) Dead, dying and low yielding trees

In the present situation, it is recommended to follow an ordinary thinning as described below.

This is known as “THINNING FROM THE BLOW” and consists of the removal of inferior individuals starting from the suppressed class, then taking the dominated class and ultimately some of the dominant class.

It is a very common form of selective thinning in regular crops. It has been devised to be in line with nature because only those trees which have been unsuccessful in the struggle for growth are removed first.

23.6.10.2.4 Grade of Ordinary Thinning

The thinning grades are defined by the spacing class removed so that a check may be made by comparing yield table numbers for the mean diameter in question. There are various grades of thinning e.g. A, B, C, D, E, grades.



i) A-Grade

Light thinning- removal of dead, dying, diseased and suppressed trees.

ii) B-Grade:

Moderate thinning - In addition to trees in A-grade further removal of defective dominated stems and whips. Advance growth which cannot be pruned or lopped may also be removed.

iii) C- Grade (Heavy thinning):

This includes trees in grade A and B and all remaining dominated defective, co-dominants that may be removed without making lasting gaps in canopy. The C grade thinning is the standard grade in vogue for yield table compilation.

iv) D-Grade (Very Heavy Thinning):

This includes trees of all above grades and some good dominants so that no lasting or permanent gap develops in canopy. The left over trees are with good boles and crowns, well spaced and evenly distributed over the site for future development.

v) E-Grade (Extremely Heavy Thinning):

This type of thinning is adopted mainly for research purposes. This is the heaviest thinning that can be made in the crop without creating permanent gaps in the canopy. Many dominant stems are also removed.

It is always better to make C-grade or D-grade thinning in a dense crop in which thinning has been unduly delayed. The removal of trees should be Economic or Hygienic value. In addition to above classes the intermediate grades of thinning such as C/D may be carried out.

23.6.10.2.5 Precautions in First Thinning

The first thinning is very important for any crop. The following factors should be considered at the time of first thinning.

- The thinning should take place before adjoining trees check one another's growth.
- The thinning should not be postponed on the ground that the poles obtained will be non-saleable or uneconomic.
- The age of first thinning should be taken on the basis of height or size attained.
- The heavy thinning should not be carried on poorer sites, drier areas and steeper slopes, because the gaps may not fill up due to poor growth of trees.
- All thinning should be done on the silvicultural lines.

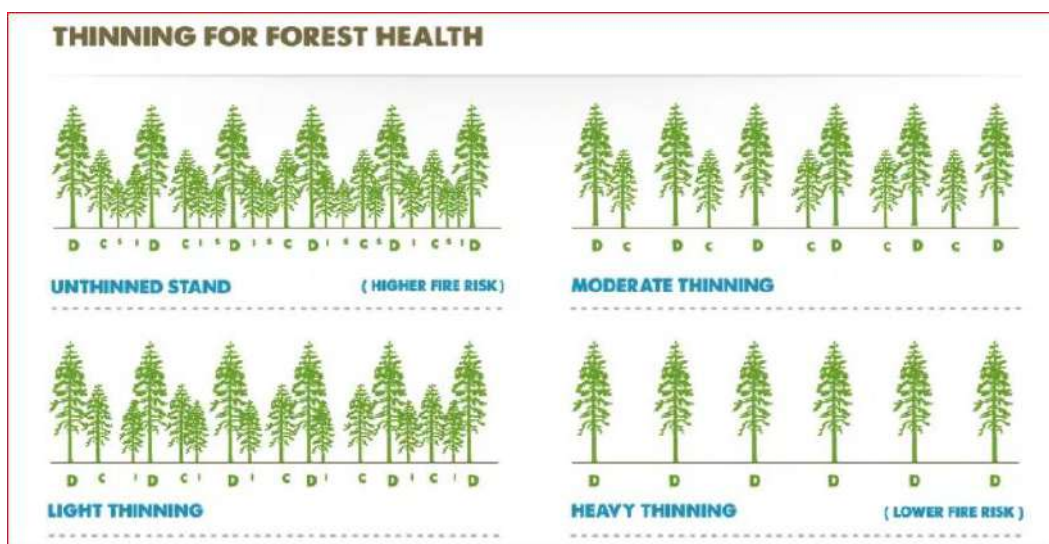
- The light demander species may require heavier thinning as compared to the shade bearer species.
- It is best to carry out silvicultural thinning. Some admixture of secondary species may be retained where this is desired on silvicultural or protection grounds.

23.6.10.2.6 Thinning In Irregular Crops:

It is difficult to classify tree in an irregular crop. The general classifications which are used for the research purposes are THREE crown positions. It is suggested that in regular crops the degree of crown freedom and their further classification into large, medium and small crown sizes, should be taken in account

Crown Freedom	Free	Restricted	Confine
Crown development or crown size	Well developed or large	Average or medium	Poor or small

- The crown freedom is judged irrespective of the size of the tree and its position in the stratification.
- The thinning in an irregular crop is done by selection method.
- The trees to be cut are that which restrict the growth of their neighbours on all sides and should be more valuable than their neighbours.
- The aim should be to maintain a crop of all diameter classes in a sufficient number of maximum sustained yield.
- The valuable species are retained whereas inferior trees of all diameter classes are removed.
- The removal of trees is carried out in diameter classes.
- It aims at continuous improvement by repeated removal of inferior stems in all diameter classes so that basal area or standing volume becomes more or less equal to theoretical ideal value.





23.6.10.2.7 Factors Affecting Thinning Practice:

The following factors may be considered before the thinning practice:

1. Site Factors
2. Nature of species
3. Age

1. Site Factors

The site quality influence on thinning practice is that a relatively close canopy on the poorer sites should be maintained. On low quality sites heavy openings should not be made. The spacing out widely in earlier stages should not be carried out on hot, dry, slopes, on poor soils and on all sites where grass and other weed invasion is likely to occur. A poor site will usually support less stems per hectare than a good one.

2. Nature of Species

The shade-bearers are more tolerant of crown than the light demanders therefore more frequent thinning is needed for light demander species. Light demanders usually show good response to ordinary thinning where as shade-bearers to crown thinning. Sal, Sisoo, Asan, Teak, being light demanders require heavier grades of ordinary thinning.

3. Age

The crown formation depends on age and in young ages when the crown formation is not completed mechanical thinning or sticks thinning may be done with succession. The light demander species require heavier grade of thinning at frequent intervals in younger crops. On the other hand some species in middle age or maturity require crown thinning.

- After thinning, intensive Soil & Moisture Conservation practices are to be adopted so as to increase moisture regime of the plantation to induce growth.
- Protection against Grazing and fire is to be taken up with rigidity.

23.6.10.3 Avenue Plantation (NAS) Series:

Lot of Avenue plantations have been raised in the past plan period. After planting operation, no specific management practices have been set up. It is warranted to have a set of guiding principle for avenue plantation (TOF).

The avenue plantations included in this treatment series are at young stage. Considering the present condition, the following prescriptions are recommended.



The avenue plantation site is to be visited and existing plants are to be recorded in the following form



Name of the Treatment Section	Name of the Road & Distance / Chainage in Km	Name of Species	Height in Meter	BGH in cm	Present Condition.	Remark / Suggestion.

- ✚ If any plant / tree is badly damaged and above 30cm GBH it is recommended to remove the plant and a new plant with promising growth is to be planted.
- ✚ Any old / hollow diseased tree likely to be fallen down in moderate wind is to be marked and enlisted. Such trees are to be jointly visited by Range Officer and any representative of PWD / NH Authority and record their suggestion on removal or retention. In case of suggestion for removal DFO is to intimate the district authority and take steps for its removal followed by planting in the assigned year.
- ✚ All retained plants above 30cm GBH are to be checked for hanging branches if found to be removed.
- ✚ The PWD / NH authority may be requested to put Radiant paints on trees at Breast Height for visibility during night.
- ✚ Similar exercise is recommended for other avenue plantations not included in this series.

23.6.10.4.1 Species suggested for Road Side Plantation.

Considering the soil characteristics, proximity to tourist spots, prone to cyclonic effect the following species are recommended for avenue plantations. It is also suggested for planting one species on both the sides over a length of 2 km to add to the beauty / aesthetic value of the road. Species suggested are

- a) *Lagerstomia flusregin* (Patuli),
- b) *Cassia fistula* (Sunari),
- c) *Dalbergia sisoo* (Sisoo),
- d) *Syzigium cumini* (Jamu)
- e) *Mangifera indica* (Aam)
- f) *Samanea saman* (Bada Chakunda)
- g) *Peltoferm pheroginium* (Radha Chuda)
- h) *Pathodia campanulata* (Mysore Queen)
- i) *Mimosps elongi* (Baula)
- j) *Azadirecta indica* (Meem)
- k) *Alstonia scholaris* (Chatiana)
- l) *Pongamia pinnata* (Karanja)

Planting of one year old promising seedlings in a block mixture than intimate mixture form is recommended.



23.6.11 Modalities for Farm Forestry:

Free seedlings are distributed for planting on private lands / back yard etc. It remained without follow of action. It is suggested to take up following action to evaluate the result.

- After distribution is completed by end of August, the distribution registers are to be examined to find out person those have taken more than 150 seedlings for planting.
- 10% of such cases, the person are to be located and his planting place is to be inspected by forester and technical suggestion for soil working, application of fertilizer and required suggestion is to be tendered.
- Its survival at end of December of same year is to be recorded.
- Some photographs are to be taken and album for every year is to be prepared and kept as record and for future reference.
- Farm Forestry involving Eucalyptus to meet raw material demand of local paper mills, a data base is to be prepared and a yield table is required to be prepared.
- The economic benefits that flow to farmer are also required to be assessed for guidance.

23.6.12 Associated Regulations and Measures:

All out efforts is required to be made to plant outside the forest area to increase the forest cover of the district.

23.6.12.1 Plantations / Natural Forests TOF

Besides plantations included in this working circle, there are plantations raised before the outgoing plan. Both Teak, Miscellaneous plantations have been raised. The prescriptions of this chapter may be extended to similar conditions / plantations.

23.6.12.2 Farm Forestry:

Farm Forestry by individuals / Mining Lease holders / Industrial houses are to be encouraged. It will not only help in establishing tree cover but also assured a healthy environment. Similarly Teak has also potential to be popularised among individuals. Rules pertaining Timber Transit requires to be revisited for this aspect. Timber planting by individuals may be considered and modalities may be adopted for future management.

23.6.12.3: Improvement of Elephant Corridors:

There are private holdings coming within Karo- Karampada Elephant corridor and Telkoi-Pallahara Elephant corridor. A special drive is suggested to motivate to take up



plantations / Agro forestry / grass land development in their land. Modalities may be developed to provide financial assistance for changing land use pattern from agriculture to “Agro Forestry” and “Meadows development dedicated for elephant corridors”.



CHAPTER-24

REDUCE EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION (REDD⁺)

25.1. Introduction:

REDD+ stands for countries' efforts to “Reduce Emissions from Deforestation and forest Degradation”, and foster conservation, sustainable management of forests, and enhancement of forest carbon stocks. Deforestation and forest degradation are the second leading cause of global warming, responsible for about 15% of global greenhouse gas emissions, which makes the loss and depletion of forests a major issue for climate change. In some countries, such as Brazil and Indonesia, deforestation and forest degradation together are by far the main source of national greenhouse gas emissions.

Eighty percent of the Earth's above-ground terrestrial carbon and forty percent of below-ground terrestrial carbon is in forests. In addition to the large contribution of deforestation and forest degradation to global emissions, combating both has been identified as one of the most cost-effective ways to lower emissions.

Deforestation and forest degradation are responsible for about 15% of global greenhouse gas emissions.

Currently, there appears to be a consensus that the issue of deforestation and forest degradation must be effectively tackled as it would otherwise limit the options available to reduce greenhouse gas emissions, greenhouse gas concentrations and increases in temperature to acceptable levels. Any reduction in the rate of deforestation and forest degradation has the benefit of avoiding a significant source of carbon emissions and reducing other environmental and social problems associated with deforestation.

Unlike afforestation and reforestation activities, which generally cause small annual changes in carbon stocks over long periods of time, stemming deforestation causes large changes in carbon stocks over a short period of time. Most emissions from deforestation take place rapidly, whereas carbon removal from the atmosphere through afforestation and reforestation activities is a slow process.

In addition to mitigating climate change, stopping deforestation and forest degradation and supporting sustainable forest management conserves water resources and prevents flooding, reduces run-off, controls soil erosion, reduces river siltation, protects fisheries and investments in hydropower facilities, preserves biodiversity and preserves cultures and traditions. With all that at stake it is clear what has to happen. With all the services

that forests provide both to humanity and the natural world, there is now widespread understanding of a simple yet profound fact that forests are more important left standing, than cut. Out of that understanding, the Forest Carbon Partnership Facility have come up.

Country commitments to mitigate and adapt to climate change are an integral part of the 2030 Agenda for Sustainable Development with its 17 global goals that countries have adopted to guide development efforts. The REDD+ mechanism contributes directly to achieving Sustainable Development Goals (SDGs) 13 and 15. Those address climate change, reducing deforestation and sustainable use of ecosystems. REDD+ can also contribute to achieving other SDGs – including those which address poverty reduction, health and well-being, hunger alleviation, and improving institutions.

24.2 FAO's support to countries' Nationally Determined Contributions (NDCs):

With FAO's technical support, countries can use REDD+ actions as catalysts to deliver on their Nationally Determined Contributions (NDCs) towards climate change mitigation and adaptation. In Agriculture, Forestry and Other Land Use (AFOLU) are among the climate actions that most countries have included their NDCs, which underscores the important role these sectors play in climate change mitigation and adaptation. Many NDCs have also made specific reference to REDD+ plans, offering an opportunity to mainstream REDD+ and climate efforts into countries' national planning processes and ultimately, actions on the ground.

24.3 REDD+ Implementation:

FAO's support to countries is based on technical expertise in assessing the drivers of deforestation and forest degradation and finding opportunities for forest carbon conservation, management and enhancement. FAO also helps countries design and implement REDD+ mitigation actions, which offer both carbon and non-carbon benefits, taking advantage of cross-sectoral expertise and building on existing experience. FAO works to strengthen collaboration with other initiatives and helps to promote public-private partnerships to scale up investments on REDD+ implementation.

24.3.1 Country highlights:

Equatorial Guinea highlights the transformational role of women in climate action. Aiming to address gender inequalities and strengthen women's contributions to the planning of national climate action, Equatorial Guinea organized a national workshop with the participation of 53 women representing various sectors and social groups. The workshop complemented an ongoing participatory process to develop the country



programme for the Green Climate Fund (GCF), which defines the national priorities to contribute to the global fight against climate change, and ways to translate these priorities into projects to be submitted to the GCF.

The 21st session of the Conference of the Parties (COP21) of the United Nations Framework Convention on Climate Change (UNFCCC) was held in Paris in November and December 2015. 195 participating countries negotiated and adopted the Paris Agreement, which includes objectives to peak greenhouse gas emissions as soon as possible, to limit the global average temperature increase above pre-industrial levels to well below 2°C, and to pursue efforts to limit the increase to 1.5°C.

The Paris Agreement, which entered into force on 4 November 2016, requires Parties to put forward their best efforts through “nationally determined contributions” (NDCs). These NDCs represent targets and actions for the post-2020 period. India ratified its' contribution the 2 of October 2016.

24.3.2 India's first NDC includes commitments:

Our country's commitment for “**Nationally Determined Contributions**” (NDCs) are

- To reduce the emissions intensity of its GDP by 33-35% from 2005 levels by 2030.
- To achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030 with the help of transfer of technology and low cost international finance including from Green Climate Fund (GCF).
- To create an additional carbon sink of 2.5 to 3 billion tonnes of CO₂ equivalent through additional forest and tree cover by 2030.
- To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management.

India announces its INDC, pledges to cut emission intensity of its GDP by 33-35 per cent by 2030

All countries are required to submit voluntary climate action plans as contribution. These will form part of the outcome of Paris climate summit.

India's INDC is fair, and its renewable energy and forestry targets are ambitious, says CSE

Ahead of the UN Conference of Parties on Climate Change, scheduled in December 2015 in Paris, India on Sunday submitted its Intended Nationally Determined Contribution

(INDC) to the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC). Delhi-based non-profit Centre for Science and Environment (CSE) has called the Indian INDC “fair” and its renewable and forestry targets “ambitious”.

In its INDC, India has pledged to improve the emissions intensity of its GDP by 33 to 35 per cent by 2030 below 2005 levels. It has also pledged to increase the share of non-fossil fuels-based electricity to 40 per cent by 2030. It has agreed **to enhance its forest cover which will absorb 2.5 to 3 billion tonnes of carbon dioxide (CO₂, the main gas responsible for global warming) by 2030.**

India has accepted the huge impact that climate change is exerting and will exert on different sectors of its economy and has agreed to enhance investments to adapt in vulnerable sectors like agriculture, water resources, coastal regions, health and disaster management.

India has also reiterated its need for international finance and technology support to meet its climate goals. In this regard, it has said it would require at least US \$ 2.5 trillion (at 2014-15 prices) to meet its climate change actions between now and 2030.

India’s forestry target is also very ambitious. It intends to create an additional carbon sink of 2.5 to 3 billion tonnes of CO₂ through additional forests by 2030.

Talking about the efforts already in the pipeline, the government highlights

- India’s National Solar Mission,
- Green Energy Corridor projects,
- Swatchh Bharat,
- National Air Quality Index,
- Smart Cities,
- Paramparagat Krishi Vikas Yojana,
- Soil Health Card Scheme,
- Pradhan Mantri Krishi Sinchayee Yojana,
- National Mission for Clean Ganga etc among others.

24.3.3 Indicative Work plan to combat Climate Change:

- Government harps on sustainable lifestyle to fight climate change.
- Promising raising requisite funds and adopting new technology.
- More focus on agriculture, water resources, coastal regions, and health and disaster management.
- To tackle climate change by adopting healthy and sustainable lifestyle, which were “inherent in traditions and values of conservation & moderation.

- To reduce consumerism in our lifestyle & reduce to reduce per capita consumption by not wasting food and limiting the number of durables / cars per household.
- To have ambitious focus on energy efficiency and dramatic increase in renewable energy.
- To enhance dependency on non-fossil fuel-based energy.

24.3.4 Suggestive measures on Forestry Sector.

In forestry sector to combat climate change the following activities are suggested.

- a) To reduce felling of trees in all sphere and enhance creation of renewable energy.
- b) To reduce dependency on fossil fuel including that of firewood.
- c) To enhance use of solar energy / wind energy where ever possible.
- d) To motivate people to reduce consumerism & reduce generation of solid waste.
- e) Conserve water body and enhance efficient use of water.



CHAPTER-25

Water Resource Management & Climate Change

25.1 Introduction:

The forests are also sources of water (surface, sub-surface and ground water). Over exploitation of the ground water resources results in declining ground water levels; there is an urgent need to augment the ground water resources through suitable management interventions. It is desirable to have forest management practices dovetailed with the principles of watershed based development approach especially in the source areas of water.

Annually replenish able ground water resource of the district is assessed to be 81323ham and the gross annual draft for domestic, industrial, and irrigation uses is 4130ham. The average stage of ground water development in the district is 25.55%.The major reservoir type water body in the district over Kanjhari MIP, Badghaghara MIP, Hadgarh.

Kanjhari MIP, Badghaghara MIP is located about 12-13 Kilometres away from the city of Keonjhar .

The Main River is Baitara flowing on western side to Eastern side of the division. River Somakoi is also flowing on East to West of the division. The division is in the catchment area of Kanjhari MIP (Irrigation Project).

25.2 Water Resource Management:

The Major water resources of the State / District are being managed by Water Resource Department of the Government of Odisha. Forest is the place of origin of all rivers / springs and perennial water sources. It is important to manage the water / runoff within the forest blocks.

25.3 Importance of Water management from Forests:

The availability and quality of water in many regions of the world are more and more threatened by overuse, misuse and pollution, and it is increasingly recognized that both are strongly influenced by forests. Moreover, climate change is altering forest's role in regulating water flows and influencing the availability of water resources. Therefore, the relationship between forests and water is a critical issue that must be accorded high priority.



