PART-II

Future Management

1. Basis of proposal

1.1 Objective of Management

The main objective of the forest management plan, working plan is for sustainable management organising following elements.

(I):Dynamics of forest 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 in hills of Mandasaru through conservation, natural regeneration and follow a systematic sustainable harvesting practices.

(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 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 reduce the grazing pressure on forest.

(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 origin of rivers, 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 bodies within the forest blocks and preserve the existing wet land inside the forests and outside.
- To ensure flow of water in springs – especially those of Mandasaru hill range.
- To create water body to impound the running waters & enhance utilization of water to a greater extent.

(IV): Forest Biodiversity.

The natural forests of importance rich in Bio- Diversity are confined to Lendrikia RF, Ranipathar RF, Chakapad RF, Baghnadi RF and Kalabagh RF forest blocks. The vegetation is of mixed dry deciduous & moist deciduous. The rich floral diversity is

seen in Lendrikia RF requires to be protected and enriched. Forests of Kalinga Sandalwood RF, Kanbagedi RF, Gerupada East RF, Gerupada West RF are strictly to be protected to regain its past glory and its bio diversity is to be supplemented. 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.

(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 behaviour 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.
- 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.

(VI): Socioeconomic Considerations and generation of forest based employment opportunities and livelihood options:

Forest Management is not confined to departmental personnel 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 sharing 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)

(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 MGNREGA, NAP, CAMPA etc.
- To improve Planting stock through Vegetative Propagation and root trainer nursery.
- To identify and protect plus trees and create improved genetic pool,
- 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.

(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 (2021-22) may be taken as base value and subsequent results may be compared to evaluate the achievements.

1.2 Method of treatment to be adopted

1.2.1 Working plan is an indispensable document of planning and managing the forests. The principle of "Sustained yield" was the corner stone of forest management. All silvicultural interventions and management techniques had the sole objective of obtaining sustained yield of commercially important species. However, with the advent of Five Year Plans and with the introduction of externally aided

forestry projects, as well as, centrally sponsored schemes, the Working Plans lost their relevance and the forests were neglected. Things did not improve in spite of clear directions in National Forest Policy, 1988. Finally, it fell to the lot of Hon'ble Supreme Court (Writ petition No. 202/95 96 T.N. GodavarmanThirumulkpad versus Union of India and others) to resurrect the glory of the Working Plans. Nevertheless, the principle of sustained yield, which was developed at a time of timber primacy, has lost much of its shine. New concepts like "Sustainable Forest Management" and "Sustainable use" have emerged in the wake of changing perceptions in forestry at the national level

1.2.2Silviculture is an operation carried out for the benefit of crop at any stage of its life and cover. Operation both on crop itself and on competing vegetation and does not include various operation. The silviculture requirements are as detailed below;

1.2.2.1 Subsidiary Silvicultural Operations of Timber Coupe

Subsidiary silvicultural operation shall be done in the year following the main felling. This departmental operation shall be done over the entire coupe area except in much degraded areas and steep slopes. The following operations are prescribed.

(i) In order to take up subsidiary silvicultural operations systematically, an annual action plan in advance shall be prepared along with treatment plan and treatment map.

(ii) All marked trees left standing by the OFDC Ltd/lessee shall be felled and removed from the annual coupe.

(iii) All the trees damaged in the main felling and which does not have any scope for survival shall be felled and removed from the annual coupe.

(iv) All high stumps shall be cut flush to the ground.

(v) All climbers left by oversight during marking shall be cut back.

(vi) All fallen pieces of branches, lops and tops, small wood left during the main felling which could cause fire hazard shall be removed.

(vii) Soil and moisture conservation measures required shall be assessed. The cultural operation such as gully plugging, contour bonding, dry stone packing, construction of check dams etc. shall be carried out in subsequent years.

(viii) The blank areas created due to shifting cultivation or any other reasons (more than half hectare of any blank patch can be considered as a blank area) shall be planted by local indigenous species.