Forested catchments supply a high proportion of the water for domestic, agricultural, industrial and ecological needs in both upstream and downstream areas. A key challenge faced by land, forest and water managers is to maximize the wide range of multi-sectoral forest benefits without detriment to water resources and ecosystem function. To address this challenge, there is an urgent need for a better understanding of the interactions between forests/trees and water, for awareness raising and capacity building in forest hydrology, and for embedding this knowledge and the research findings in policies. Similarly, there is a need to develop institutional mechanisms to enhance synergies in dealing with issues related to forests and water as well as to implement and enforce action programmes at the national and regional levels.

In the past, forest and water policies were often based on the assumption that under any hydrological and ecological circumstance, forest is the best land cover to maximize water yield, regulate seasonal flows and ensure high water quality. Following this assumption, conserving (or extending) forest cover in upstream watersheds was deemed the most effective measure to enhance water availability for agriculture, industrial and domestic uses, as well as for preventing floods in downstream areas.

Forest hydrology research conducted during the 1980s and 1990s suggests a rather different picture. Although the important role of upstream forest cover in ensuring the delivery of high-quality water has been confirmed, earlier generalizations about the benefits of upstream forest cover on downstream annual and seasonal flows were generally fallacious and misleading. Studies have shown instead that, especially in arid or semi-arid ecosystems, forests are not the best land cover to increase downstream water yield. Moreover, solid evidence has shown that in tropical ecosystems the protective role of upstream forest cover against seasonal downstream floods has often been overestimated. This is especially true in connection with major events affecting large-scale watersheds or river basins.

The International Year of Freshwater 2003 and the third World Water Forum (Kyoto, Japan, 2003) helped drive the incorporation of this understanding of biophysical interactions between forests and water into policies. The International Expert Meeting on Forests and Water, held in Shiga, Japan in November 2002 in preparation for these events, highlighted the need for more holistic consideration of interactions between water, forest, other land uses and socio-economic factors in complex watershed ecosystems. During the past five years, the Shiga Declaration has become a key reference for the development of a new generation of forest and water policies.



This article summarizes the state of current knowledge about forest and water interactions in watershed ecosystems. It summarizes some key issues that have emerged from discussion among forest hydrologists, other water-sector experts and policy-makers in the years since the Shiga Declaration, the third World Water Forum and the International Year of Freshwater.

25.3.1 The Present Practices:

The present practices for water resources management involves protection of catchment area of major rivers, Reservoirs and origin of springs. Important forest blocks coming within critical catchment area are managed under Protection working Circle.

The degraded forest which constitutes about 26% is proposed to be managed under Rehabilitation Working Circle. No tree felling is recommended. Extensive Soil & Moisture conservation and tree planting in blank areas prescribed.

In case of Plantation working Circle, Planting has been prescribed. It is aimed for creation of good tree cover in blank areas including outside the forest area.

In case of Selection/Improvement Working circle, the crop density is above 40% and soil & water regime is in a good state. To minimize the effect of tree felling subsidiary silvicultural operation along with soil & moisture conservation has been prescribed.

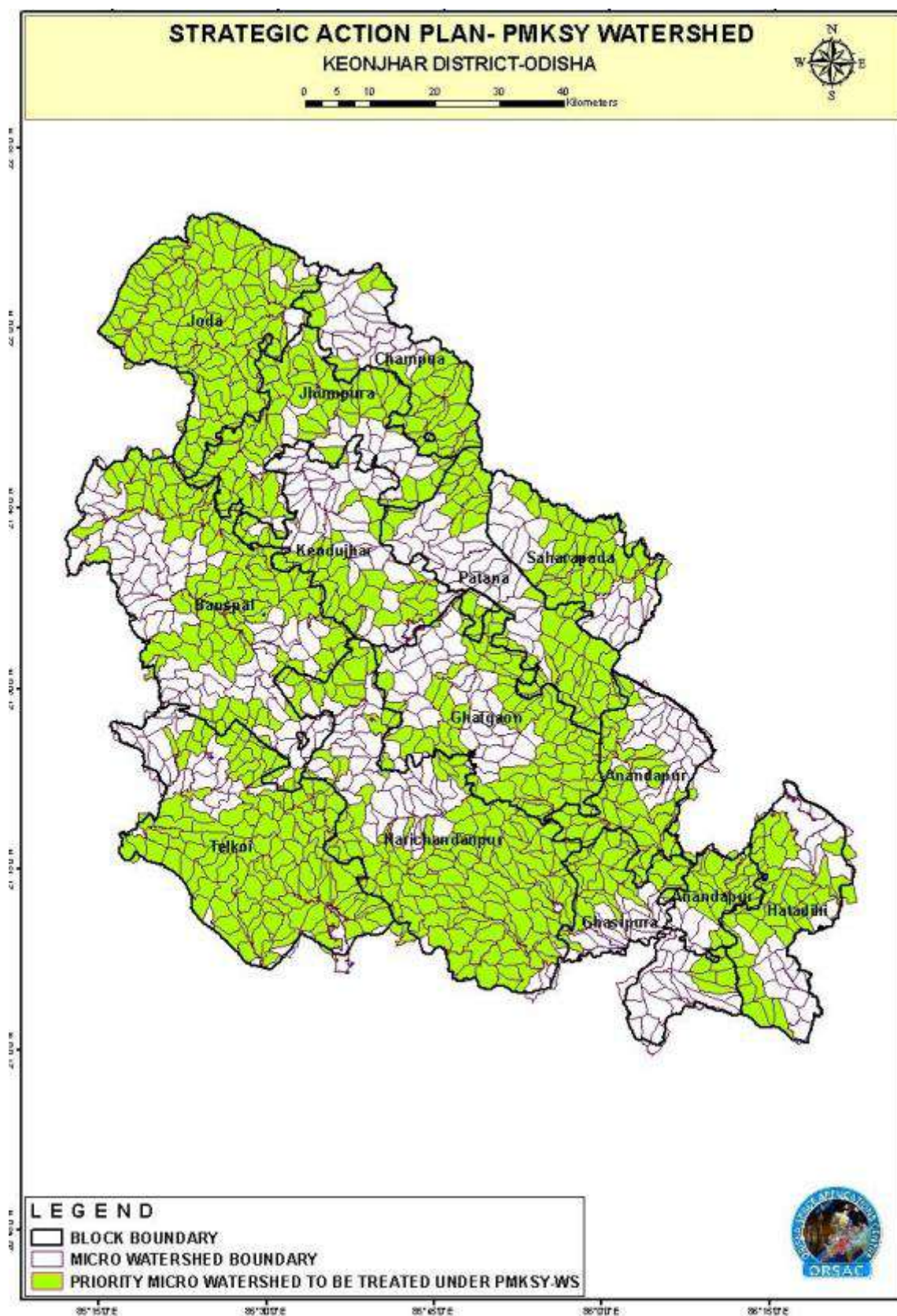
In Protection Working Circle Soil & Moisture conservation has been prescribed.

25.4 Constitution of Management Unit:

For management purposes each range will be taken as a unit. All forest blocks coming within the range jurisdiction will be the specific site for interventions.

Table No 25.1 Area Proposed For Management Under This Plan WR & Climate Change WC						
Range	RF	PRF	DPF	PF	VF	Total
Barbil	13793.2551		518.2300		103.5580	14415.0431
BJP	2742.3730	5920.6116	11009.6682	2205.4980	16.6040	21894.7548
Champua	9912.8311	463.3400	483.8673	338.5192	825.3170	12023.8746
Ghatgaon	26588.8095		250.1693		74.4180	26913.3968
Keonjhar	16063.0325	3575.4201		82.5560	427.4700	20148.4786
Patna	7656.6000	31.0200	161.4343		1041.0880	8890.1423
Telkoi	36142.2023	4974.8109	935.5279	51.4978	126.8860	42230.9249
Total	112899.1035	14965.2026	13358.8970	2678.0710	2615.3410	146516.6151

[illegible]





25.5 Method of treatment:

The method of treatment is mainly focused on

- Intensive Soil & Moisture Conservation.
- Judicious use of Ground Water
- Creation of Inland water body
- Rain water harvesting
- Awareness program on “Importance of Water & its management”

25.5.1 Soil & Moisture conservation:

In any forest development program, Soil & Moisture Conservation will be taken up as an “Integral part of all interventions”. Under SMC activities, Loose Boulder Check dams, staggered trenches, Percolation Pits, Vegetative Check dams and Masonary structure will be executed in a forest block on an integral manner. Standarded Procedure for SMC as found in standard text book on “Soil & Moisture Conservation” will be followed.

25.5.2 Judicious use of Ground water:

The third National Groundwater Conference, which concluded on the Centre for Water Resources Development and Management (CWRDM) campus came up with an eleven-point recommendation urging stakeholders in the sector to explore emerging techniques in managing groundwater resources.

The three-day sessions, which stressed the judicious use of groundwater resources, observed that water security could be achieved by adopting appropriate groundwater recharge practices. It called for the use of advanced tools such as geophysical techniques, remote sensing and GIS for groundwater exploration, assessment and management.

Effective measure

The use of groundwater modeling was highlighted as an effective measure in water resource assessment for sustainable groundwater development projects. Delegates during their presentations on water conservation models said drip irrigation and fertigation systems should be popularized among farmers. In areas where groundwater development was more than 70%, steps should be taken to ensure conservation of groundwater by adopting sprinkler and drip irrigation systems, they said.

The panelists also pointed out that coastal and urban hydrology were becoming increasingly important due to population pressure that exerted excessive stress on limited groundwater resources in such regions. The future water demand in these areas

should be considered and groundwater resources should be judiciously used and protected, they said.

One of the major recommendations at the conference was the need to conduct more studies on seawater intrusion and submarine groundwater discharge using numerical modeling, geophysical and hydro-chemical techniques. Scientists who made the recommendation explained that such studies would highlight the importance of quantum of nutrient and freshwater discharge to the ocean which has larger societal implications.

Data base

Creating a data base system for integrated water resources management from basin scale to watershed scale was another suggestion made at the conference. Scientists said this should be backed up by legal framework so that the data base could be freely accessed by all stakeholders in the country.

Participatory Approach

Participatory hydrological monitoring improves the users' understanding of local groundwater resource characteristics and helps local communities to form a community opinion to support appropriate measures for managing the available resources equitably. The objectives of participatory hydrological monitoring can be summarized as follows:

- Creating awareness on groundwater resource availability,
- Establishing the local micro catchment level rainfall-recharge relationship,
- Develop appropriate water use plans matching with the utilizable groundwater reserves, and
- Establish need for conservation of groundwater and need for increased recharge.

The project argued that farmers needed to develop their knowledge on local hydrological conditions before they could make sound decisions on groundwater management. It is also assumed that better awareness of the local hydrological balance would help motivate communities to optimally manage the available groundwater. In order to improve knowledge and create awareness, APWELL project trained groundwater users as barefoot technologists with the task of collecting hydrological data.

25.5.3 Creation of Inland Water body:

It is proposed to create more water body (Inland water body) for retention of more surface water. It will ameliorate the local climate and reduce pressure on Ground water use.

25.5.4 Rain water harvesting:

Rain water harvesting systems consists of the following components:



- Catchment- Used to collect and store the captured Rainwater.
- Conveyance system – It is used to transport the harvested water from the catchment to the recharge zone.
- Flush- It is used to flush out the first spell of rain.
- Filter – Used for filtering the collected Rainwater and remove pollutants.
- Tanks and the recharge structures: Used to store the filtered water which is ready to use.

The process of rainwater harvesting involves the collection and the storage of rainwater with the help of artificially designed systems that run off naturally or man-made catchment areas like- the rooftop, compounds, rock surface, hill slopes, artificially repaired impervious or semi-pervious land surface.

Several factors play a vital role in the amount of water harvested. Some of these factors are:

- The quantum of runoff
- Features of the catchments
- Impact on the environment
- Availability of the technology
- The capacity of the storage tanks
- Types of the roof, its slope and its materials
- The frequency, quantity and the quality of the rainfall
- The speed and ease with which the Rainwater penetrates through the subsoil to recharge the groundwater.

The rainwater harvesting system is one of the best methods practised and followed to support the conservation of water. Today, scarcity of good quality water has become a significant cause of concern. However, Rainwater, which is pure and of good quality, can be used for irrigation, washing, cleaning, bathing, cooking and also for other livestock requirements.

Advantages of Rainwater Harvesting

The benefits of rainwater harvesting system are listed below.

- Less cost.
- Helps in reducing the water bill.
- Decreases the demand for water.
- Reduces the need for imported water.
- Promotes both water and energy conservation.
- Improves the quality and quantity of groundwater.

- Does not require a filtration system for landscape irrigation.
- This technology is relatively simple, easy to install and operate.
- It reduces soil erosion, stormwater runoff, flooding, and pollution of surface water with fertilizers, pesticides, metals and other sediments.
- It is an excellent source of water for landscape irrigation with no chemicals and dissolved salts and free from all minerals.

25.5.5 Awareness program on “Importance of Water & its management”

Regular awareness camp is required to be conducted at Range / Section and Beat level to drive the concept of Water resource management.

25.6. Climate Change:

25.6.1 Climate Change and the future of forestry & forest research:

Climate change includes both global warming driven by human-induced emissions of greenhouse gases and the resulting large-scale shifts in weather patterns. Though there have been previous periods of climatic change, since the mid-20th century humans have had an unprecedented impact on Earth's climate system and caused change on a global scale.

The largest driver of warming is the emission of gases that create a greenhouse effect, of which more than 90% are carbon dioxide (CO₂) and methane. Fossil fuel burning (coal, oil, and natural gas) for energy consumption is the main source of these emissions, with additional contributions from agriculture, deforestation, and manufacturing. The human cause of climate change is not disputed by any scientific body of national or international standing. Temperature rise is accelerated or tempered by climate feedbacks, such as loss of sunlight-reflecting snow and ice cover, increased water vapour (a greenhouse gas itself), and changes to land and ocean carbon sinks.

Temperature rise on land is about twice the global average increase, leading to desert expansion and more common heat waves and wildfires. Temperature rise is also amplified in the Arctic, where it has contributed to melting permafrost, glacial retreat and sea ice loss. Warmer temperatures are increasing rates of evaporation, causing more intense storms and weather extremes. Impacts on ecosystems include the relocation or extinction of many species as their environment changes, most immediately in coral reefs, mountains, and the Arctic.¹ Climate change threatens people with food insecurity, water scarcity, flooding, infectious diseases, extreme heat, economic losses, and displacement. These human impacts have led the World Health Organization to call climate change the greatest threat to global health in the 21st century. Even if efforts to minimise future warming are successful, some effects will continue for centuries, including rising sea levels, rising ocean temperatures, and ocean acidification.



Energy flows between space, the atmosphere, and Earth's surface. Rising greenhouse gas levels in the atmosphere are causing a net warming effect to act on Earth's climate system.

Many of these impacts are already felt at the current level of warming, which is about 1.2 °C (2.2 °F). The Intergovernmental Panel on Climate Change (IPCC) has issued a series of reports that project significant increases in these impacts as warming continues to 1.5 °C (2.7 °F) and beyond. Additional warming also increases the risk of triggering critical thresholds called tipping points. Responding to these impacts involves both mitigation and adaptation.

25.6.2 Mitigation:

Limiting climate change – consists of reducing greenhouse gas emissions and removing them from the atmosphere. Methods to achieve this include

- a) The development and deployment of low-carbon energy sources such as wind and solar,
- b) A phase-out of coal, enhanced energy efficiency, and forest preservation.

25.6.3 Adaptation:

Adoption consists of adjusting to actual or expected climate, such as through improved coastline protection, better disaster management, assisted colonisation, and the development of more resistant crops. Adaptation alone cannot avert the risk of "severe, widespread and irreversible" impacts.

25.6.4 Paris Agreement:

Under the 2015 Paris Agreement, nations collectively agreed to keep warming "well under 2.0 °C (3.6 °F)" through mitigation efforts. However, with pledges made under the Agreement, global warming would still reach about 2.8 °C (5.0 °F) by the end of the century. Limiting warming to 1.5 °C (2.7 °F) would require halving emissions by 2030 and achieving near-zero emissions by 2050.

25.6.5 Drivers of Temperature Rise:

Contributors to climate change from the time period of 1850-1900 to the average from 2010-2019, as reported in the sixth IPCC assessment report. All drivers listed are human caused, as the IPCC found no significant contribution from internal variability or solar and volcanic drivers. The climate system experiences various cycles on its own which can last for years (such as the El Niño–Southern Oscillation), decades or even centuries. Other changes are caused by an imbalance of energy that is "external" to the climate system, but not always external to the Earth. Examples of external forcings include changes in the composition of the atmosphere (e.g. increased concentrations of green house gases), solar luminosity, volcanic eruptions, and variations in the Earth's orbit around the Sun.

To determine the human contribution to climate change, known internal climate variability and natural external forcing need to be ruled out. A key approach is to determine unique "fingerprints" for all potential causes, then compare these fingerprints with observed patterns of climate change. For example, solar forcing can be ruled out as a major cause because its fingerprint is warming in the entire atmosphere, and only the lower atmosphere has warmed, as expected from greenhouse gases (which trap heat energy radiating from the surface). Attribution of recent climate change shows that the primary driver is elevated greenhouse gases, but that aerosols also have a strong effect.



Greenhouse gases



CO₂ concentrations over the last 800,000 years as measured from ice cores (blue/green) and directly (black)

The Earth absorbs sunlight, then radiates it as heat. Greenhouse gases in the atmosphere absorb and reemit infrared radiation, slowing the rate at which it can pass through the atmosphere and escape into space. Before the Industrial Revolution, naturally-occurring amounts of greenhouse gases caused the air near the surface to be about 33 °C (59 °F) warmer than it would have been in their absence. While water vapour (~50%) and clouds (~25%) are the biggest contributors to the greenhouse effect, they increase as a function of temperature and are therefore considered feedbacks. On the other hand, concentrations of gases such as CO₂ (~20%), tropospheric ozone, CFCs and nitrous oxide are not temperature- dependent, and are therefore considered external forcings.

Human activity since the Industrial Revolution, mainly extracting and burning fossil fuels (coal, oil, and natural gas), has increased the amount of green house gases in the atmosphere, resulting in a radiative imbalance. In 2019, the concentrations of CO₂ and methane had increased by about 48% and 160%, respectively, since 1750. These CO₂ levels are higher than they have been at any time during the last 2million years. Concentrations of methane are far higher than they were over the last 800,000 years.



The Global Carbon Project shows how additions to CO₂ since 1880 have been caused by different sources ramping up one after another. Global anthropogenic greenhouse gas emissions in 2018, excluding those from land use change, were equivalent to 52 billion



tones of CO₂. Of these emissions, 72% was actual CO₂, 19% was methane, 6% was nitrous oxide, and 3% was fluorinated gases. CO₂ emissions primarily come from burning fossil fuels to provide energy for transport, manufacturing, heating, and electricity. Additional CO₂ emissions come from deforestation and industrial processes, which include the CO₂ released by the chemical reactions for making cement, steel, aluminum, and fertiliser. Methane emissions come from livestock, manure, rice cultivation, landfills, wastewater, coal mining, as well as oil and gas extraction. Nitrous oxide emissions largely come from the microbial decomposition of inorganic and organic fertiliser. From a production standpoint, the primary sources of global greenhouse gas emissions are estimated as: electricity and heat (25%), agriculture and forestry (24%), industry and manufacturing (21%), transport (14%), and buildings (6%).

Despite the contribution of deforestation to greenhouse gas emissions, the Earth's land surface, particularly its forests, remain a significant carbon sink for CO₂. Natural processes, such as carbon fixation in the soil and photosynthesis, more than offset the greenhouse gas contributions from deforestation. The land-surface sink is estimated to remove about 29% of annual global CO₂ emissions. The ocean also serves as a significant carbon sink via a two-step process. First, CO₂ dissolves in the surface water. Afterwards, the ocean's overturning circulation distributes it deep into the ocean's interior, where it accumulates over time as part of the carbon cycle. Over the last two decades, the world's oceans have absorbed 20 to 30% of emitted CO₂.

Aerosols and clouds

Air pollution, in the form of aerosols, not only puts a large burden on human health, but also affects the climate on a large scale. From 1961 to 1990, a gradual reduction in the amount of sunlight reaching the Earth's surface was observed, a phenomenon popularly known as *global dimming*, typically attributed to aerosols from biofuel and fossil fuel burning. Aerosol removal by precipitation gives tropospheric aerosols an atmospheric lifetime of only about a week, while stratospheric aerosols can remain in the atmosphere for a few years. Globally, aerosols have been declining since 1990, meaning that they no longer mask greenhouse gas warming as much.

In addition to their direct effects (scattering and absorbing solar radiation), aerosols have indirect effects on the Earth's radiation budget. Sulfate aerosols act as cloud condensation nuclei and thus lead to clouds that have more and smaller cloud droplets. These clouds reflect solar radiation more efficiently than clouds with fewer and larger droplets. This effect also causes droplets to be more uniform in size, which reduces the growth of raindrops and makes clouds more reflective to incoming sunlight. Indirect effects of aerosols are the largest uncertainty in radiative forcing.

While aerosols typically limit global warming by reflecting sunlight, black carbon in soot that falls on snow or ice can contribute to global warming. Not only does this increase the absorption of sunlight, it also increases melting and sea-level rise. Limiting new black carbon deposits in the Arctic could reduce global warming by 0.2 °C (0.36 °F) by 2050.

Changes of the land surface



The rate of global tree cover loss has approximately doubled since 2001, to an annual loss approaching an area the size of Italy.

Humans change the Earth's surface mainly to create more agricultural land. Today, agriculture takes up 34% of Earth's land area, while 26% is forests, and 30% is uninhabitable (glaciers, deserts, etc.). The amount of forested land continues to decrease, largely due to conversion to cropland in the tropics. This deforestation is the most significant aspect of land surface change affecting global warming. The main causes of deforestation are: permanent land-use change from forest to agricultural land producing products such as beef and palm oil (27%), logging to produce forestry/forest products (26%), short term shifting cultivation (24%), and wildfires (23%).

In addition to affecting greenhouse gas concentrations, land-use changes affect global warming through a variety of other chemical and physical mechanisms. Changing the type of vegetation in a region affects the local temperature, by changing how much of the sunlight gets reflected back into space (albedo), and how much heat is lost by evaporation. For instance, the change from a dark forest to grassland makes the surface lighter, causing it to reflect more sunlight. Deforestation can also contribute to changing temperatures by affecting the release of aerosols and other chemical compounds that influence clouds, and by changing wind patterns. In tropic and temperate areas the net



effect is to produce significant warming, while at latitudes closer to the poles a gain of albedo (as forest is replaced by snow cover) leads to an overall cooling effect. Globally, these effects are estimated to have led to a slight cooling, dominated by an increase in surface albedo.

Solar and volcanic activity

Physical climate models are unable to reproduce the rapid warming observed in recent decades when taking into account only variations in solar output and volcanic activity. As the Sun is the Earth's primary energy source, changes in incoming sunlight directly affect the climate system. Solar irradiance has been measured directly by satellites, and indirect measurements are available from the early 1600s. There has been no upward trend in the amount of the Sun's energy reaching the Earth. Further evidence for greenhouse gases being the cause of recent climate change come from measurements showing the warming of the lower atmosphere (the troposphere), coupled with the cooling of the upper atmosphere (the stratosphere). If solar variations were responsible for the observed warming, warming of both the troposphere and the stratosphere would be expected, but that has not been the case.

Explosive volcanic eruptions represent the largest natural forcing over the industrial era. When the eruption is sufficiently strong (with sulfur dioxide reaching the stratosphere) sunlight can be partially blocked for a couple of years, with a temperature signal lasting about twice as long. In the industrial era, volcanic activity has had negligible impacts on global temperature trends. Present-day volcanic CO₂ emissions are equivalent to less than 1% of current anthropogenic CO₂ emissions.

25.6.6 Climate change feedback



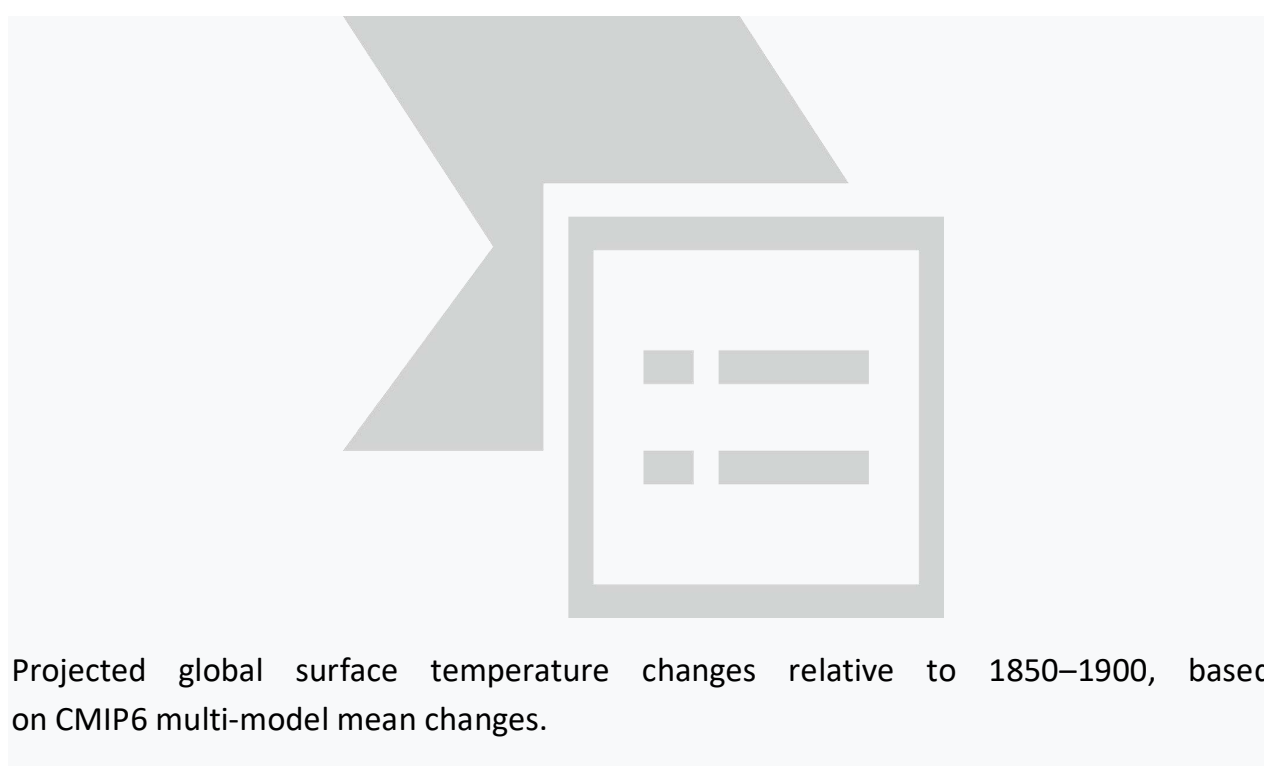
Sea ice reflects 50% to 70% of incoming solar radiation while the dark ocean surface only reflects 6%, so melting sea ice is a self-reinforcing feedback.

The response of the climate system to an initial forcing is modified by feedbacks: increased by self-reinforcing feedbacks and reduced by balancing feedbacks. The main reinforcing feedbacks are the water-vapour feedback, the ice–albedo feedback, and probably the net effect of clouds. The primary balancing feedback to global temperature change is radiative cooling to space as infrared radiation in response to rising surface temperature. In addition to temperature feedbacks, there are feedbacks in the carbon cycle, such as the fertilizing effect of CO₂ on plant growth. Uncertainty over feedbacks is the major reason why different climate models project different magnitudes of warming for a given amount of emissions.

As air gets warmer, it can hold more moisture. After initial warming due to emissions of greenhouse gases, the atmosphere will hold more water. As water vapour is a potent greenhouse gas, this further heats the atmosphere. If cloud cover increases, more sunlight will be reflected back into space, cooling the planet. If clouds become more high and thin, they act as an insulator, reflecting heat from below back downwards and warming the planet. Overall, the net cloud feedback over the industrial era has probably exacerbated temperature rise. The reduction of snow cover and sea ice in the Arctic reduces the albedo of the Earth's surface. More of the Sun's energy is now absorbed in these regions, contributing to amplification of Arctic temperature changes. Arctic amplification is also melting permafrost, which releases methane and CO₂ into the atmosphere.

Around half of human-caused CO₂ emissions have been absorbed by land plants and by the oceans. On land, elevated CO₂ and an extended growing season have stimulated plant growth. Climate change increases droughts and heat waves that inhibit plant growth, which makes it uncertain whether this carbon sink will continue to grow in the future. Soils contain large quantities of carbon and may release some when they heat up. As more CO₂ and heat are absorbed by the ocean, it acidifies, its circulation changes and phytoplankton takes up less carbon, decreasing the rate at which the ocean absorbs atmospheric carbon. Climate change can increase methane emissions from wetlands, marine and freshwater systems, and permafrost.

25.7 Future Warming & Carbon Budgeting:



Future warming depends on the strengths of climate feedbacks and on emissions of greenhouse gases. The former are often estimated using various climate models, developed by multiple scientific institutions. A climate model is a representation of the physical, chemical, and biological processes that affect the climate system. Models include changes in the Earth's orbit, historical changes in the Sun's activity, and volcanic forcing. Computer models attempt to reproduce and predict the circulation of the oceans, the annual cycle of the seasons, and the flows of carbon between the land surface and the atmosphere. Models project different future temperature rises for given emissions of greenhouse gases; they also do not fully agree on the strength of different feedbacks on climate sensitivity and magnitude of inertia of the climate system.

The physical realism of models is tested by examining their ability to simulate contemporary or past climates. Past models have underestimated the rate of Arctic shrinkage and underestimated the rate of precipitation increase. Sea level rise since 1990 was underestimated in older models, but more recent models agree well with observations. The 2017 United States-published National Climate Assessment notes that "climate models may still be underestimating or missing relevant feedback processes".

A subset of climate models add societal factors to a simple physical climate model. These models simulate how population, economic growth, and energy use affect – and interact with – the physical climate. With this information, these models can produce scenarios of how greenhouse gas emissions may vary in the future. This output is then used as input for physical climate models to generate climate change projections. In some scenarios emissions continue to rise over the century, while others have reduced emissions. Fossil fuel resources are too abundant for shortages to be relied on to limit carbon emissions in the 21st century. Emissions scenarios can be combined with modelling of the carbon cycle to predict how atmospheric concentrations of greenhouse gases might change in the future. According to these combined models, by 2100 the atmospheric concentration of CO₂ could be as low as 380 or as high as 1400 ppm, depending on the socioeconomic scenario and the mitigation scenario.

The remaining carbon emissions budget is determined by modelling the carbon cycle and the climate sensitivity to greenhouse gases. According to the IPCC, global warming can be kept below 1.5 °C (2.7 °F) with a two-thirds chance if emissions after 2018 do not exceed 420 or 570 gigatonnes of CO₂, depending on exactly how the global temperature is defined. This amount corresponds to 10 to 13 years of current emissions. There are high uncertainties about the budget; for instance, it may be 100 gigatonnes of CO₂ smaller due to methane release from permafrost and wetlands.

25.8 Impact of Climate Change:

25.8.1 Physical environment

The environmental effects of climate change are broad and far-reaching, affecting oceans, ice, and weather. Changes may occur gradually or rapidly. Evidence for these effects comes from studying climate change in the past, from modelling, and from modern observations. Since the 1950s, droughts and heat waves have appeared simultaneously with increasing frequency. Extremely wet or dry events within the monsoon period have increased in India and East Asia. The rainfall rate and intensity of hurricanes and typhoons is likely increasing. Frequency of tropical cyclones has not increased as a result of climate change.



Historical sea level reconstruction and projections up to 2100 published in 2017 by the U.S. Global Change Research Program

Global sea level is rising as a consequence of glacial melt, melt of the ice sheets in Greenland and Antarctica, and thermal expansion. Between 1993 and 2020, the rise increased over time, averaging 3.3 ± 0.3 mm per year. Over the 21st century, the IPCC projects that in a very high emissions scenario the sea level could rise by 61–110 cm. Increased ocean warmth is undermining and threatening to unplug Antarctic glacier outlets, risking a large melt of the ice sheet and the possibility of a 2-meter sea level rise by 2100 under high emissions.

Climate change has led to decades of shrinking and thinning of the Arctic sea ice, making it vulnerable to atmospheric anomalies. While ice-free summers are expected to be rare at 1.5°C (2.7°F) degrees of warming, they are set to occur once every three to ten years at a warming level of 2.0°C (3.6°F).^[141] Higher atmospheric CO_2 concentrations have led to changes in ocean chemistry. An increase in dissolved CO_2 is causing oceans to acidify. In addition, oxygen levels are decreasing as oxygen is less soluble in warmer water, with hypoxic dead zones expanding as a result of algal blooms stimulated by higher temperatures, higher CO_2 levels, ocean deoxygenation, and eutrophication.

26.8.2 Tipping points and long-term impacts

The greater the amount of global warming, the greater the risk of passing through ‘tipping points’, thresholds beyond which certain impacts can no longer be avoided even

if temperatures are reduced. An example is the collapse of West Antarctic and Greenland ice sheets, where a temperature rise of 1.5 to 2.0 °C (2.7 to 3.6 °F) may commit the ice sheets to melt, although the time scale of melt is uncertain and depends on future warming. Some large-scale changes could occur over a short time period, such as a collapse of the Atlantic Meridional Overturning Circulation, which would trigger major climate changes in the North Atlantic, Europe, and North America.

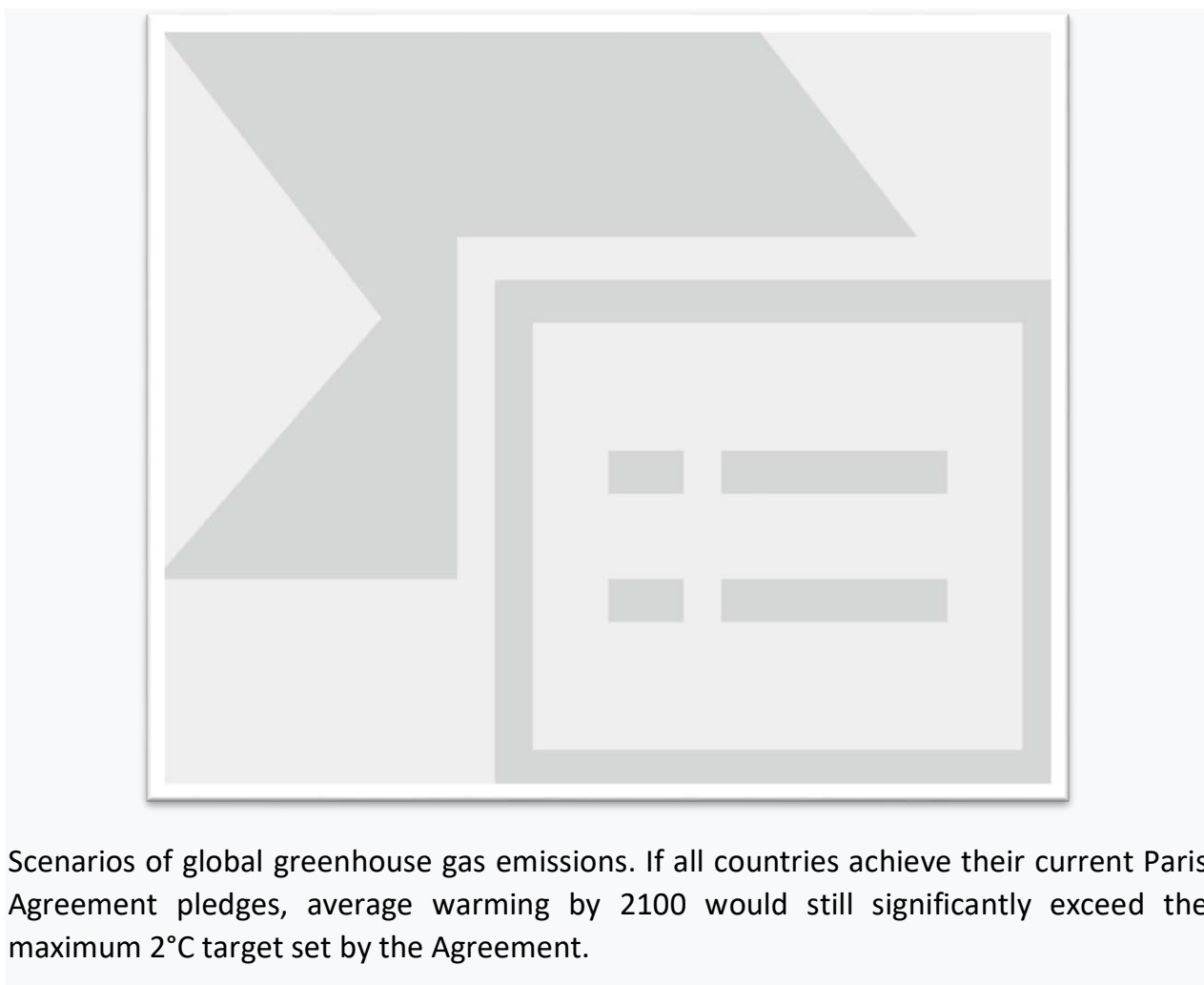
The long-term effects of climate change include further ice melt, ocean warming, sea level rise, and ocean acidification. On the timescale of centuries to millennia, the magnitude of climate change will be determined primarily by anthropogenic CO₂ emissions. This is due to CO₂'s long atmospheric lifetime. Oceanic CO₂ uptake is slow enough that ocean acidification will continue for hundreds to thousands of years. These emissions are estimated to have prolonged the current interglacial period by at least 100,000 years. Sea level rise will continue over many centuries, with an estimated rise of 2.3 metres per degree Celsius (4.2 ft/°F) after 2000 years.

25.8.3 Effect on Nature and wildlife:

Recent warming has driven many terrestrial and freshwater species poleward and towards higher altitudes. Higher atmospheric CO₂ levels and an extended growing season have resulted in global greening, whereas heatwaves and drought have reduced ecosystem productivity in some regions. The future balance of these opposing effects is unclear. Climate change has contributed to the expansion of drier climate zones, such as the expansion of deserts in the subtropics. The size and speed of global warming is making abrupt changes in ecosystems more likely. Overall, it is expected that climate change will result in the extinction of many species.

The oceans have heated more slowly than the land, but plants and animals in the ocean have migrated towards the colder poles faster than species on land. Just as on land, heat waves in the ocean occur more frequently due to climate change, with harmful effects found on a wide range of organisms such as corals, kelp, and seabirds. Ocean acidification is impacting organisms who produce shells and skeletons, such as mussels and barnacles, and coral reefs; coral reefs have seen extensive bleaching after heat waves. Harmful algae bloom enhanced by climate change and eutrophication cause anoxia, disruption of food webs and massive large-scale mortality of marine life. Coastal ecosystems are under particular stress, with almost half of wetlands having disappeared as a consequence of climate change and other human impacts.

25.9 Mitigation



Scenarios of global greenhouse gas emissions. If all countries achieve their current Paris Agreement pledges, average warming by 2100 would still significantly exceed the maximum 2°C target set by the Agreement.