1.2.2.2 Simultaneous Silvicultural Operations of Bamboo

It needs proper and timely execution of subsidiary silvicultural operation for the increase in productivity of the bamboo forests. These operations should be immediately executed during or after the year of actual harvest. So that it can be beneficial for the existing available natural regeneration in the forest to get proper nourishment and will enrich in the composition of bamboo forest. These operations shall preferably be done along with the main cutting and comprise of the following components.

1. All cutting debris shall be removed and the clump shall be left cleaned.
2. If any clump has not been cleaned at the time of felling, such clumps shall also be attended to through pruning in addition to the climber cutting. If any high stumps have left those shall be rectified as far as practicable.
3. The exposed rhizomes shall be covered with soil scrapped from surrounding plain areas as per availability and preferably from uphill side of a hilly undulating terrain. In some steep slope hilly areas, stone walls may be given on downhill side to stabilize the soil covered to the rhizome from erosion by making a shape half-mound trench.
4. During this process, it should be taken to ensure that no damage is caused to the rhizomes and rootstock.

1.2.2.3 Artificial regeneration(plantation)

Plantation is required in blocks that have permanent blanks and barren land, which are devoid of root stock and natural regeneration.

Continued exploitation of natural resources due to human and livestock demands, depletion of forest cover and loss of biodiversity, has resulted in serious land degradation in the Division. The non-arable waste lands of the Division usually suffer from one or more problems such as low nutrient status, eroded topsoil, difficult land surfaces like ravines, gullies, torrents, lack of soil moisture, development of soil toxicity or poor soil physical conditions. The problems may be inherent to the site but in a majority of the cases these have been formed due to persistent biotic

disturbances (excessive grazing, biomass extraction and consequent absenceof natural vegetation/regeneration).

1.2.2.4 Assisted Natural Regeneration(ANR)

ANR is the human protection and preservation of natural tree seedling in forested area. In addition to protection efforts, new trees are planted when needed/ wanted (enrichment plantation). With ANR Forest grow faster than they would naturally, resulting in significant contribution to carbon sequestration efforts.

Some of forests in this division are mostly open mixed miscellaneous forest in various stages of degradation. The crop density would vary from 0.1 to 0.4 and these forest blocks are generally found in close proximity to human habitation. Mature trees may be available in a scattered manner in some of these forest blocks, interspersed with pole crop and bushy growth. The regeneration study reveals that the regeneration of few species like Sal, Kendu, Asan, etc is moderate to good in majority of the blocks. But the young shoots are affected due to frequent fires, grazing. So ANR is required to restock the area.

1.3 Constitution of working circles

1.3.1 To achieve the above objectives and in consistence with the provisions of the National Working Plan Code, 2014 as well as approval of the Working Plans' Committee, the following Working Circles have been constituted for the management of the forest area covered under this plan:

1. The Selection Working Circle.
2. The Rehabilitation Working Circle.
3. The Plantation Working Circle.
4. The Forest Protection Working Circle.
5. The J.F.M. (Overlapping) Working Circle.
6. The Bamboo (Overlapping) Working Circle.
7. The NTFP (Overlapping) Working Circle.
8. The Wildlife (Overlapping) Working Circle.

1.3.1.1. The Selection Working Circle:

This working circle has been formed with an objective to further improve the growing stock. In fact, the blocks covered under this circle are mostly Sal forests with

associates which are un-even aged with good tree growth. These forest blocks have forests with good crown density and mature trees. Conservative selection felling for harvest of some mature trees is prescribed. Majority of the blocks included under this circle are in the Ranges Karada, Phulbani, Tikabali, Sudrukumpa, Phiringia and Raikia of the Division. The total area allotted to this working circle is **45943.04**hectares which is approximately **31.5%** of the total forest area covered in the plan.