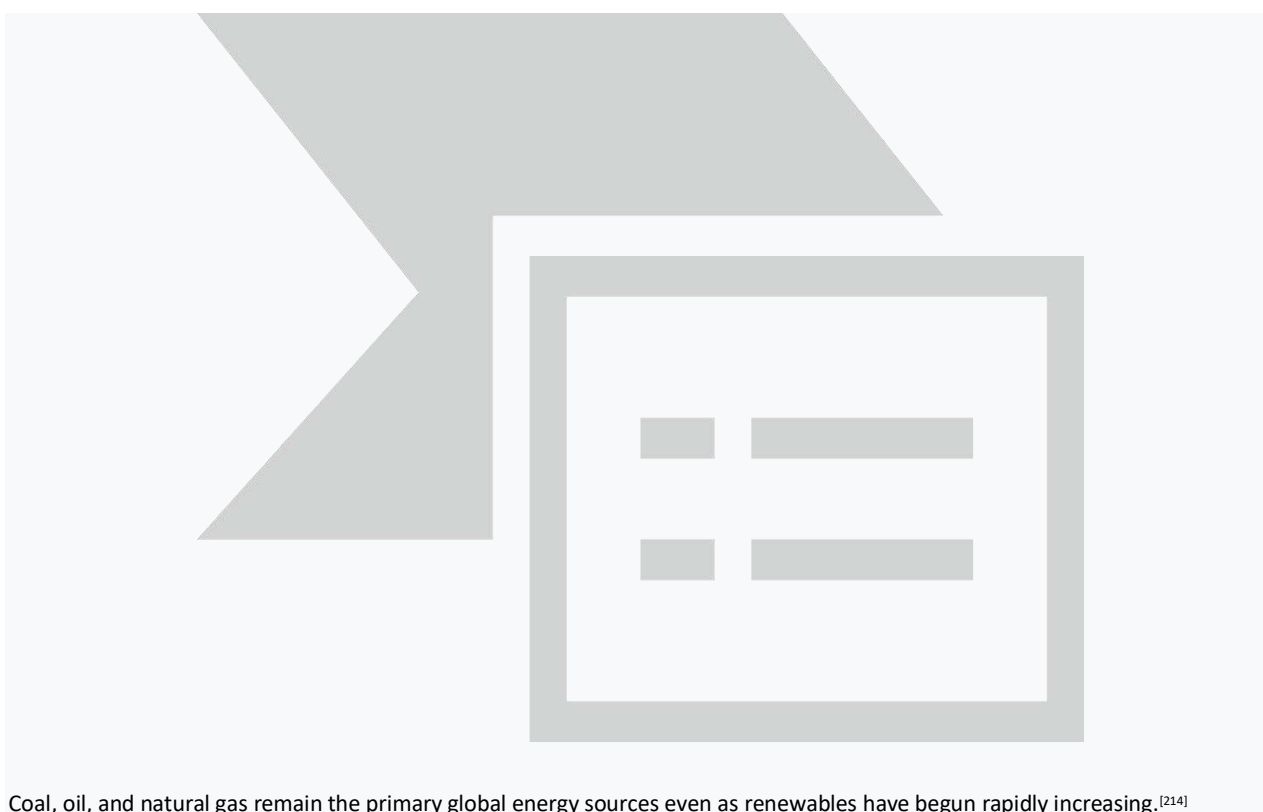
Climate change impacts can be mitigated by reducing greenhouse gas emissions and by enhancing sinks that absorb greenhouse gases from the atmosphere. In order to limit global warming to less than 1.5 °C with a high likelihood of success, global greenhouse gas emissions need to be net-zero by 2050, or by 2070 with a 2 °C target. This requires far-reaching, systemic changes on an unprecedented scale in energy, land, cities, transport, buildings, and industry. Scenarios that limit global warming to 1.5 °C often describe reaching net negative emissions at some point. To make progress towards a goal of limiting warming to 2 °C, the United Nations Environment Programme estimates that, within the next decade, countries need to triple the amount of reductions they have committed to in their current Paris Agreements; an even greater level of reduction is required to meet the 1.5 °C goal.

Although there is no single pathway to limit global warming to 1.5 or 2.0 °C (2.7 or 3.6 °F), most scenarios and strategies see a major increase in the use of renewable energy in combination with increased energy efficiency measures to generate the

needed greenhouse gas reductions. To reduce pressures on ecosystems and enhance their carbon sequestration capabilities, changes would also be necessary in agriculture and forestry, such as restoring natural ecosystems by reforestation.

Other approaches to mitigating climate change entail a higher level of risk. Scenarios that limit global warming to 1.5 °C typically project the large-scale use of carbon dioxide removal methods over the 21st century. There are concerns, though, about over-reliance on these technologies, as well as possible environmental impacts. Solar radiation management (SRM) methods have also been explored as a possible supplement to deep reductions in emissions. However, SRM would raise significant ethical and legal issues, and the risks are poorly understood.

25.9.1 Clean energy



Coal, oil, and natural gas remain the primary global energy sources even as renewables have begun rapidly increasing.^[214]



Economic sectors with more greenhouse gas contributions have a greater stake in climate change policies.

Long-term decarbonisation scenarios point to rapid and significant investment in renewable energy, which includes solar and wind power, bioenergy, geothermal energy, and hydropower. Fossil fuels accounted for 80% of the world's energy in 2018, while the remaining share was split between nuclear power and renewables; that mix is projected to change significantly over the next 30 years. Solar and wind have seen substantial growth and progress over the last few years; photovoltaic solar and onshore wind are the cheapest forms of adding new power generation capacity in most countries. Renewable represented 75% of all new electricity generation installed in 2019, with solar and wind constituting nearly all of that amount. Meanwhile, nuclear power costs are increasing amidst stagnant power share, so that nuclear power generation is now several times more expensive per megawatt-hour than wind and solar.

To achieve carbon neutrality by 2050, renewable energy would become the dominant form of electricity generation, rising to 85% or more by 2050 in some scenarios. The use of electricity for other needs, such as heating, would rise to the point where electricity becomes the largest form of overall energy supply. Investment in coal would be eliminated and coal use nearly phased out by 2050.

In transport, scenarios envision sharp increases in the market share of electric vehicles, and low carbon fuel substitution for other transportation modes like shipping. Building heating would be increasingly decarbonized with the use of technologies like heat pumps.

There are obstacles to the continued rapid development of renewables. For solar and wind power, a key challenge is their intermittency and seasonal variability. Traditionally, hydro dams with reservoirs and conventional power plants have been used when variable energy production is low. Intermittency can further be countered by demand flexibility, and by expanding battery storage and long-distance transmission to smooth variability of renewable output across wider geographic areas. Some environmental and land use concerns have been associated with large solar and wind projects, while bioenergy is often not carbon neutral and may have negative consequences for food security. Hydropower growth has been slowing and is set to decline further due to concerns about social and environmental impacts.

Low-carbon energy improves human health by minimizing climate change and has the near-term benefit of reducing air pollution deaths, which were estimated at 7 million annually in 2016. Meeting the Paris Agreement goals that limit warming to a 2 °C increase could save about a million of those lives per year by 2050, whereas limiting global warming to 1.5 °C could save millions and simultaneously increase energy security and reduce poverty.

25.9.2 Energy efficiency

Reducing energy demand is another major feature of decarbonisation scenarios and plans. In addition to directly reducing emissions, energy demand reduction measures provide more flexibility for low carbon energy development, aid in the management of the electricity grid, and minimize carbon-intensive infrastructure development. Over the next few decades, major increases in energy efficiency investment will be required to achieve these reductions, comparable to the expected level of investment in renewable energy. However, several COVID-19 related changes in energy use patterns, energy efficiency investments, and funding have made forecasts for this decade more difficult and uncertain.

Efficiency strategies to reduce energy demand vary by sector. In transport, gains can be made by switching passengers and freight to more efficient travel modes, such as buses and trains, and increasing the use of electric vehicles. Industrial strategies to reduce energy demand include increasing the energy efficiency of heating systems and motors, designing less energy-intensive products, and increasing product lifetimes. In the building sector the focus is on better design of new buildings, and incorporating higher levels of energy efficiency in retrofitting techniques for existing structures. In addition to decarbonizing energy use, the use of technologies like heat pumps can also increase building energy efficiency.

25.9.3 Agriculture and industry

Agriculture and forestry face a triple challenge of limiting greenhouse gas emissions, preventing the further conversion of forests to agricultural land, and meeting increases in world food demand. A suite of actions could reduce agriculture and forestry-based greenhouse gas emissions by two thirds from 2010 levels by reducing growth in demand for food and other agricultural products, increasing land productivity, protecting and restoring forests, and reducing greenhouse gas emissions from agricultural production.^[240]

In addition to the industrial demand reduction measures mentioned earlier, steel and cement production, which together are responsible for about 13% of industrial CO₂ emissions, present particular challenges. In these industries, carbon-intensive materials such as coke and lime play an integral role in the production process, so that reducing CO₂ emissions requires research-driven efforts aimed at decarbonising the chemistry of these processes.

25.9.4 Carbon sequestration



Most CO₂ emissions have been absorbed by carbon sinks, including plant growth, soil uptake, and ocean uptake (2020 Global Carbon Budget).

Natural carbon sinks can be enhanced to sequester significantly larger amounts of CO₂ beyond naturally occurring levels. Reforestation and tree planting on non-forest lands are among the most mature sequestration techniques, although the latter raises food security concerns. Soil carbon sequestration and coastal carbon sequestration are less understood options. The feasibility of land-based negative emissions methods for mitigation are uncertain in models; the IPCC has described mitigation strategies based on them as risky.

Where energy production or CO₂-intensive heavy industries continue to produce waste CO₂, the gas can be captured and stored instead of being released to the atmosphere. Although its current use is limited in scale and expensive, carbon capture and storage (CCS) may be able to play a significant role in limiting CO₂ emissions by mid-century. This technique, in combination with bio-energy production (BECCS) can result in net-negative emissions, where the amount of greenhouse gases that are released into the atmosphere are less than the sequestered, or stored, amount in the bio-energy fuel being grown. It remains highly uncertain whether carbon dioxide removal techniques, such as BECCS, will be able to play a large role in limiting warming to 1.5 °C, and policy decisions based on reliance on carbon dioxide removal increases the risk of global warming increasing beyond international goals.

25.9.5 Adaptation:

Adaptation is "the process of adjustment to current or expected changes in climate and its effects". Without additional mitigation, adaptation cannot avert the risk of "severe, widespread and irreversible" impacts. More severe climate change requires more transformative adaptation, which can be prohibitively expensive. The capacity and potential for humans to adapt, called *adaptive capacity*, is unevenly distributed across different regions and populations, and developing countries generally have less. The first two decades of the 21st century saw an increase in adaptive capacity in most low- and middle-income countries with improved access to basic sanitation and electricity, but progress is slow. Many countries have implemented adaptation policies. However, there is a considerable gap between necessary and available finance.

Adaptation to sea level rise consists of avoiding at-risk areas, learning to live with increased flooding, protection and, if needed, the more transformative option of managed retreat. There are economic barriers for moderation of dangerous heat impact: avoiding strenuous work or employing private air conditioning is not possible for everybody. In agriculture, adaptation options include a switch to more sustainable diets, diversification, erosion control and genetic improvements for increased tolerance to a changing climate. Insurance allows for risk-sharing, but is often difficult to obtain for

people on lower incomes. Education, migration and early warning systems can reduce climate vulnerability.

Ecosystems adapt to climate change, a process that can be supported by human intervention. Possible responses include increasing connectivity between ecosystems, allowing species to migrate to more favourable climate conditions and species relocation. Protection and restoration of natural and semi-natural areas helps build resilience, making it easier for ecosystems to adapt. Many of the actions that promote adaptation in ecosystems, also help humans adapt via ecosystem-based adaptation. For instance, restoration of natural fire regimes makes catastrophic fires less likely, and reduces human exposure. Giving rivers more space allows for more water storage in the natural system, reducing flood risk. Restored forest act as a carbon sink, but planting trees in unsuitable regions can exacerbate climate impacts.

There are some synergies and trade-offs between adaptation and mitigation. Adaptation measures often offer short-term benefits, whereas mitigation has longer-term benefits.^[260] Increased use of air conditioning allows people to better cope with heat, but increases energy demand. Compact urban development may lead to reduced emissions from transport and construction. Simultaneously, it may increase the urban heat island effect, leading to higher temperatures and increased exposure. Increased food productivity has large benefits for both adaptation and mitigation.

Countries that are most vulnerable to climate change have typically been responsible for a small share of global emissions, which raises questions about justice and fairness. Climate change is strongly linked to sustainable development, along with the use of fossil fuels and emission of greenhouse gases. Limiting global warming makes it easier to achieve sustainable development goals, such as eradicating poverty and reducing inequalities. The connection between the two is recognised in the Sustainable Development Goal 13 which is to "Take urgent action to combat climate change and its impacts". The goals on food, clean water and ecosystem protections have synergies with climate mitigation.

The geopolitics of climate change is complex and has often been framed as a free-rider problem, in which all countries benefit from mitigation done by other countries, but individual countries would lose from investing in a transition to a low-carbon economy themselves. This framing has been challenged. For instance, the benefits in terms of public health and local environmental improvements of coal phase-out exceed the costs in almost all regions. Another argument against this framing is that net importers of fossil fuels win economically from transitioning, causing net exporters to face stranded assets: fossil fuels they cannot sell.

25.9.6 Policy options

A wide range of policies, regulations and laws are being used to reduce greenhouse gases. Carbon pricing mechanisms include carbon taxes and emissions trading systems. As of 2019, carbon pricing covers about 20% of global greenhouse gas emissions. Direct global fossil fuel subsidies reached \$319 billion in 2017, and \$5.2 trillion when indirect costs such as air pollution are priced in. Ending these can cause a 28% reduction in global carbon emissions and a 46% reduction in air pollution deaths. Subsidies could also be redirected to support the transition to clean energy. More prescriptive methods that can reduce greenhouse gases include vehicle efficiency standards, renewable fuel standards, and air pollution regulations on heavy industry. Renewable portfolio standards have been enacted in several countries requiring utilities to increase the percentage of electricity they generate from renewable sources.

As the use of fossil fuels is reduced, there are Just Transition considerations involving the social and economic challenges that arise. An example is the employment of workers in the affected industries, along with the well-being of the broader communities involved. Climate justice considerations, such as those facing indigenous populations in the Arctic, are another important aspect of mitigation policies.

25.9.7 International climate agreements



Since 2000, rising CO₂ emissions in China and the rest of world have surpassed the output of the United States and Europe.



Per person, the United States generates CO₂ at a far faster rate than other primary regions.

Nearly all countries in the world are parties to the 1994 United Nations Framework Convention on Climate Change (UNFCCC). The objective of the UNFCCC is to prevent dangerous human interference with the climate system. As stated in the convention, this requires that greenhouse gas concentrations are stabilised in the atmosphere at a level where ecosystems can adapt naturally to climate change, food production is not threatened, and economic development can be sustained. Global emissions have risen since signing of the UNFCCC, which does not actually restrict emissions but rather provides a framework for protocols that do. Its yearly conferences are the stage of global negotiations.

The 1997 Kyoto Protocol extended the UNFCCC and included legally binding commitments for most developed countries to limit their emissions. During Kyoto Protocol negotiations, the G77 (representing developing countries) pushed for a mandate requiring developed countries to "[take] the lead" in reducing their emissions, since developed countries contributed most to the accumulation of

greenhouse gases in the atmosphere, and since per-capita emissions were still relatively low in developing countries and emissions of developing countries would grow to meet their development needs.

The 2009 Copenhagen Accord has been widely portrayed as disappointing because of its low goals, and was rejected by poorer nations including the G77. Associated parties aimed to limit the increase in global mean temperature to below 2.0 °C (3.6 °F).^[288] The Accord set the goal of sending \$100 billion per year to developing countries in assistance for mitigation and adaptation by 2020, and proposed the founding of the Green Climate Fund. As of 2020, the fund has failed to reach its expected target, and risks a shrinkage in its funding.

In 2015 all UN countries negotiated the Paris Agreement, which aims to keep global warming well below 1.5 °C (2.7 °F) and contains an aspirational goal of keeping warming under 1.5 °C. The agreement replaced the Kyoto Protocol. Unlike Kyoto, no binding emission targets were set in the Paris Agreement. Instead, the procedure of regularly setting ever more ambitious goals and reevaluating these goals every five years has been made binding. The Paris Agreement reiterated that developing countries must be financially supported. As of February 2021, 194 states and the European Union have signed the treaty and 188 states and the EU have ratified or acceded to the agreement.

The 1987 Montreal Protocol, an international agreement to stop emitting ozone-depleting gases, may have been more effective at curbing greenhouse gas emissions than the Kyoto Protocol specifically designed to do so. The 2016 Kigali Amendment to the Montreal Protocol aims to reduce the emissions of hydrofluorocarbons, a group of powerful greenhouse gases which served as a replacement for banned ozone-depleting gases. This strengthened the makes the Montreal Protocol a stronger agreement against climate change.

25.9.8 National responses

In 2019, the United Kingdom parliament became the first national government in the world to officially declare a climate emergency. Other countries and jurisdictions followed suit. In November 2019 the European Parliament declared a "climate and environmental emergency", and the European Commission presented its European Green Deal with the goal of making the EU carbon-neutral by 2050. Major countries in Asia have made similar pledges: South Korea and Japan have committed to become carbon neutral by 2050, and China by 2060. Major developing countries like India have undertaken policy initiatives like the National action plan on Climate Change since 2009 that promote development objectives while also yielding co-benefits for addressing climate change effectively under 8 sub missions. India has a target of 175 GW



of renewable energy capacity by 2022 and 450 GW by 2030 under its nationally determined contributions.

As of 2021, based on information from 48 NDCs which represent 40% of the parties to the Paris Agreement, estimated total greenhouse gas emissions will be 0.5% lower compared to 2010 levels, below the 45% or 25% reduction goals to limit global warming to 1.5 °C or 2 °C, respectively.





CHAPTER-26

APPLICATION OF MODERN TECHNOLOGY

26.0 Introduction:

A number of popular technologies are currently being used in the field, but Geographic Information Systems (GIS) and Global Positioning System (GPS) rank at the top. Pick up a modern smart phone and you'll see how far this technology has come in just a short period of time. For modern foresters and loggers, an array of similar handheld receivers can be used to download data gathered from GPS, which can then be input into databases that combine it with other GIS information. This data can then be added directly into spreadsheets, modeling programs, visualization applications and mapping projects. Such technology helps foresters and loggers monitor and analyze timberland health, improve transportation routing, track forest growth and maintain a database of timberland changes.

LIDAR technology (Light Detection and Ranging) is also beneficial for modern foresters, which collects tree measurements and detailed imaging. While traditional prisms are still valuable tools, LIDAR helps to measure canopy heights and volume, basal areas and habitat mapping.

Drones are also proving to be increasingly valuable to foresters. While drones are still considered to be a hobbyist toy by many, forestry professionals use them to help with forest management planning, detecting disease and managing forest fires. For large properties, drones are a great device for assessing volume and the overall condition of tree plantations.

Most of these tools have practical applications on the ground and in the field, which result in real-world information that cannot be replaced. However, combining this information with the detailed, customizable datasets that are available in SilvaStat360 allows foresters to apply context to the information they gather in the field so they are better equipped to make more informed decisions.

All of these technologies provide incredible benefits to the forestry industry and the pace of exciting, new technological developments continues to quicken. Members of the modern forest supply chain who embrace and utilize these technologies will be well-positioned to succeed in the modern global forest economy.

26.1 Modern Technology being adopted:

At present the Forest Officials are quite conversant with the following technology and frequently using for forest management. These are



- Use of Global Positioning System (GPS) in survey, Demarcation & locating the specified spot.
- Use of Differential Global Positioning System (DGPS) for survey of Forest blocks / area with an exact accuracy of 95% level.
- GIS applications for map study / Map preparation etc.
- Study and use of Satellite Imagery for detecting vegetation change, degradation of land / vegetation.
- Use of Satellite imagery for detection of Fire and faster communication of location of incidents.
- Clonally Propagation with mist chamber facilities for better genetically improved seedlings for plantation purpose.
- Root trainer nursery for mass seedling production.
- Use of Sprinkler for watering in Nursery.
- Use of blowers, Chemical fire extinguisher to combat Forest fire.
- Various mobile applications, Infrared radio collars to detect animal movement & reporting.
- Early warning system on Elephant movement.

The available technology at the hands of Forester, as stated above are not used / applied in an extensive manner that is required & desirable. During this plan period it is expected that each forester in field should have access to all these facilities and use them for day to day management.

26.2 Modern Technology to be introduced in Forest Management:

With advancement of technology it is proposed to have the following facilities available with Nayagarh Wildlife Division for better management.

- a. Identified Plus trees within the Division and maintaining a Clonal Orchard.
- b. To have improved Mega Nursery with clonal propagation facilities with mist chamber, Sprinkler System.
- c. Root trainer facilities and capacity to meet requirement of Quality Planting Materials for the division instead of depending upon temporary nursery.
- d. All forest blocks / plantations surveyed with DGPS and mapping thereof.
- e. Establishment of GIS Cell with available Satellite imagery for monitoring purpose.
- f. Modern logging tools to meet emergency in **Post Cyclone Management**.
- g. Drone camera facilities to watch forest fire, wildlife movement and winter birds congregation & problems.
- h. Strengthen Early warning System to detect / manage elephant movement in the division.



26.3 Forest Certification:

The Forest Certification Module provides basic and more detailed information on forest certification as a third-party voluntary, market-based mechanism to promote the sustainable use of forest resources. The module explains what forest certification is, differentiates between forest management certification and chain-of-custody certification, sets out the benefits and costs, and describes the steps that a forest manager must take to acquire it. It also provides links to tools and case studies to foster access to, compliance with and use of forest certification.

26.3.1 What is forest certification?

Forest certification is a voluntary process whereby an independent third party (the “certifier”) assesses the quality of forest management and production against a set of requirements (“standards”) predetermined by a public or private certification organization. Forest certification, and associated labeling, is a way of informing consumers about the sustainability of the forests from which wood and other forest products were produced. There are two types of forest certification:

1. Certification of forest management, which assesses whether forests are being managed according to a specified set of standards; and
2. Certification of the chain of custody (sometimes referred to as CoC certification), which verifies that certified material is identified or kept separate from non-certified or non-controlled material through the production process, from the forest to the final consumer.

To label an end-product as certified, both forest management certification and chain-of-custody certification are required. Most forest management certification standards address a wide range of economic, social, environmental and technical aspects of forest management, including the well-being of workers and of families living in and around the forest area subject to certification.

26.3.2 Why forest managers be interested in certification?

Forest managers – such as forest owners, entrepreneurs, associations and timber companies – may voluntarily decide to apply for certification. They may do so in expectation of better prices for their products, to maintain or increase access to markets for their products, to improve their public image, and to achieve social and environmental goals.

26.3.2 (i) What is behind the idea?

Forest certification is a market mechanism to promote the sustainable use and management of forests and to identify “sustainably produced” products for the consumer. The aim is to reward forest managers who pursue sustainable forest practices rather than practices with the potential to cause negative economic, social and environmental impacts. A certification label on a forest product informs potential buyers that the product was produced in a well-managed forest in accordance with a given set of standards. Consumers concerned about social and environmental issues are expected to give preference to products carrying such a label, and they may also be prepared to pay higher prices for them. Forest managers may be motivated to pursue certification for various reasons, ultimately leading to improvements in the quality of forest management and an increase in the extent of well-managed forests.

26.3.2 (ii) What are the benefits?

In many cases, the most immediate benefit of certification for forest managers is the streamlining of forest operations due to improvements in efficiency and greater control of production processes. Although experience has shown that certified forest products do not always obtain higher prices compared with uncertified products, certification may be essential for maintaining access to some markets. Certification has been shown to be a valuable tool for positioning products in the marketplace and in certain sectors: in the paper and packaging sector, for example, certification is the norm rather than the exception in many major markets. Certification can also provide confirmation that a product fulfils legal requirements – such as those established by laws aimed at preventing the trade of illegal timber products – and may help producers and traders in fulfilling administrative obligations. Forest certification may help bring about improvements in the working conditions and safety and health of forest workers, lead to improved forest conservation outcomes, and encourage sustainable forest use. Forest certification can help boost the public image of companies – both those that pursue certification in their own forest operations, and those that purchase only certified products.

26.3.2(iii) What are the costs?

Forest managers incur both direct and indirect costs in pursuing certification. Direct costs include those associated with the certification process – such as the fees paid to certifiers to conduct initial assessments and subsequent audits, hold stakeholder consultations and prepare reports. Achieving certification may also require investments in machinery, staff training, infrastructure and logistics to improve forest management in compliance with the certification standards; these indirect costs could be much higher than direct



costs, depending on the gap between the existing quality of management and that required to meet the certification standards. Because the direct costs of certification are relatively fixed, they usually decrease per unit of wood production or forest area – in other words, they decline, in relative terms, the larger the forest operation. Indirect costs, on the other hand, increase as operations increase in size because of the need to improve practices across larger areas.

26.3.2(iv) How is certification achieved?

Achieving forest certification can be either a quick or a lengthy process, depending on the pre-certification quality of forest management, administration and documentation systems, and on the capacity of the applicant to make the required adjustments. Basic certification requirements include: compliance with the law; well-written and coherent forest management plans; the implementation and monitoring of operations to reduce forest damage; adequate working conditions; and good relations with people living in and around the forest subject to the certification process. The certification process requires that applicants take a number of steps to demonstrate full compliance with the standards. A certificate valid for a specified number of years is issued when compliance has been achieved. In more depth

26.3.3 PEFC's criteria for SFM standards Criterion;

The criterion are

1. Maintenance and appropriate enhancement of forest resources and their contribution to the global carbon cycle.
2. Maintenance of forest ecosystem health and vitality.
3. Maintenance and encouragement of productive functions of forests (wood and non-wood).
4. Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems.
5. Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).
6. Maintenance of other socioeconomic functions and conditions.
7. Compliance with legal requirements.

The concept of forest certification arose as a way of addressing public concerns about tropical deforestation and forest degradation. The Forest Stewardship Council (FSC), which pioneered forest certification in the early 1990s, was created as a result of collaboration between environmental non-governmental organizations, forest product companies and social interest groups. Today, there are more than 50 certification schemes addressing a wide variety of forest types, tenure and management regimes. The

Programme for the Endorsement of Forest Certification (PEFC) is the largest certification framework in terms of forest area, accounting for about two-thirds of the total certified area worldwide, while the FSC is the fastest-growing scheme (by certified area)

26.3.4 Principles, Criteria, Indicators and Standards.

In most forest certification schemes, the specific requirements for good forest management are presented in a hierarchical system of principles, criteria and indicators. Principles provide an overall framework and set out a vision of sustainable forest management.

Criteria are categories of conditions or processes by which sustainable forest management can be assessed, and each criterion is characterized by a set of indicators that can be monitored to assess change over time.

The process by which certification bodies have developed their principles, criteria and indicators has varied. In 1994, the FSC defined ten global principles and associated criteria that set the framework within which national groups could develop indicators and verifiers specifying national and subnational standards through multistakeholder processes. The PEFC adopted a definition of sustainable forest management that was developed by the Ministerial Conference on the Protection of Forests in Europe in 1993 (and later adopted by FAO). The PEFC supplements its principles, criteria and indicators derived from globally recognized intergovernmental processes with additional requirements in national schemes prepared with the involvement of key stakeholders – including forest owners and managers – and endorsed by the PEFC Council. Certification standards are generally developed, reviewed and revised in consultation with stakeholders. Global standards may be adapted to suit national conditions.

During the plan period the concept is to be driven in to Forest management in this aspect.





CHAPTER-27

MISCELLANEOUS REGULATION

27.1 Introduction:

During forest Management many issues remain outside the perview of the Working Plan Prescriptions. Some of the burning issues are attempted to be addressed in this chapter i.e. **“Miscellaneous Regulation”**

27.2 Forest Consolidation:

At present there are 24 PRF and 29 no of DPF in the Division. Some of the PRF Notification are dated to during late 70's and early 80's. No substantial progress has been made in declaring PRF as RF under Section 21 of the Forest act to complet the process. Similarly DPF position is not at all improving the List of PRF/ DPF which needs immediate attention for declaring as PRF / RF as applicable.

Table No 27.1 :List PRF (Keonjhar Division)

SI No	Block	Notified area	GIS Area	Notification No. & date
	B&JP Range			
1	Amuni	50.5987	50.5987	F.S.- 33/78-32757/R dt. 16.5.78
2	Bayakumutia	118.0045	118.0045	F.S207/78-74559/R dt. 13.11.78
3	Champey	363.8651	363.8651	F.S.- 17/78-30525/R dt. 5.5.78
4	Danla	170.7029	170.7029	F.S.- 35/78-32929/R dt. 17.5.78
5	Digachampey	170.0146	170.0146	F.S.- 32/78-35218/R dt. 30.5.78
6	Dumuridiha	501.9573	501.9573	F.S.- 208/78-74579/R dt. 13.11.78
7	Gandhamardan	2295.9907	2295.9907	F.S.- 205/78-74607/R dt. 13.11.78
8	Gonasika	334.3871	334.3871	F.S.- 204/78-74583/R dt. 13.11.78
9	Gouda champey	447.3693	447.3693	F.S.- 26/78-33849/R dt. 23.5.78
10	Lunaghar-I	131.6830	131.6830	F.S.- 22/78-34796/R dt. 27.5.78
11	Lunaghar-II	360.9440	360.9440	F.S.- 28/78-32669/R dt. 16.5.78
12	Raiguda	489.3750	489.3750	F.S.-23/78- 30773//R dt. 5.5.78
13	Suakati-I	475.3921	475.3921	F.S.- 27/78-30511/R dt. 5.5.78
14	Suakati-II	134.9700	134.9700	F.S.- 14/78-30515/R dt. 5.5.78
B& JP Range Total		6045.2543		6045.2543
	Champua Range			
15	Baitarani East 'A'	154.1400	154.1400	F.S.- 50/78-12079/R dt. 20.2.78
16	Baitarani East 'B'	309.2000	309.2000	F.S.- 70/78-35058/R dt. 29.5.78
Champua Range Total		463.3400		463.3400



	Keonjhar Range			
17	Khajuribani	3575.4201	3575.4201	F.S.- 34/78-32753/R dt. 16.5.78
	Patna Range			
18	Budhikapudi 'II'	31.0200	31.0200	F.S.- 200/78-74555/R dt. 13.11.78
	Telkoi Range			
19	Dublupal	88.2300	88.2300	F.S.- 73/78-35066/R dt. 29.5.78
20	Godhihudi	78.8700	78.8700	F.S.- 12/78-30785/R dt. 5.5.78
21	Rekuti	275.3000	275.3000	FS 202/78 73202/R dt. 7.11.78
22	Renda	1282.4329	1282.4329	FS 11/78 30896/R dt. 5.5.78
23	Sikheswari	3105.5000	3105.5000	FS 8/78 35254/R dt. 30.5.78
24	Syamanali Koilisuta	341.4900	341.4900	FS 36/78 30777/R dt. 5.5.78
Telkoi Range Total		5171.8229	5171.8229	
Division Total		15286.8573	15286.8573	

Table No27.2 List of DPF of Keonjhar Forest Division

Sl. No.	Name of the Range	Name of the D.P.F	Area in Ha.	Submitted to Collector for U/s 4(i) Le no & date	Name of the Tahasil
1	Barbil	Murgabeda	518.23	8016 dt. 22.12.1990	Barbil
2	B&JP	Guptaganga	179.1081	8001 dt. 22.12.1990	Telkoi
3	B&JP	Katira	483.7163	3777 dt. 25.04.1994	Telkoi
4	B&JP	Pamdadhar-Bayakumutia	259.439	4846 dt. 22.08.1988	Keonjhar
5	B&JP	Sanaghagara(B)	792.8602	3775 dt. 25.04.1994	Keonjhar
6	B&JP	Sundurua	753.7537	8010 dt. 22.12.1990	Keonjhar
7	B&JP	Taramakanta	417.5775	3780 dt. 25.04.1994	Telkoi
8	B&JP	Kalanda	1060.862	10888 dt. 23.12.1999	Telkoi
9	B&JP	Kakharua	1240.073	10891 dt. 23.12.1999	Telkoi
10	B&JP	Khandadhar	1956.448	4621 dt. 03.07.2018	Telkoi
11	B&JP	Kuanr	2080.6917	6017 dt. 31.10.1987	Telkoi
12	B&JP	Kumundi(B)	88.62	6014 dt. 31.10.1987	Keonjhar
13	B&JP	Sanghagara (A)	583.84	7112 dt. 18.08.1978	Keonjhar
14	B&JP	Siddhamath	1112.6787	7108 dt. 18.08.1978	Keonjhar
15	Champua	Jamirta	313.6505	6213 dt. 01.11.1988	Barbil
16	Champua	Kankana	170.2168	6216 dt. 01.11.1988	Barbil



17	Ghatgaon	Kapaspada	80.3289	6497 dt. 14.07.1992	Ghatgaon
18	Ghatgaon	Khajurijuani	95.7075	6450 dt. 14.07.1992	Ghatgaon
19	Ghatgaon	Tara (B)	74.1329	6020 dt. 31.10.1987	Ghatgaon
20	Patna	Machhagarh	14.3668	11204 dt. 24.11.1992	Keonjhar
21	Patna	Mushkhori (A)	50.8829	6506 dt. 14.07.1992	Keonjhar
22	Patna	Mushakhori (B)	72.2146	6509 dt. 14.07.1992	Ghatgaon
23	Patna	Chemena II	23.97	2319 dt. 24.02.1979	Keonjhar
24	Telkoi	Binjabahal (A)	18.3531	98 dt. 02.01.1987	Telkoi
25	Telkoi	Binjabahal (B)	19.8303	6273 dt. 24.06.1981	Telkoi
26	Telkoi	Madhyapur	101.5797	7320 dt. 29.08.1978	Telkoi
27	Telkoi	Oriya	161.0948	1963 dt. 22.03.1990	Telkoi
28	Telkoi	Binjabahal (C)	140.83	6579 dt. 26.11.1987	Telkoi
29	Telkoi	Tangurubahal	493.84	6279 dt. 24.06.1981	Telkoi
	S. Total		13358.897		

There are many good forest patches needs to be brought under administrative control of Forest Department. Steps are required to be taken for initiating proposal for Reservation. The process that requires to followed are

1. Identification of area to be reserved. It should not be less than 50 ha for future management convenience.
2. Collection of Land Schedule as per Hal Settlement and preliminary mapping of Cadastral Map.
3. Obtain permission from PCCF and intimate intention for reservation with due justification (Vegetation, Proximity to water body / River/ Spring etc).
4. Intimate Collector, Keonjhar for his approval
5. On approval take detail survey, prepare Cadastral map, Topo map with Pillar position, Field Book, Latitude / Longitude.
6. Prepare six set of such map / Land Schedule and Field book with Boundary description. (Chainage, Degree with FB/ BB), General Boundary description.
7. Submit proposal to PCCF for his approval.
8. On approval submit the proposal to Collector, Keonjhar for on ward transmission to R& DM department for notification u/s 4 of the Odisha Forest Act, 1972.
9. After Section 4 notifications, the process to RF notification u/s 21 to be pursued.

27.3 Forest Boundary Maintenance:

From the field study, it is seen that out of 13995 boundary pillars, 9149 pillars are in good condition which constitutes 65%. Some portions of pillars are either missing or damaged.



The boundary position is satisfactory and it can be inferred as “Forest boundary is secured.”

(The boundary of DPF, PF and VF has not been surveyed. It needs a complet survey & maintenance)

The pillars are required to be maintained. The Boundary Pillar maintenance is required to be taken up in a five year Cycle as indicated under Para 2.3.2.of PART-I.

In case of Village special drive is required to find out maps / corresponding Hal Settlement records, demarcation and secured its boundary. It is most vulnerable forest area with department.

27.4 Fire Protection:

Fire Protection is an important issue in case of Forest management. During 2021, massive fire broke out in Odisha and lot up hue & cry raised. Keeping in view the damage caused and under preparedness in this matter a Standard Operational Calendar has been developed and suggested below.

Table No 27.3 Standard Operational Calendar for Fire Protection

Sl No	Description	Period	Executing Authority
1	Review of last Fire seasons loss & financial burden	October	Divisional Forest Officer & Supervising authority
2	Review Resource available at Hand	October	
3	Prepare a systematic Fire Fighting method to be adopted – Vulnerable sites etc & requirement of Man power, Resource and equipments.	November	Range Officer, DFO
4	Procure equipments / repair and maintenance of Equipments	November	Range Officer, DFO
5	Activate VSS / Villagers and all squad at hand – Demonstration camps etc	December	Range Officer, DFO
6	Collect & Display Contact number of Fire Station, Emergency Number, Range / Forester / Forest Guard Number	January	Range Officer, DFO
7	Fire Line maintenance	January/ 1st Week of February	Forester / Range Officer and DFO
8	Identification of Vulnerable points / Control burning etc	January / February – 1st part.	Forester / Forest Guard/ Range Officer.
9	Operate Control Room and deploy Frontline Staff / Squads / Vehicles	1st Week of February	Forest Range Officer / DFO



10	Improvement Communication System and appointment of Contact person to Divisional / Range Fire Control Cell.	1st Week of February	DFO
11	Prepare for facing eventuality like Fire Burnt / First aid Kit Hospitalization etc	During Fire Season February – June	Medical Contact to be established February 2nd Week onwards.
13	Fire Review / Guideline / command during season	As and When Required	Forest Range Officer / DFO.
14	Review / Fire mapping	July	Forest Range Officer / DFO.

Fire Protection measures need to be implemented with for better forest management, growth and regeneration.

27.5 Protection against Grazing:

At present Grazing in Reserved forests, Proposed Reserved Forests, DPF etc are not allowed. The forest blocks / sections / plantations needs to be protected against Grazing. A formal notification indicating Regenerated area may be issued by DFO, Keonjhar as “Closed to Grazing” for three years from year of treatment. This needs to be circulated to local bodies, PRI (Panchyat Raj Institutions) to have an effect on controlled grazing.

27.6 Forest road:

There are 17 forest roads in the division to facilitate transportation of Forest Produce and inspection of Forests, The total length of the forest Road is 153.88 km.

It should be annually maintained for effective supervision. The Forest Roads need to be closed to Public for a day in a year.

27.7 Identification of Plus Trees:

Plantation is an important component in enrichment of forests and creation of new manmade forests. Day by Day good plus trees – the source of Quality Seed are reducing day by day. To preserve the available genetically superior plus trees in the locality, a special drive to “**Know your plus trees**” is required to be lunched. Under this drive all forest staffs, VSS members, temporarily engaged staffs are to be shortly briefed about aim & objectives of this drive and asked to enlist plus trees in there locality They may be asked to enlist trees (Plus Trees) of any species found in the locality (prive / Govt land / Forest land) and report in the following farmat.



Name of Species	Description of tree identified	Girth / Height in m	Location	Latitude / Longitude.	Remark / Date of Identification.

Such list is to be compiled, visited by officials for verification. After verification each tree may be given a Unique No from the Division Office and the number may be written on the tree. Consolidated list may be circulated to all staffs / VSS of the locality for its protection and collection of seeds from such trees

Steps may also be initiated to preserve the Genetic quality by Vegetative Propagation in Central nursery of the division.

27.8 Demarcation of VSS assigned area, Preparation of map and signing of MoU

In general it is observed that the forest assigned to VSS has not been properly demarcated, mapped and MoU has not been signed between Forest Department and Villagers. This aspect is to be addressed in a time bound manner which will give a boosting effect to Joint Forest Management drive in the division. Record keeping pertaining to VSS requires to be monitored and a special drive is to be taken to update the records.

27.9 Mining projects in The Division:

Joda- Badbil- BJP Range are having many Mining Leases. Most of the Mines are in operative stage. The list of Mines is furnished below. The location of the mines as received are at Plate No I, II, III. The mines are being regulated by the Steel & Mines as per provisions of MMDR Act, 1957 and as amended up to 2015. The list of Mines are furnished as Table No 27.3 below.