1.3.1.2. The Rehabilitation Working Circle:

This Working Circle includes mainly denuded/degraded forest blocks with degraded Sal and other miscellaneous forests. These blocks have adequate rooted waste and coppice growth which can be improved by cultural operations supplemented with artificial regeneration. These areas are in need of urgent rehabilitation and restoration measures. All such areas are found to be in close proximity to human habitation and therefore attempt has to be made to involve the local in the protection and regeneration of these degraded forests by formation of V.S.S. and their effective functioning. An area of **91946.806** hectares has been allotted to this working circle which is approximately **63.08**% of the total forest area covered in the plan.

1.3.1.3. The Plantation Working Circle:

This Working Circle includes all the forest blocks, which have permanent large sized gaps and blanks without much vegetative growth and root stock. These areas have generally no forest growth due to many factors including repetitive fire, grazing and soil conditions. These areas cannot be easily restocked through natural regeneration methods within a reasonable time frame since these areas require intensive artificial regeneration measures. The existing plantations raised in different blocks during the previous years are also included in this Working Circle. The total area allotted to this Working Circle is **3176.8**hectareswhich is approximately **2.18**% of the total forest area covered in the plan.

1.3.1.4. The Forest Protection Working Circle:

This circle includes all the forest areas, which are prone to human interferences like illicit felling, encroachment, poaching, shifting cultivation and fire. In addition ecologically fragile areas and those forest areas existing in steep precipitous hill

slopes, which required to be protected, have also been included in this Working Circle. Special protection measures will be accorded to the forest blocks allotted to this working circle. The total area included in this working circle is **4680.13** hectares which is approximately **3.2**% of the total forest area covered in the plan.

1.3.1.5. The Bamboo (Overlapping) Working Circle:

This working circle covers the potentially rich bamboo areas of the division areas where bamboo occurs either gregariously or in scattered manner. This Working Circle overlaps with the Selection and Rehabilitation Working Circle. The bamboo forest of this division are suffering from degradation due to frequent fire, heavy grazing illicit and unscientific felling. Gregarious flowering of bamboo clumps has not yet been noticed in the forest blocks of the Division. The total area allotted to this Working Circle is **99937.682** hectares which is approximately **68.5%** of the total forest area covered in the plan.

1.3.1.6. The NTFP (Overlapping) Working Circle:

This working circle is also an Overlapping circle covering almost the entire plan area. The object of this working circle is to give suitable prescription for conservation, regulation, value addition and marketing of all NTFPs found in the division. The total area under this overlapping working circle works out to be **145746.8**hectares.

1.3.1.7. The Wild life (Overlapping) Working Circle:

This is an overlapping circle covering almost the entire working plan area of the Division. However, special management prescriptions are provided for some forest blocks, where there is adequate concentration of wild life. During this plan period it is proposed to identify and maintain special wildlife habitats, unique wildlife habitat and also critical wildlife habitats which have been neglected in the past. Steps will be taken to prevent wildlife crimes and wildlife depredation by appropriate protection measures with peoples' participation in detection and disposal of cases.

1.3.1.8. The Joint Forest Management (Overlapping) Working Circle:

This overlapping working circle overlaps with mainly the Rehabilitation Working Circle. All the forest blocks which have been allotted to the Vana Sanarkashayna Samities for protection and management as per the JFM resolution of the State have been included in this working circle. Further all the notified Village forests have also

been brought under this working circle. The forest under this overlapping circle will be managed through site specific micro plans prepared by the village committees which will be in consonance with the prescriptions of the main Working circle to which the forest block has been allotted. The need should be empowering the V.S.S. and making them accountable with given proper forest management environment. As a result of which it would be possible "to have the cake and eat it too". This is what Forest Management in the 21st century and new millennium will strive for.