Table No 27.3(i) : M.L. & P.L AREA JODA CIRCLE WITH THEIR STATUS

TOPO SHEET NO.73-F/8

Sl. No	Name of Lessee	Location	RF/DPF	Area in Ha	Mineral	Status
1	D.R pattanaik	Murgabeda	Thakurani RF	15.3780	Iron Ore	ML
2	Dr. S. Pradhan	baitarani	Baitarani RF	52.8920	Iron Ore	ML
3	TISCO	Joda East	Baitarani RF	670.8070	Iron Ore	ML
4	SAIL	Bolani	Karo RF	1320.8950	Iron Ore	ML
10	O.M.D.C	Bhadrasahi	Sidhamatha RF	103.6000	Iron Ore	ML
11	B.P.M.E.L	Thakurani	Thakurani RF	1600.8730	Iron Ore	ML
13	K.N Ram (MESCO)	Roida-I	Sidhamatha RF	104.6800	Iron Ore	ML
15	Kaypee Enterprises	Thakurani	Thakurani RF	228.0400	Iron Ore	ML
19	A. Lodha	balagonda	Karo RF	326.5080	Iron Ore	ML
24	K.C Pradhan	Lakraghat	Sidhamatha RF	10.7200	Iron Ore	ML
25	Dr. S. Pradhan	Balita	Thakurani RF	34.7500	Iron Ore	ML
26	Bhanj Mineral (P) Ltd.	Deojhar	Thakurani RF	399.0200	Iron Ore	ML
27	B.D Pattanaik	Kalaparnat	Thakurani RF	25.6330	Iron Ore	ML
28	TISCO	Manmora	Baitarani RF	16.3490	Mn. Ore	ML
35	O.M.C	Dalki	Thakurani RF	265.2600	Mn. Ore	ML
36	B.P.M.E.L	Dalki	Thakurani RF	267.7600	Mn. Ore	ML
37	TISCO	Bamebari Baneikala	Thakurani RF	1150.5500	Mn. Ore	ML
38	O.M.C	Roida block-D	Sidhamatha RF	129.4990	Mn. Ore	ML
43	TISCO	Katamati	Murgabeda DPF	403.3240	Mn. Ore	ML
44	O.M.D.C	Belkundi	Uliburu RF	1276.8650	Iron & Mn	ML
45	TISCO	Joda West	Baitarani RF	1437.7190	Iron & Mn	ML
46	O.M.C	Serenda Bhadrasi	Thakurani RF	1734.5170	Mn. Ore	ML
47	OMC/IDC	Roida block-C	Sidhamatha RF	192.8100	Iron & Mn	ML
51	Bhanj Mineral (P) Ltd.	Inganijharn	Baitarani RF	242.3130	Iron & Mn	ML
55	B.P.M.E.L	Roida	Sidhamatha RF	254.9520	Iron & Mn	ML
58	Kusaleswar Minerals	Kalaparnat	Thakurani RF	9.8140	Mn. Ore	ML



59	K.C Pradhan	Horomotto	Karo RF	61.0150	Iron & Mn	ML
62	S.D Sharma	Raika	Thakurani RF	26.2430	Iron & Mn	ML
66	D.R Pattnaik	Thakurani	Thakurani RF	121.3850	Iron & Mn	ML
67	Dr. S. Pradhan	Inganijharn	Baitarani RF	18.7000	Iron & Mn	ML
68	SAIL	Bolani	Karo RF	1787.0930	Iron & Mn	ML
70	Essel Mining & Ind. Ltd.	Kasia	Sidhamatha RF	194.1960	Iron, Limestone & Dolomite	ML
74	B.K.Mohanty	Uliburu	Uliburu RF	62.7260	Iron. Mn & Quartzite	ML
75	B.K.Mohanty	Uliburu	Uliburu RF	56.9400	Iron, Mn & Limestone	ML
78	T.B.Lal	Kasia Barapada		77.4970	Iron Ore	ML
79	S.N Mohanty	Khuntapani	Baitarani RF	15.3780	Iron Ore	ML
80	K.N Ram & Co.	Roida -II	Sidhamatha RF	74.8660	Iron Ore	ML
82	OMDC	Bagiaburu	Uliburu RF	21.5200	Iron Ore	ML
88	NMDC	Kiriburu	Kiriburu RF	1051.8810	Iron Ore	ML
88	Jagdish Mishra	Uliburu	KF	30.5130	Iron Ore	ML
90	Dr. S. Pradhan	baitarani	Baitarani RF	1.5050	Iron Ore	ML
92	O.M.C	Roida Sidhamatha	Sidhamatha RF	78.7110	Iron Ore	ML
94	M.R.Das	Uliburu	Uliburu RF	3.0760	Mn. Ore	ML
95	B.C Deb	Dadwan	Baitarani RF	114.9340	Iron & Mn	ML
97	Tarini Minerals	Deojhar	Thakurani RF	34.3650	Iron Ore	ML
98	M.R Das	Deojhar	Thakurani RF	11.5370	Iron Ore	ML
99	S.L Sarda & M.L Sarda	Thakurani	Thakurani RF	947.0460	Iron Ore	ML
102	K.C Pradhan	Bolani	Karo RF	17.1000	Iron Ore	ML
106	Kusaleswar Minerals	Raika	Thakurani RF	6.2280	Iron & Mn	ML
108	Dr. S. Pradhan	Kalaparbat	Thakurani RF	177.4530	Iron & Mn	ML



Table No 27.3 (ii) M.L. & P.L AREA JODA CIRCLE WITH THEIR STATUS
TOPO SHEET NO.73-G/5

Sl. No	Name of Lessee	Location	RF/DPF	Area in Ha	Mineral	Status
5	Pattanaik Minerals	Jaribahal	KF	106.5340	Iron Ore	ML
6	O.M.C	Khandbandh	KF	366.3110	Iron Ore	ML
7	S.C Padhee	Gurubeda	KF	49.7760	Iron Ore	ML
8	Narayani Sons	Surjaturpa	Baitarani RF	138.9000	Iron Ore	ML
9	K.M Corporation	Jururi	KF	27.1700	Iron & Mn	ML
12	R.P Sao	Guali	Sidhamatha RF	365.0260	Iron Ore	ML
14	K.J.S Ahluwalia	Nuagaon	KF	767.2840	Iron Ore	ML
16	K.C.Pradhan	Chamakpur	DPF	142.6970	Iron Ore	ML
17	Sirazudin & Co.	Belda	KF	335.8900	Iron Ore	ML
18	O.M.C	Balda, Palsa, Jajang	KF	866.5950	Iron Ore	ML
20	K.M.C	Jururi	KF	135.5700	Iron & Mn	ML
21	K.M.C	Jururi	KF	12.6900	Iron Ore	ML
22	Mineral Trading Syndicate	Bhalubasa	DPF	62.3220	Iron Ore	ML
23	T.B Lal	Jajang	KF	39.8970	Iron & Mn	ML
29	Pattanaik Minerals	Jaribahal	KF	17.1500	Iron Ore	ML
30	TISCO	Gurda & Jururi	Baitarani RF	643.6120	Iron Ore	ML
31	O.M.D.C	Bhadrasahi	Sidhamatha RF	999.7060	Iron Ore	ML
32	R.P Sao	Chormalda	Sidhamatha RF	141.1220	Iron Ore	ML
33	Rungta Sons (P) Ltd.	Katasahi	Sidhamatha RF	226.6240	Iron Ore	ML
34	O.M.C	Dubuna	Pedipokhari RF	1135.4190	Iron Ore	ML



39	M.L Rungta	Kalimati	KF	715.6390	Iron Ore	ML
40	K.M.C	Jururi	KF	54.7540	Iron Ore	ML
41	K.M.C	Jururi	KF	39.4560	Iron Ore	ML
42	S.N Pal	Katamati	KF	9.6990	Iron Ore	ML
48	O.M.C	S.G.B.K	KF	1011.4620	Iron & Mn	ML
49	Essel Mining & Ind. Ltd.	Jilling & Langalota	Baitarani RF	456.1000	Iron & Mn	ML
50	H.G Pandya & Others	Jajang	DPF	100.1370	Iron & Mn	ML
52	A. Roy & B. Roy	Jalahuri	Baitarani RF	182.1080	Iron & Mn	ML
53	Rungta Mines (P) Ltd.	Jajang	KF	669.3500	Iron & Mn	ML
54	S.C Padhi	Banspani	KF	41.6820	Iron & Mn	ML
56	TISCO	Khandbandh	Baitarani RF	1293.4330	Iron & Mn	ML
57	M.R Das	Kalaparnat	KF	5.1390	Iron & Mn	ML
60	K.C.Pradhan	Paredipada	Karo RF	12.1000	Iron & Mn	ML
61	R.B Das	Kundurupani	KF	10.2550	Iron & Mn	ML
63	S.N Mohanty	Unchbali	KF	9.6300	Iron & Mn	ML
64	Essel Mining & Ind. Ltd.	Unchbali	KF	107.3060	Iron & Mn	ML
65	K.J.S Ahluwalia	Kendudihi	Sidhamatha RF	40.3060	Iron & Mn	ML
69	Pragati Pvt. Ltd.	Khuntapani	Baitarani RF	18.6150	Iron & Mn	ML
76	O.M.C	Banspani	Baitarani RF	380.4000	Iron Ore	ML
77	O.M.C	Sarkadihi	Pedipokhari RF	564.3560	Iron Ore	ML
81	M.H Rehman	Topadihi	KF	26.4760	Iron Ore	ML
81A	M/s U.M.S	Laidapada	KF	28.3280	Mn. Ore	ML
83	D.C Jain	Dolpahar BI-A	Baitarani RF	89.9610	Iron Ore	ML
84	D.C Jain	Dolpahar BI-B	Baitarani RF	0.6970	Iron Ore	ML
85	D.C Jain	Dolpahar BI-II	Baitarani RF	7.6970	Iron Ore	ML
86	D.C Jain	Dolpahar BI-III	Baitarani RF	1.0120	Iron Ore	ML
87	D.C Jain	Dolpahar BI-C	Baitarani RF	2.0020	Iron Ore	ML
89	O.M.C	Tiringpahar	Baitarani RF	79.3000	Iron Ore	ML
91	Rungta Sons (P) Ltd.	Bandhubeda	KF	26.2260	Iron Ore	ML



93	O.M.C	Parulipada	Karo RF	170.1700	Iron & Mn	ML
96	N. Pattanaik	Jajang Khandbandh	KF	66.3680	Iron Ore	ML
100	FACOR	Katasahi	KF	13.6740	Iron Ore	ML
101	Smt. Indrani Pattanaik	Unchbali	KF	106.1127	Iron Ore	ML
103	S.N. Mohanty	Unchbali	KF	10.1170	Iron & Mn	PL
104	O.M.C	Chormalda	Sidhamatha RF	416.8350	Mn. Ore	ML
107	O.S.I.L	Gorubeda	Baitarani RF	148.3570	Iron Ore	ML
109	T.P.Mohanty	Naibarga	KF	69.9780	Iron & Mn	PL
110	T.P.Mohanty	Naibarga	KF	29.2260	Iron & Mn	PL
111	T.B.Lal	Brahmanijhari	KF	429.9170	Iron & Mn	PL
112	S.N Paul	Katasahi	KF	31.3460	Mn. Ore	PL
112A	R.B Thakur	Katasahi	KF	96.5680	Iron & Mn	ML

TOPO SHEET NO.73-F/12

113	Akhil Ch. Mohanta	Ramachandrapur		38.3000	Chinaclay	PL

TOPO SHEET NO.73-G/9

71	B.K Mohanty	Parsala		28.6700	Quartzite	ML
73	G.L Chauda	Chanthia		3.0700	Quartzite	ML
105	Black Stone Mining	Dhabakuchuda		205.8700	Pyrophillite	PL

TOPO SHEET NO.73-G/13

72	S.N Mohanty	Raruangoda		32.9210	Quartzite	ML





CHAPTER-28

SUMMARY OF PRESCRIPTIONS

28.1 Objectives of Management & Working Circles Constituted:

The objectives of this working plan is to provide a basic approach for sustainable management of forests and preserve its biodiversity in light of the National Forest Policy, encompassing the ecological (environmental), economic (production) and social (including cultural) dimensions. The objectives for attaining this goal include conservation of forests and reducing forest degradation, maintenance and enhancement of ecosystem services including ecotourism, enhancement of forest productivity together with establishment of regeneration to improve forest health and vitality as per ecological and silvicultural requirements of the species, progressively increasing the growing stock and carbon sequestration potential, maintenance of biological diversity, sustainable yield of forest produce, prevention of soil erosion and stabilization of the terrain; improvement and regulation of hydrological regime; people's involvement in planning and management of forests fulfilling socio-economic and livelihood needs of the people. The sectors of consideration are Dynamics of Forests and Stands, Forests and Soil, Forests and Water, Forest Biodiversity, Climate and Forests, Socioeconomic Considerations and generation of forest based employment opportunities and livelihood options. The following Working Circles have been constituted for scientific management of available forest resources of the Division.

- i. Selection Working Circle (28563.4757 ha)
- ii. Improvement Working Circle (71156.9206ha)
- iii. Rehabilitation Working Circle (38113.4625ha)
- iv. Plantation Working Circle (8234.3647 ha)
- v. Protection Working Circle (448.3916Ha)
- vi. Podu(O) Working circle (1086 Ha)
- vii. Non Timber Forest Produce (Overlapping) Working Circle (141223.2031 Ha).
- viii. Wildlife (Overlapping) Working Circle (141223.2031 Ha)
- ix. Joint Forest Management (Overlapping) Working Circle (35735.0809 Ha)
- x. TOF Working Circle (2007.54 Ha + 576 RKM avenue Plantation)

All total it is proposed to have Ten Working Circle. Out of these working circles, Five Working Circle will have independent area where as other Four Working Circle will have overlapping jurisdiction. The TOF (Tree outside the Forest Area) Working Circle does not cover any RF/ PRF or VF.



28.1.1 Plan Validity:

The period of this working Plan is **from 1st April'2022 to 31st March 2032**. The implementation and probable impact of various prescriptions may be reviewed after five years of working, if it is so required.

28.2 Selection Working Circle (S.W.C)

28.2.1 Special objectives of Management:

Special objectives of management of this working Circle is within the general objectives of the Working Plan. The special objectives are outlines below.

- i) To remove mature and silviculturally available trees before they become unsound.
- ii) To create openings in the canopy to allow adequate light so as to allow establishment of light demanding species i.e. principally Sal.
- iii) To thin out the congested pole crop to allow diameter growth and also have interim harvest through which the VSS looking after the area will be benefited.
- iv) To allow natural regeneration and cover the entire area with vegetation of climatic species.
- v) To improve the density of the forest crop as well as stand structure by suitable silvicultural operations.
- vi) To remove dead and unsound trees for creating hygienic condition in the forest.
- vii) To carryout subsidiary silvicultural operations so that conducive situation can be created for better growth of existing crop and natural regeneration.
- viii) To manage the forest so as to to maintain it at this Climatic Stage so as to keep this composition of Forest with majority of Sal.

28.2.2 Exploitable Girth

Harvestable diameter is being prescribed in different plans for different species from time to time. The criteria considered for recommended "Harvestable Diameter / Girth" are as follows.

- i) The Annual Increment of the Species,
- ii) Development of unsoundness due to climatic and biotic factors,
- iii) Marketability & Demand,
- iv) Site Quality and productivity of Soil



Considering all aspect in the outgoing plan the exploitable Girth (GBH) for Sal was fixed at 150cm and above for all species. Considering the present scenario GBH for exploitation is prescribed as follows. Prescription of previous plan is followed except in case of other species where the Exploitable Girth is prescribed at 135 cm and above.

Table No 28.1 Exploitable Girth At Breast Height- Keonjhar Division.			
Sl. No.	Species		Girth
	Common name	Botanical name	
1	Sissoo	<i>Dalbergia latifolia</i>	135 cm & above
2	Dhaura	<i>Anogeissus latifolia</i>	
3	Sal (Sargi, Rengal)	<i>Shorea robusta</i>	150 cm & above
4	Siris (Sersuan)	<i>Albizzia lebek</i>	
5	Senha (Sidha)	<i>Legerstroemia parviflora</i>	
6	Piasal (Bija)	<i>Pterocarpus marsupium</i>	150 cm & above
7	Gambhar	<i>Gmelina arborea</i>	
8	Kurum (Haldu)	<i>Adina cordifolia</i>	
9	Kasi	<i>Bridelia retusa</i>	
10	Mundi	<i>Mitragyna parviflora</i>	
11	Asan (Sahaj)	<i>Terminalia tomentosa</i>	
12	Moi	<i>Lannea coromandelica</i>	
13	Semul (Simal)	<i>Bombax ceiba</i>	
14	All other species		135 cm & above

This will be applicable for all Felling Series and all other situation and Plantations

28.2.3 Silvicultural System:

The Silvicultural System proposed to be adopted is **“Selection System with adequate improvement measures to restock the area in High Forest System”**. Under this adopted system the matured and dead trees will be selectively removed leaving adequate mother trees to have good seed dispersal and natural regeneration. After removal of selected trees, the remaining trees will be treated so as to obtain good established regeneration

28.2.4 Constitution of Felling Series:

The area assigned to this Working Circle has been divided to six Felling Series. Each felling Series has been sub divided to ten (10) Annual Coupes and numbered as I, II, III --- X prefixed with Felling Series abbreviation.



28.2.5 Yield Projected.

During the Plan period 15457 trees are likely to be marked & removed. The trees will yield 6911.85 Cum of Timber and 4607.70 MT of Firewood.

28.2.6 Subsidiary silvicultural operations (cleaning and thinning):

After Coupe working, the coupe area is required to be improved through Subsidiary Silvicultural Operation. The following works are required to be taken up under Subsidiary Silvicultural Operation (SSO)

- All marked trees those have not been removed by the OFDC Ltd during coupe working are required to be removed without considering its economic value.
- All debris, barks etc are to be removed from the coupe area and may be dumped in pits for natural decay and formation of humus.
- All diseased tree parts should be removed from the coupe and preferable burnt in order to check it's out break.
- High stumps of living trees if found, it should be cut back at a height 30-40cm above the ground level.
- Silvicultural Cleaning and thinning are two major subsidiary silvicultural operations being prescribed. Cleaning is being taken up in Sapling Crops where as thinning is prescribed in Pole Crops. If such crop is available within the coupe cleaning / thinning if required to be taken up.
- Soil & Moisture Conservation work is required to be taken up. The forests assigned to this working circle are mostly matured with advance growth in pole stage. Hence thinning as required is prescribed. The details of thinning have been described under Para- 14.6.10.4 above.
- Soil & Moisture Conservation: Moisture regime of a forest block greatly influences the crop composition, quality class and productivity of the forests. The dryer the tract – poorer is the vegetation. The forests included in this working circle are the best available forest blocks of the division. It is recommended to improve soil moisture regime in forests to improve the vigour of the crop, allow the species towards a climatic climax with increased biodiversity. It is recommended to treat all the available seasonal nallas to enhance period of water flow, check soil erosion in slopes, increase the humus layer in forest floor.

The following activities are prescribed

- A. Vegetative / brushwood Check dams on nalla bed.
- B. Loose boulder Check dams (LBCD)
- C. Percolation Pits.



D. Create & Maintain Humus layers to reduce run off and enhance time of collection

E. In congested patches thinning of appropriate grade is prescribed.

28.2.7 Regeneration:

For regenerating the area high forest system is to be adopted. Activities like Sowing of Seeds, Closing to Grazing, Fire Protection Measure & Fire Protection Measure are recommended.

28.3 Improvement Working Circle (IWC)

28.3.1 Special objectives of Management:

Special objectives of management of this working Circle is within the general objectives of the Working Plan. The special objectives are outlined below.

- i) To remove dead trees before they become hazards to wildlife, forest fire.
- ii) To create openings in the canopy to allow adequate light so as to allow establishment of light demanding species i.e. principally Sal.
- iii) To thinning the congested pole crop to allow diameter growth and also have interim harvest through which the VSS looking after the area will be benefited.
- iv) To allow natural regeneration and cover the entire area with vegetation of climatic species.
- v) To improve the density of the forest crop as well as stand structure by suitable silvicultural operations.
- vi) To remove dead trees for creating hygienic condition in the forest.
- vii) To carry out subsidiary silvicultural operations so that conducive situation can be created for better growth of existing crop and natural regeneration.

28.3.2 Silvicultural system:

The Silvicultural System proposed to be adopted is **“Improvement measures to restock the area in High Forest System”**. Under this adopted system the congested and dead trees will be selectively removed leaving adequate mother trees to have good seed dispersal and natural regeneration. After removal of dead trees and thinning, the remaining trees will be treated so as to obtain good established regeneration and diameter growth.

28.3.3 Harvestable diameters:

There is no prescription for harvest in this working circle. Hence harvestable diameters are not prescribed. Trees as required under thinning (C grade to D Grade) will be removed as per thinning requirement to be discussed below.



28.3.4 Improvement cycle:

The Plan period is 10 years i.e. from 2022-23 to 2031-32. The area assigned to this working circle will be covered within the Plan Period i.e. 10 years. Therefore a improvement Cycle of 10 years is prescribed and followed.

28.3.5 Division into Annual Coupes (Improvement Sections):

The area assigned to this Working Circle has been divided to twenty Improvement Series. Each felling Series has been sub divided to ten (10) Annual Coupes and numbered as I,II, III --- X prefixed with Improvement Series abbreviation.

28.3.6 Yield Projected.

There is no prescription for felling of green / dieing trees. Only dead trees, if available will be salvaged out. During thinning some poles from consested patches will be removed in the process depending upon the grade of thinning i.e. C or D grade. As forests of Badbil Range, Champua Range and BJP Range are affected seriously by Mining no thinning will be normally carried out. Thiinning will be taken up in Keonjhar, Ghahtgaon, Patna and Telkoi Range.

28.3.7 Closing to Grazing:

The area assigned to a particular year is required to be closed to grazing for three to protect the natural regeneration to attain a sapling stage. This should be strictly adhering to. **A formal “Close to Grazing” order is to be issued and circulated to local offices / villages and VSS.**

28.3.8 Subsidiary Silvicultural Operation:

Silvicultural Cleaning and thinning are two major subsidiary sivicultural operations being prescribed. Cleaning is being taken up in Sapling crops where as thinning is prescribed in pole crops. The forests assigned to this working circle are mostly in pole stage. Hence thinning as required is prescribed.

28.3.9 Regeneration:

The silvicultural system adopted for this working circle is a “High Forest System”. For regeneration, the seed bearers are to be well maintained and covering of blank areas by sowing of seeds with after care is prescribed. Collection of genetically good seeds is to be stressed. The standard guideline for selecting a mother tree is furnished below.

- Collect seed lots from between 15 and 25 individuals that are spaced at least 100 meters distance from any other collection tree of the same species.
- Choose trees in vigorous health and avoid any that are diseased, suppressed, deformed, environmentally stressed, or in otherwise poor health.



- Collect from trees that are well formed and either dominant or co-dominant in the canopy.
- Avoid individuals that are isolated from others of the same species.
- Harvest only mature seed from ripened fruits.
- To ensure genetic variation, collect fruits equally from all parts of the crown--top, sides, and bottom--as these parts may have been pollinated at varying times from different sources.
- Collect throughout a species' normal habitat, noting variations in site.
- Man-made stands, including live fencing, plantations, or windbreaks, should be carefully reviewed as to their establishment before being selected as a seed source.

28.4 Rehabilitation Working Circle (RWC)

28.4.1 Special objectives of Management:

The Special Objectives of Management set out for this Working Circle within the ambit of the general objectives of management are as follows.

- To induce natural regeneration & improve the condition of existing forests through protection against encroachment, grazing, fires and illicit felling.
- To improve the crop density to more than 50% from the present position through protection, Silvicultural practices.
- To enhance soil enrichment through Soil & Moisture Conservation measures.
- To regulate the surface water runoff to enhance percolation and water availability down the streams.
- To protect against the River Bank / Stream Bank erosion through vegetative measures.
- To restock barren areas through artificial regeneration with most desirable indigenous species.
- To have partnership with the local community in protection and management of the forests.
- To increase the water retaining capacity of the soil & bring the crop to climax species composition.
- To Control / eradicate the weeds and check its invasion.
- To restore and improve the microclimate and micro edaphic condition of forests.
- To increase the biodiversity and heterogeneity in the forest crop by encouraging natural regeneration.



28.4.2 Silvicultural system:

The Silvicultural System to be adopted for this working Circle is ***“Silvicultural Cleaning, Tending followed by Aided Natural Regeneration supplemented with enrichment Plantation”***

a) Silvicultural Cleaning: Silvicultural Cleaning operation includes

- Removal of soft stem Weeds (Annual in nature).
- Singling of Shoots.
- The species / plant if considered to be a good coppicer and in malformed, it may be cut flush to ground. This will induce a good promising shoot with high probability of **“Established Regeneration”**.
- Cut back the living high stumps to produce good coppice shoot.
- The annual climbers which hinders with the establishment of regeneration to be removed.
- Woody Climbers interlinking the trees above 10 m height may not be removed as it will help to sustain wind pressure during Cyclone.
- Eradication of weeds as a priority.

b) Silvicultural Tending: Silvicultural Tending involves

- Thinning of natural growth in a congested patch (Above Sapling Stage i.e. in a pole crop to enhance diameter growth.)
- Advance growth / Natural growth are to be retained.
- Pruning in heavily branched individuals to allow faster height growth. Pruning should be restricted to one third height of the individual plant. ($\frac{1}{3}^{\text{rd}}$ of the Plant height)
- Woody climbers affecting poles below 5m height required to be cut down.
- List disturbance to Ground Flora.

c) Aided Natural Regeneration:

Besides Silvicultural Cleaning the following activities are prescribed for the Aided Natural Regeneration (ANR)

- Regeneration from Seed Origin (Recruits, Seedlings and Saplings) to be aided with weeding, Soil Working and application of fertilizer to enhance growth & speedy establishment.
- Extensive Soil & Moisture Conservation measures to be taken up. Besides Contour trenches, contour bonding, gully plugging, Vegetative check dams, percolation pits are required to be taken up to improve soil moisture regime.



Individual plants of **Natural Origin** need to be provided with **Half Moon Trench**, Soil Mulching etc.

d) Enrichment Plantation

- In Blanks seedlings of indigenous species matching with the natural seedlings / saplings / vegetation available to be planted. Planting of teak inside natural forest to be avoided.
- Prepare the soil in blanks, around the existing seeding trees (Mother Trees) to receive seeds and allow the seeds to germinate and grow.

28.4.3 Harvestable diameters:

From enumeration / sampling data, it is observed that only 3.88 % of trees are above 120 cm and below 150 cm and 2.41 % above 150cm girth class. Under this condition some matured trees having no reproductive capacity / defective trees are required. As no general prescription for felling of trees prescribed, harvestable diameter for any species has not been fixed.

28.4.4 Constitution of Treatment Series:

The assigned area has been allotted to different Rehabilitation series. All total fourteen (14) Rehabilitation series have been constituted. Each series is subdivided to 10 sections with year of allotment.

28.4.5 Yield prescribed:

As there is no prescription to harvest forest produce, no yield has been calculated. However during silvicultural cleaning and thinning, brush wood, Fire wood and poles may be obtained. In order to maintain hygiene of the forest, dead trees , highly unsound trees may be removed leaving some dead trees / fallen trees at least 4-5 trees per hectare for wildlife management point of view.

In case of VSS assigned area, the removed forest produce may be handed over to the Villagers as per JFM Resolution after maintaining necessary records of removal and sharing mechanism as per VSS Resolution.

28.4.6 Treatment suggested:

The forest Blocks assigned to this working circle has been divided to 14 treatment series For convenience of working each Treatment Series has been sub-divided in to 10 sections. Each year the assigned area is required to be treated strictly. The Treatment Series and corresponding Sections and year of operation have been described under Para 16.4 above.



28.5 Plantation Working Circle:

28.5.1 Objectives of Management

The objectives of management of this working circle are in tandem with the general objectives of this Plan. The Special Objectives are as follows.

- ❖ To manage Economic plantations / Teak Plantations of out going plans in a scattered manner and improve growth status through Silvicultural practices.
- ❖ To bring the plantations raised here and there to a single management fold and scientifically manage to optimize the yield.
- ❖ To encourage participatory management of erstwhile Social Forestry Plantations and activate the VFC.
- ❖ To manage the plantations raised under Compensatory Afforestation Scheme and declared as Protected Forest thereafter.
- ❖ To Increase availability of Firewood and timbers in the locality and reduce pressure on forests for fuel wood and furniture wood.
- ❖ To increase the crop density of forests and improve the Carbon Sequestration.
- ❖ To develop a healthy usufruct benefit sharing mechanism in the villages and encourage natural resource management with a community approach method.
- ❖ To take suitable measures to prevent soil erosion and conserve soil and moisture in barren hilly tracts.
- ❖ To cover-up the encroached areas under tree cover after its eviction.

28.5.2 Area included in the Working Circle::

The crops included in this working circle are of types i.e. Teak & Economic Plantations, Bamboo Plantations, Social Forestry Project Plantation (VF), **Natural Forests** Encroachment, Protected Forest.

28.5.3 Silvicultural System:

The Silvicultural System for woodlots of erstwhile Social Forestry Plantation / Protected Forest will be managed with Silvicultural System **“Clear felling with standard followed by Artificial Regeneration”** by planting. Where ever promising coppice shoots will be developed / come up, the same will also be retained to reduce the replanting cost. The number of standards per hectare will depend upon biotic interference, possibility of dispersal of seeds for a high forest system, fruit bearing species, having timber value at a higher girth class. The minimum number of trees prescribed for retention is 25 number and maximum 75 numbers per hectare.

In case of Teak Plantation / Economic Plantation / Compensatory afforestation raised in outgoing Plans or under other schemes it will be Silviculturally tendered to have a good



stand. Thinning along with Soil & Moisture conservation measures will be implemented to enhance growth rate with removal of **“Stems having Utility value”**.

The encroached areas after eviction will be planted up following standard planting procedure / norm.

28.5.4 Rotation Period:

Rotation period for Sal, Teak and other species for the Division has been discussed at Para14.6.3. The Rotation Period of 120 years for Sal is prescribed and followed. In the outgoing Plan 120 years of Rotation age was prescribed for all species. During field visit and growth statistics available it is felt that Except Teak for all other species, the Rotation Period of 120 years is accepted and followed. In case of teak which has been introduced in many Forest blocks in Block Plantation in blank areas under Economic Plantation, the growth is very encouraging. Due to its high timber value it is in much demand in the locality, in the State and outside. Selective removal by illicit felling is a perceptible threat. Considering all its aspect i.e. Growth Status and Market demand, rotation age of 100 years for teak in this division is suggested. For other species usually planted is as follows.

Table No 28.2 Rotation Period for various species in Plantation			
Sl No	Species	Rotation Period in Year	Remark
1	Teak	100	In case of SFP Plantations Clear felling with Standard is being followed. Rotation period is applicable for Standards only.
2	Sisoo, Gambhari	100	
3	Eucalyptus, Other Soft wood, Acacia, Cassia etc	25	
4	Fruit bearing	As long as fruiting continues	

28.5.5 Harvestable Diameter/ GBH:

Harvestable diameter is being prescribed in different plans for different species from time to time. The criteria considered for recommended “Harvestable Diameter / Girth” are as follows.

- i) The Annual Increment of the Species,
- ii) Development of unsoundness due to climatic and biotic factors,
- iii) Marketability & Demand,
- iv) Site Quality and productivity of Soil

Considering the present scenario GBH for exploitation is prescribed as follows.

**Table No 28.3 Harvestable Girth / Diameter of other planted species.**

Sl no	Species	Girth in cm	Diameter in cm	Remark
1	<i>Acacia auriculiformis</i> (Sunajhari)	90	29	
2	<i>Anacardium occidentale</i> (Cashew)			As long as Fruiting continues.
3	<i>Anogeissus acuminata</i> (Phashi)	180	48	
4	<i>Anthocephalus cadamba</i> (Kadamba)	150	48	
5	<i>Azadirachta indica</i> (Neem)	180	57	
6	<i>Bomax ceiba</i> (Simili)	150	48	
7	<i>Erythrina variegata</i> (Paladhua)	120	38	
8	<i>Gmelina arborea</i> (gambhari)	120	38	
9	<i>Melia azedarach</i> (Mahaneema)	120	38	
10	Fruit bearing species			As long as Fruiting continues.
11	Teak, Sisoo	120	38	

This is applicable for all plantations under Economic Plantation head, Compensatory Afforestation program and plantations raised under other schemes.

28.6 Protection Working Circle (Pr.WC)

28.6.1 The objectives of Management:

The special objectives of Management of this Working Circle are within broader objectives of this working plan. The objectives are outlines as follows.

- To completely check soil erosion in forests coming within origin of Baitarani River.
- Soil Erosion of any form is to be completely reduced / checked.
- Full protection to vegetation against illicit felling, Fire.
- Ensure regeneration of palatable food / grass stock all along the protected area.
- No tree felling in any forest for any purpose within this area will be taken up.

28.6.2 Silvicultural System:

The area assigned to this working circle will be under “**360° Protection**” from all angles. Hence no Silvicultural System is prescribed for assigned blocks / areas. In case of exigency required “Soil & Moisture Conservations” of limited scale is recommended. It is better to allow nature to nurse the crop with an ideal concept “**Least management is the best management**”



28.6.3 Rotation period:

There is no prescription for removal of trees from these forests under this Working Circle. Hence no rotation period is prescribed.

28.6.4 Harvestable diameters:

As no felling is involved there is no “**Harvestable Diameter**” recommendation in this working circle.

28.6.5 Prescription:

The assigned area to this working circle will be strictly protected against fire, illicit felling, poaching, encroachment etc. No activities are generally prescribed. In case of any extra-ordinary situation, activities may be taken up with the approval of higher authority and with a justification for deviation. Annual deviation statement needs to be submitted and get approval.

This working circle is constituted with an objective to maintain natural vegetation without any interference or managerial / silvicultural manipulation of crop composition. This principle is to be strictly adhering to.

28.7 Podu Reclamation Working Circle [Podu WC]

28.7.1 Special objectives of Management:

The basic objectives of this working circle are as follows.

- i. To reclaim the podu ravaged forest area and bring it to tree cover.
- ii. To encourage agro forestry model where it is not possible to evict the cultivator completely.
- iii. To educate the cultivator on advance tillage methods, need for cultivation on terrace along with tree planting.
- iv. To provide inputs to have cultivation on Shed for a better Agro Silviculture practices.
- v. To provide a helping hand to cultivator to reduce dependence on shifting cultivation and adopt alternate livelihood practices including Horticultural plantations.
- vi. To take steps to check further extension of Podu in the division.
- vii. To assist the tribal cultivator to settle the rights under “Forest Rights Act’ if eligible.

28.7.2 Silvicultural system:

The land is to be reclaimed by “**Agro Forestry Model with appropriate Soil & Moisture Conservation to have sustained productivity.**”



28.7.3 Rotation period.

There is no harvesting proposal for the area assigned to this working circle. Hence there is no Rotation Period prescribed. The assigned area is to be reclaimed within the Plan Period i.e. within 10 year cycle.

28.7.4 Harvestable diameters:

There is no provision for harvesting. Hence no harvestable diameter / Girth are prescribed. The seedlings those will be planted up under Agro Forestry Model will be nurtured for speedy soil cover.

28.7.5 Reclamation Cycle:

The assigned area is proposed to be reclaimed within 10 years. There is possibility of damage of seedlings planted by the cultivator. Hence each area reclaimed is to be reviewed & improved in five year interval.

28.7.6 Calculation of the yield:

It is a reclamation Process. No yield is expected. Hence no yield is calculated for this series.

Expected outcome: It is expected to check further clearance of forest for podu cultivation. The cultivator will stick to the land now under cultivation. A permanent tree cover will be created. Soil erosion will be minimized. Modern agricultural practices in hill region will be imbibed by the farmers.

28.7.7 Plantation in Agro Forestry Model with involvement of the Cultivator,

After motivation, the area is to be brought under plantation under Agro- Forestry Model. Spacing of 1mx1m – 3m gap – 1mx1m is the recommended spacing for first growing species or 3mx3m- 4m gap -3mx3m spacing for horticultural tree crop like Mango, Jack Fruit, Lemon, Citrus species are recommended. In the interspaces cultivation of Turmeric, Zinger, Pineapple and to some extent maize is recommended. Planting should be along the contour and line to line staggered.

28.8 Non Timber Forest Produce (Overlapping) Working Circle

28.8.1 Crop Condition:

No systematic study has been made to assess the potentiality of NTFP species wise. However on general observation, the area is rich in Sal leaf, Siali Leaf & Fiber. , Kendu, Chara, Bahada, Harida, Anla, Kusum, bana Haladi, Mango, Jack Fruit, Honey, Wax, Siali Leaf & Fibre, Sal seeds, various barks and tubers. It is desired to have a complete study



and documentation of available NTFP and MAP in the region. The availability of NTFP is in a declined trend all over the division with depletion of forest resources.

28.8.2 Special objectives of Management:

The special objectives of management are as follows.

- i. To educate VSS / JFM Committee and Gram panchyat about scientific collection methods of NTFP on a sustainable basis.
- ii. To educate primary collectors of NTFP about contribution of NTFP towards their livelihood and share of income from NTFP.
- iii. To educate VSS / Primary collectors about propagation of various herbs / shrubs / climbers and how to improve the stock in forest both quality and quantity.
- iv. To enhance abundance of NTFP species in forest through regulatory mechanism in non-assigned VSS areas / VSS areas.
- v. To conserve and protect the depleting natural medicinal plant resources in the forest area.
- vi. To encourage local community for ex-situ / in situ conservation of NTFP & medicinal plants through VSS.
- vii. To generate self employment and livelihood support for the forest fringe dwellers.
- viii. To develop and disseminate scientific harvesting, processing and storage techniques relating to NTFP products.
- ix. To share market information to primary gatherers.
- x. To impart training on value addition

28.8.3 Silvicultural system:

No silvicultural System is prescribed for management of NTFP species found in the forests. It is proposed to manage the NTFP resource through

- Regulated collection & trading with Value addition by regular training.
- Impart training on Scientific Collection.
- Improve growing Stock by checking biotic interference.
- In-situ & Ex-situ Conservation.

28.8.4 Collection Cycle:

The NTFP like fruits / leaves, tubers, etc are normally collected in an annual cycle depending on its maturity and requirement/ utility. Honey, wax, mushrooms are widely collected depending upon availability & season. Many MAP (Medicinal & Aromatic) Plants are collected as and when required throughout the year.



28.8.5 Yield Projected:

No yield is projected as most of the items under this Working Circle are being regulated by Panchyats.

28.8.6 Prescription:

For improvement of NTFP collection “Scientific Collection method” has been suggested. Further In-Situ, Ex Situ conservation has been suggested. Plantation of cane & other NTFP species @100 ha per year and Demonstration plot over 10 ha has been suggested.

28.9 Wildlife (Overlapping) Working Circle [WL(O)WC]

The natural forest area is the niche for the Wild animals. Due to presence of Karo-Karampada Elephant Corridor and Telkoi Pallahara the movement of animals is normally experienced in Badbil, Champua and BJP Range, Telkoi and Ghatgaon Range. The Singbhum Elephant Reserve of Jharkhanda state is adjacent to Keonjhar Division Barbil & Champua Range. Migration of Elephant from Singbhum west to Keonjhar division is frequent and in a large scale. The forests assigned to this Working Circle are all Reserved Forests, All PRF, and DPF of the Division.

28.9.1 Objectives of Management:

The special objectives of management are in line of general objectives of Working Plan. All objectives under Elephant Reserve are also objectives of this working Circle. Besides the above other objectives are as follows.