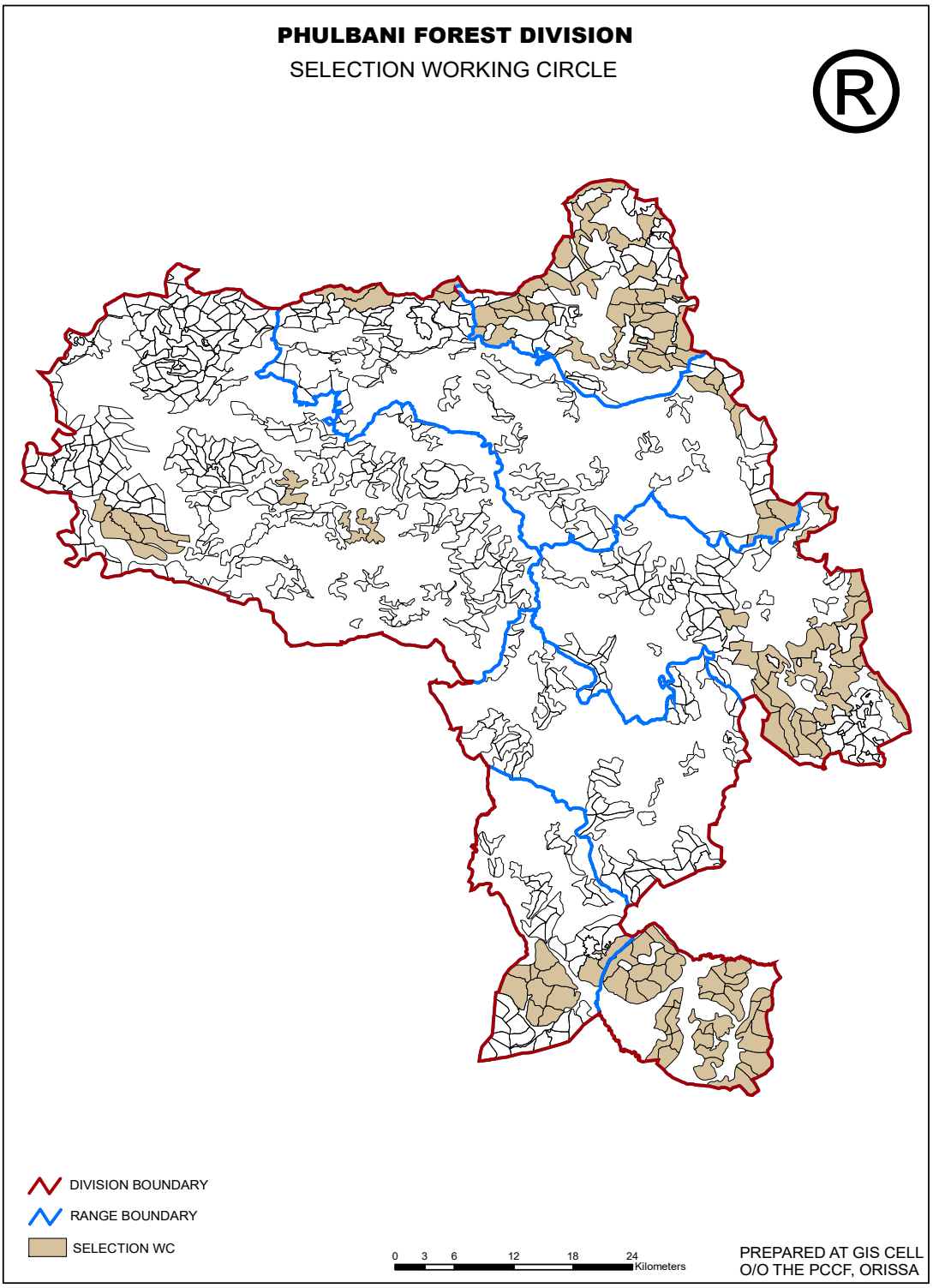
1.4 Period of Working plan and necessity for intermediate revision:-

This Working Plan has been prepared for a period of 10 years i.e. from 2021-22 to 2030-31. It is unlikely that prescriptions made in this Plan will need any major alterationduring the Plan period. However, the prescriptions may be reviewed after five years and if so required the Regional Chief Conservator of Forests (Territorial) in consultation with Conservator of Forests, Working Plan, shall submit a proposal to that effect for approval of the competent authority.