- To Conserve, Protect and improve existing wild life and their habitat.
- To enhance bio-diversity and Wild Life population in the region.
- To involve people in management of Wildlife & associate them in preventing crime against Wild animals.
- To build up scientific knowledge on wildlife resources of the region.
- To train personnel at various levels for conservation and management of wildlife.
- Carry out research relevant to management including the development of techniques appropriate to Indian conditions especially to this locality.
- To educate people about wildlife and need for their conservation.
- To prevent sporadic and strategic crime against wild animals / birds.
- To protect Life and properties of public against animal depredation.

28.9.2 Management Approach

For management of wildlife the basic elements are outlined as follows.

Management of wildlife depends on certain elements such as public support and awareness to protect wildlife and their habitats.

- a) **Public Participation:** It is necessary to make local people realise and accept the idea and importance of wildlife protection. Public interaction can help in making



local people responsible and cooperate in enforcement of wildlife management laws and regulations. Their feedback should also be taken for effective functioning of wildlife management.

- b) Public Awareness:** People should understand the concept of conservation of natural resources. The wildlife managers and other responsible persons should held public discussions, shows, and talks and should also take help of other media like newspapers, magazines, radio and television to make people aware about the basic concepts behind wildlife management. This can stop people from exploiting natural resources, which is the major threat to wildlife and their habitats
- c) Education:** The role of education in public awareness programs is very important. There should be environmental subjects based on wildlife conservation in school and college curricula. The well-educated and trained specialists on environmental and forest issues should participate in public training and interact with people and solve their queries to make them more responsible towards their wildlife management duties.
- d) Nature Interpretation Centres:** Nature interpretation centres may include setting up of educational camps or exhibition in nearby regions of wildlife importance.
- e) Coordination:** Wildlife management is operated at four basic levels – local, state, national and international. Overall coordination for animal conservation, propoagation and management is essential.

In general, the following guiding Principle may be adopted.

The general management practices involves

- a) Improvement of existing habitat and Development of new habitat for any species found in the locality.
- b) Preservation of existing wetlands.
- c) Adequate Fire Protection Measures.
- d) Providing a conducive and safe breeding zone for existing animals.
- e) Protect nesting of migratory Birds in Mahanadi River and Hirakud Reservoir.
- f) Provide water to animals during summer.
- g) Create & maintain grass lands.
- h) Remain vigilant against poaching of animals by live electric wire and loops.
- i) Take legal action against poachers.
- j) Public education / awareness camps on wild animals.



28.9.3 Prescriptions:

Prescription includes Improvement of Habitats, Maintenance of Wet lands, Maintenance of Creaks, Creation & Maintenance of Grass Land, Providing water to animals, Providing Protection, Fire Protection measures, Detail study of Animal behaviour & scientific Documentation

28.10 Joint Forest Management (Overlapping) Working Circle

Joint forest management is concept of developing relationships between fringe forest groups and forest department on the basis of mutual trust and jointly defined roles and responsibilities for forest protection and development. Odisha remains the first to pass the first resolution for JFM. At present, the JFM Resolution 2011 is the basis on which forests are assigned

28.10.1 Salient Features of Joint Forest Management:

Joint Forest management encourages the development of partnerships between local people and forest department to manage forest resource jointly. It provides a communication structure for consultation and negotiation between forest Department and forest users and provides legalized access for the local communities to forest lands. JFM encourages local people to protect forest areas in order to prevent free grazing of livestock and to assist in preventing illegal activities by outsiders. JFM assures local people that a certain proportion of the intermediate and final harvests from forest lands will accrue to them.

28.10.2 Special Objectives of Management:

The special objectives of Management of this Working Circle are as follows.

- i) To restock the degraded Forests through community participation.
- ii) To ensure protection, regeneration and management of the forest wealth through a participatory approach.
- iii) Mass Awareness campaign and motivation to the villagers is to be spread to every forest fringe village.
- iv) To make the people and Forest Department equal partners in management process.
- v) Demarcation and Survey of the area allotted under V.S.S.
- vi) Artificial regeneration in the degraded forest area is to be taken up to restore the barren and blank area.
- vii) Soil and Moisture Conservation Measures have to be adopted in the VSS assigned area and preparation of micro-plan to each VSS.
- viii) To reduce the dependency on forest, income generating activities are to be created.



- ix) The other Department involve in peoples participatory aspects like Agriculture, Horticulture, Soil Conservation, veterinary; Health, mass education etc. have to be involved to achieve all-round socio-economic development of the village.
- x) To develop VSS as an institution at local level to manage “**Natural Resource**”.
- xi) To have special thrust on “**Fringe Forest Management.**”

28.10.3 Prescriptions:

The prescription involves Demarcation of VSS Area, Preparation of Micro-plan, Plantation & Choice of Species, Incentive Schemes for the VSS, Capacity Building Program ,VFDF (Village Forest Development Fund) ,and Training camps for VSS Members.

28.10.4 Scope of expanding JFM Working Circle:

(i) Out of 146208.6626 ha of forest area under management fold,35735.08909 ha has been assigned to different JFM committee (VSS) which workout to be 24.41%of the forest area. There is ample scope to increase the area under JFM. At present “**AJY - Aama Jungal Yojana**” is being implemented which provides an avenue to expand area under JFM.

(ii) There are many forested area under the administrative control of Revenue department. The JFM resolution 2011 has extended its purview to manage Revenue Forests in a **Joint Forest Management** approach. Where PRI (Panchyat Raj Institutes) are interested in management of such forests, the same may be taken for management under VSS.

28.11 TOF Working Circle:

The Forest area in Keonjhar Division is about 30.91% of Geographical area. Out of the forest area recorded around 16.57% area is of DLC Land / Revenue Forest. Besides the forests, under administrative control of Forest department about 311.11Sq.KM is of Revenue forests (16.57 % of the Geographical area) remain outside the management purview. Plantations are being raised under various schemes like Forest Development Agency, Mahatma Gandhi National Rural Employment Guarantee Act (MANREGA), CAMPA, Farm Forestry, Avenue Plantations etc. Hence its management is of equal importance. In order to provide a management strategy for these plantations / natural forests, it is proposed to constitute “**ToF Working Circle**”. Total area allotted is 2007.540 ha and 576.00 RKM Avenue Plantation.



28.11.1 Constitution of Working Circle:

The area allotted to this Working circle consists of three types of Plantation i.e. Misc. Plantation, Teak plantation and Avenue Plantation. In case of miscellaneous Plantation, Teak plantations all long term rotation species like Teak, Phasi, Sisoo, Asan are planted. The survival in case of Teak is about 85% and in other cases survival is around 75%. The growth Status varies depending upon age of plantation. Plantations raised during 2010-11 to 2018-19 are considered as established. Rest of plantations are expected to be established within the plan period.

28.11.2 Objectives of management:

The objectives of management are varied and depending upon category of plantations the special objectives TOF management & specific objectives are furnished as follows.

a) General Objectives:

- i. To increase tree cover of the district / division through planting outside the forest land.
- ii. To increase bio mass production by planting quick growing species.
- iii. To stabilize the loose soil through planting & protect catchment area of River Baitarani.
- iv. To amiliarate effects of Mining in “Critically Polluted area” i.e. Joda- barbil- Koirā Region.
- v. To check air pollution and arrest dust particles originating dur to transportation related activities.
- vi. To improve the aesthetic value along the road net work.
- vii. To encourage Farm forestry to meet the demand of Raw materials of papermill.
- viii. To enhance the Economic Condition of People.

b) Of Teak Plantation.

- To enhance timber productivity of Forests,
- To enrich existing vegetation outside the forest area and meet the demand of timber especially timber required for furniture.

c) Of Avenue Plantations:

- To improve the aesthetic value of the landscape,
- To check dust pollution on roads and also act as noise barrio in the locality.
- To ameliorate the climate,
- To provide shade to passer-by,
- To provide habitat to birds / reptiles/ rodents.
- To add tree cover to bring the area within the standard norm i.e. 33% tree cover of the total geographical area.

**d) Of Farm Forestry:**

- To encourage public to have their own backyard plantation to meet their household requirement on firewood, fodder.
- To bring private land under tree planting.
- To supplement raw material availability for industries/ furniture woods.
- To make public less dependent on forests.

28.11.3 Silvicultural system:

Silvicultural System to be adopted is ***“Improvement of Stand by Silvicultural tending”***. Under this system all plantations will be treated for improving the quality of stands i.e. both height & Girth to bring the stand to more useful stage. Activities will be Thinning of appropriate Grade along with Soil & Moisture Conservation.

28.11.4 Rotation period:

The area assigned to this working Circle bears Teak and other Species. For Teak a rotation period of 100 years has been fixed. For other species found in TOF areas the rotation period fixed under Para 16.6.3 will be applicable. The same is reproduced at Table no 28.4 below

Table No 28.4 Rotation Period for various species in Plantation			
Sl No	Species	Rotation Period in Year	Remark
1	Teak	100	In case of SFP Plantations Clear felling with Standard is being followed. Rotation period is applicable for Standards only.
2	Sisoo, Gambhari	100	
3	Eucalyptus, Other Soft wood, Acacia, Cassia etc	25	
4	Fruit bearing	As long as fruiting continues	
5	Timber species for Chariot construction	As per standard requirement of Temple management (Shree Jagannath Temple / Lingaraj Temple)	

28.11.5 Harvestable diameter/ Girth:

There is no prescription for final harvest of any plantation. Harvestable diameter prescribed to be applicable for all purpose if so required.

28.11.6 Calculation of the yield:

No final harvest is prescribed for any plantations included in this working circle. From teak plantation some poles of utility may be obtained. From other plantations no utilizable produce is expected. There is Teak plantation as a mixed species. During light grade thinning i.e. C Grade thinning 20 numbers of poles may be expected to be



removed per hector for better enhancement of retained stems. From other plantated species no utilizable yield is expected.

28.12 Reduce Emissions from Deforestation and forest Degradation (REDD+)

REDD+ stands for countries' efforts to "Reduce Emissions from Deforestation and forest Degradation", and foster conservation, sustainable management of forests, and enhancement of forest carbon stocks. Deforestation and forest degradation are the second leading cause of global warming, responsible for about 15% of global greenhouse gas emissions, which makes the loss and depletion of forests a major issue for climate change

28.12.1 Suggestive measures on Forestry Sector.

In forestry sector to combat climate change the following activities are suggested.

- a) To reduce felling of trees in all sphere and enhance creation of renewable energy.
- b) To reduce dependency on fossil fuel including that of firewood.
- c) To enhance use of solar energy / wind energy where ever possible.
- d) To motivate people to reduce consumerism & reduce generation of solid waste.
- e) Conserve water body and enhance efficient use of water.

28.13 .Application of Modern Technology

A number of popular technologies are currently being used in the field, but Geographic Information Systems (GIS) and Global Positioning System (GPS) rank at the top. LIDAR technology (Light Detection and Ranging) is also beneficial for modern foresters, which collects tree measurements and detailed imaging. While traditional prisms are still valuable tools, LIDAR helps to measure canopy heights and volume, basal areas and habitat mapping.

Drones are also proving to be increasingly valuable to foresters. While drones are still considered to be a hobbyist toy by many, forestry professionals use them to help with forest management planning, detecting disease and managing forest fires.

28.13.1 Suggestions:

With advancement of technology it is proposed to have the following facilities available with Jeypore Division for better management.

- a. Identified Plus trees within the Division and maintaining a Clonal Orchard.
- b. To have improved Mega Hi-tech Nursery with clonally propagation facilities with mist chamber, Sprinkler System at Naktidangar Central Nursery.



- c. Root trainer facilities and capacity to meet requirement of Quality Planting Materials (QPM) for the division instead of depending upon temporary nursery.
- d. All forest blocks / plantations to be surveyed with DGPS and mapping thereof, which is in progress.
- e. Establishment of GIS Cell with available Satellite imagery for monitoring purpose at Divisional and Range level.
- f. Modern logging tools to meet emergency.
- g. Drone camera facilities to watch forest fire, wildlife movement and winter bird's congregation & problems.
- h. Use of Tranquilizing guns and drug and other rescue equipments for dealing with problematic Wild animals.
- i. Use of Red Dot Sight and Laser Range Finder.
- j. Night vision Binocular.
- k. Trap- Cameras, Mega phone with Siren, Public Portable Address Sound system.
- l. Use of VHF fixed set and Hand held set for communication.
- m. Improvement and enhancement of VHF network is suggested.

28.14 Miscellaneous Regulation

The following issues are highlighted for taking followup action for a better management. These area Forest Consolidation, Forest Boundary Maintenance, Management of Reserved Land (RL), Fire Protection, Protection against Grazing, Harvesting & Disposal Mechanism for Sandalwood, Identification of Plus Trees, Demarcation of VSS assigned area, Preparation of map and signing of MoU.

These are some of the aspects need attention during implementation of Working Plan Prescription.





CHAPTER-29

GENERAL

29.1 General financial forecast and financial plan of operation:

Considering the prescriptions in various working circles, the activities involve & its quantum of operation with financial forecast at the present price level is furnished at Table no 29.1

Table No 29.1: General financial forecast				
Sl No	Name of Working Circle	Suggested area of operation. In Ha	Per unit Cost norm in Lakh Rs	Total amount in Lakh Rs
1	SWC	28563.4757		
a	Coupe Marking	60 coupe	25000	15.00
b	Thinning	28563.4757	Rs0.05	1428.17
c	SSO in Coupe	28563.4757	Rs0.05	1428.17
d	Fires Protection, Grazing	28563.4757	Rs0.20	5712.70
1	IWC	71156.9206		
a	Coupe Marking	200 Coupe	25000	50.00
b	Thinning	71156.9206	Rs0.05	3557.85
c	SSO in Coupe	71156.9206	Rs0.05	3557.85
d	Fires Protection, Grazing	71156.9206	Rs0.20	14231.38
2	Rehabilitation WC	38113.4625		
a	RDF activities		@Rs0.65	24773.75
b	Treatment to natural seed origin seedlings		@Rs0.1	3811.35
c	Fires Protection, Grazing		0.20	7622.69
3	Protection WC	448.3916		
a	Training of nalla & SMC		@Rs 0.03	13.45
b	Fire Protection Measures		@Rs0.01	4.48
c	Control of Grazing		@Rs0.003	13.45
d	Motivation, Fencing & Other activities		LS	500.0
4	Plantation WC			
a	Replanting of VWL(VF)	1292.653	@Rs3.00	3877.959
B	Thinning	1465.748	@0.10	146.5748
C	Eviction & Plantation	345.8947	@3.50	1210.6315
d	Bamboo Pl. maintenance / Improvement	335.0	@0.50	167.5
5	Podu WC	1086		



	Rehabilitation of Podu Area		@4.00 lakh	4344.00
	Motivation / Training	Ls		20.00
7	NTFP(O) WC	141223.2031		
a	In situ conservation	Training to Primary collectors etc	LS	50.00
b	Ex- situ conservation	100 ha Planting	@2.00 lakh per ha	200.00
c	Demonstration Plot		LS	40.00
8	Wildlife (O) WC	141223.2031		
a	Creation of Water body	100 nos	@6.00 Lakh	600.00
b	Maintenance of Creaks	10 no	@10.00 lakh	100.00
c	Wetland Management	2 no	@15.00 Lakh	30.00
d	Grass Land Development.	100 ha	@50,000/-	50.00
e	Public Awareness	50 camps	@35000/-	17.50
9	JFM (O) WC	684 VSS		
a	Training of VSS members		LS	50.00
b	Audit of VSS Account & Documentation.		LS	50.00
c	NAP	1000 ha	@Rs3.00 Lakh	3000.0
11	TOF WC			
a	Silvicultural Thinning	2154.536	@0.25 per ha	538.634
b	Avenue Plantation	576	@0.1 per RKM	57.60
c	Monitoring of Farm Forestry		LS	50.00
12	Car Timber (O) WC			
a	Annual Tree marking / Felling and Transportation			150.00
b	Regeneration			200.00
13	REDD+			
a	Reduce dependency on fossil fuel including that of firewood		LS	100.00
b	Use of solar Energy		LS	100.00
c	Public awareness		LS	50.00
14	Application of Modern Technology			
a	Plus Tree / Clone Orchard		LS	100.00
b	High tech Nursery		LS	150.00
c	GIS Cell & Drone camera		LS	40.00
15	Consolidation			



a	Pillar posting & Consolidation activities		Ls	200.00
		Total		82410.6893

(NB: The financial requirement to implement the plan prescription is 824.11 crore at the present price level on an holistic approach. Basing on Wage escalation, the cost of implementation will be hiked by minimum 20% of the estimated cost.)

29.2 Source of Funding:

The division receives funds from State Plan, Central Plan, CAMPA Fund, National Afforestation Program, MANREGA, district Planning untie Funds. The level of present resource allocation is to a tune of Rs 15.0 Crores to 18.00 Crores. Govt. is putting more thrust in plantations and rehabilitation of degraded forests. Resources to a tune of Rs94.00 crores to 98.00 crores annually may be a constrain. More fund flow from NREGS, FDA, CAMPA are the source of possibility. Hence it is expected to implement the plan prescription in totality and no financial constrain will be faced.

29.3 Miscellaneous:

Besides the Working Plan Prescription various miscellaneous regulation in form Acts/ Rules / administrative directives are framed and being implemented by the Forest Department. These are

- 1) Forest (Conservation) Act,1980;
- 2) Ban on use of Polythene in State / Country.
- 3) Forest Rights Act,2005, etc.

These rules / guidelines are to be followed for better management of Forest & Environment.

29.4 Petty felling and Extraction:

Petty Felling and extraction for research and training needs may be allowed by Divisional Forest Officer on academic interest. It is necessary to emphasize the fact that experimental, preservation and sample plot, seed stand and their demarcated surrounds, etc. are excluded from all operations prescribed in the working plan. Special grants in exceptional circumstances for maintenance of these may be allowed, which do not cause much deviation.

29.5 Rights and Concessions:

At present Rights & Concessions those are allowed are

- i) Right of Way on Forest Blocks,



- ii) Collection of Non Timber Forest Produce as admissible in JFM Resolution-2011
- iii) Rights on Forest land either individual or Community to be allowed as per provisions of Forest Rights Act,2005 / Rules,2006

No other rights & concessions are allowed at this stage.

29.6 Other research and Bio Diversity study.

It is proposed to have a detail Biodiversity Study in Forest blocks of Daspalla Range & Mahipur. Peoples Bio Diversity Register may be prepared with the help of Bio Diversity Board of the State. A special study in *Cycas nayagarensis* may be taken up with help of Reserch Scholar.





ANNEXURE

SL no	Annexures	Annexure no	Page no
1	Gov notification No. 1F (A)-99/2003/13214/F&E dated 8 th August 2003	I	
2	The complete building list	II	
3	Letter No RDM/-LRGEA.POLICY – 0018-23784/ R&DM Dated 30.06.2018	III	
4	Cases booked against ineligible encroachers and the extent of forest land enroached in pre-1980 and post-1980	IVA & IVB	
5	Sample Point enumeration information	V	
6	Winter Bird census data	VI	
7	Ban order of plastic	VII	
8	Gazette Notification No. SRO No. 934/2002 dated. 14.11.2002 of the Panchayat Raj (GP) Department.	VIII	
9	The General sale value of Timber as per OFDC Ltd rate	IX	
10	JFM Resolution 2011 and Subsequently amendment vide Notification No 9182/ F&E dated 1 st June 2015 and 2019	X , XA,XB	
11	Economic study conducted in the state during 2014-15	XI	
12	Labour wages revised notification	XII	
13	A detailed incumbency list	XIII	
14	Forest area vide letter no 3628/ 11F (SFM)-15 / 2018 dated 26.02.2019	XIV	
15	Area allotted to different Working circle	XV	
16	Divisional Area Statement	XVI	
17	<i>Orissa Grama Panchayats (Minor Forest Produce Administration) Rules, 2002</i>	XVII	
18	NTPF policy of 2000 rule	XVIII	