CHAPTER-2

SELECTION WORKING CIRCLE

2.1



2.2 General Constitution of Working Circle:-

2.2.1 The forest blocks and compartments which have good growth with mature trees and having adequate natural regeneration are included in this Working circle. 14 Reserved Forest blocks and 6 Proposed Reserved Forestshave been allotted to the Selection Working Circle. The total area allotted to Working Circle is**45943.04**ha. It constitutes 31.5% of the total Working Plan area of the Division. All these blocks have dense forest growth, with the average density of 0.4-0.8.

2.2.2 This Working Circle possesses Sal and other miscellaneous species above exploitable diameter for exploitation. There is considerable variation in the crop composition of the forest areas included in this circle. The crop is invariably of uneven age with some representation of all age classes. Allotment of forest areas to this working circle is based on reconnaissance survey followed by confirmation through sample point inventory and analysis of stand and stock tables for these blocks provided by NRSC, Hyderabad .

2.3General Characteristics of vegetation:-

The forests under this circle are uneven aged and have fairly good natural regeneration. This Working Circle comprises of Moist Peninsular Sal, Moist Mixed Deciduous, Northern Tropical Dry Deciduous and Dry Mixed Deciduous Forests.

The vegetation consists of mainly Sal and associated species like *Piasal, Asan, Dhaura, Kurum, Kasi, Bandhan, Kusuma*as predominant &co-dominant species .Bamboo is present in pure brakes as well as in varying densities when found along with other tree species. In general, the problem of fire especially during the NTFP collection season is prevalent in the entire area, resulting in changes in soil composition and crop condition.

2.4Felling Series, Cutting sections and JFM areas:-

The selection working circle is divided into ten felling series as per followings.

1. Baraba felling series
2. Nandabali felling series
3. Ranaba felling series
4. Brutanga(N) felling series
5. Chakapad-I felling series
6. Chakapad-II felling series
7. Ranipathar felling series
8. Donga felling series
9. Kiamunda felling series
10. Karada felling series

2.5. Blocks, Compartments and JFM area (marked on GIS bases Maps)

2.5.1 Blocks and Compartments:

The total area allotted to this circle is **45943.04** hectarein 14 RFs and 6 PRFs blocks. A statement of allocation of blocks and compartments together with area is given below. The blocks have been re-grouped into Felling series for the purpose of silviculture and other management interventions. While constituting the felling series, care has been taken to restrict it within a Range jurisdiction for administrative convenience and for better implementation of the prescriptions.

Table No. SWC.1Range wise Blocks and compartments allotted to Selection Working Circle

Range	Felling Series	Forest Block	Compartment	
			Number	Area
KARADA	BARABA	BARABA RF	BARB5	192.76
KARADA	BARABA	BARABA RF	BARB5	325.33
KARADA	BARABA	BARABA RF	BARB1	199.64
KARADA	BARABA	BARABA RF	BARB2	238.42
KARADA	BARABA	BARABA RF	BARB1	136.84
KARADA	BARABA	BARABA RF	BARB2	130.015
KARADA	BARABA	BARABA RF	BARB3	218.42
KARADA	BARABA	BARABA RF	BARB4	244.6
KARADA	BARABA	BADEGADA PRF	BDG1	316.23
KARADA	BARABA	BADEGADA PRF	BDG1	76.8
KARADA	BARABA	BADEGADA PRF	BDG2	280.79
KARADA	BARABA	BADEGADA PRF	BDG2	303.42
KARADA	BARABA	BADEGADA PRF	BDG2	339.39
			TOTAL	**3002.655**
KARADA	NANDABALI	NANDABALI PRF	NDBL2	311.36
KARADA	NANDABALI	NANDABALI PRF	NDBL2	350.32
KARADA	NANDABALI	NANDABALI PRF	NDBL2	285.41
KARADA	NANDABALI	NANDABALI PRF	NDBL2	308.23
KARADA	NANDABALI	NANDABALI PRF	NDBL2	264.28
KARADA	NANDABALI	NANDABALI PRF	NDBL2	182.8
KARADA	NANDABALI	NANDABALI PRF	NDBL1	303.159
KARADA	NANDABALI	NANDABALI PRF	NDBL1	340.49
KARADA	NANDABALI	NANDABALI PRF	NDBL1	426.23
KARADA	NANDABALI	NANDABALI PRF	NDBL1	352.75
			TOTAL	**3125.029**
KARADA	RANABA	RANABA RF	RANB-4	539.86

KARADA	RANABA	RANABA RF	RANB-4	212.596
KARADA	RANABA	RANABA RF	RANB-5	563.653
KARADA	RANABA	RANABA RF	RANB-1	184.4
KARADA	RANABA	RANABA RF	RANB-2	171.33
KARADA	RANABA	RANABA RF	RANB-2	361.61
KARADA	RANABA	RANABA RF	RANB-1	233.71
KARADA	RANABA	RANABA RF	RANB-3	579.27
KARADA	RANABA	MACHHAGHAT RF	MAGH-1	322.26
KARADA	RANABA	MACHHAGHAT RF	MAGH-1	331.52
KARADA	RANABA	MACHHAGHAT RF	MAGH-3	117.87
KARADA	RANABA	MACHHAGHAT RF	MAGH-2	442.17
KARADA	RANABA	MACHHAGHAT RF	MAGH-4	87.45
KARADA	RANABA	MACHHAGHAT RF	MAGH-3	369.19
KARADA	RANABA	MACHHAGHAT RF	MAGH-4	203.75
			TOTAL	**4720.639**
PHULBANI	BURTANG (N)	KHAJURIPADA	KHPD3	240.79
PHULBANI	BURTANG (N)	KHAJURIPADA	KHPD3	240.54
PHULBANI	BURTANG (N)	KHAJURIPADA	KHPD3	285.4
PHULBANI	BURTANG (N)	KALABAGH	KLBG4	299.19
PHULBANI	BURTANG (N)	KALABAGH	KLBG5	229.94
PHULBANI	BURTANG (N)	KALABAGH	KLBG13	705.61
PHULBANI	BURTANG (N)	KALABAGH	KLBG14	555.55
PHULBANI	BURTANG (N)	BURTANG NORTH	BURN1-N	211.01
PHULBANI	BURTANG (N)	BURTANG NORTH	BURN2-N	593.51
PHULBANI	BURTANG (N)	BURTANG NORTH	BURN3-N	560.07
PHULBANI	BURTANG (N)	KHAJURIPADA	KHPD3	260.8
TIKABALI	BURTANG (N)	ARCHANGI A		225.84
TIKABALI	BURTANG (N)	ARCHANGI B		210.39
			TOTAL	**4618.64**
TIKABALI	CHAKAPAD-1	CHAKAPADA	CHKP6	457.275
TIKABALI	CHAKAPAD-1	CHAKAPADA	CHKP7	536.32
TIKABALI	CHAKAPAD-1	CHAKAPADA	CHKP8	161.51
TIKABALI	CHAKAPAD-1	CHAKAPADA	CHKP8	140.32
TIKABALI	CHAKAPAD-1	CHAKAPADA	CHKP8	107.93
TIKABALI	CHAKAPAD-1	CHAKAPADA	CHKP8	158.47
TIKABALI	CHAKAPAD-1	CHAKAPADA	CHKP1	682.26
TIKABALI	CHAKAPAD-1	CHAKAPADA	CHKP4	295.56
TIKABALI	CHAKAPAD-1	CHAKAPADA	CHKP5	610.917
TIKABALI	CHAKAPAD-1	BURTANG SOUTH RF	BURN5-S	426.38
			TOTAL	**3576.942**
TIKABALI	CHAKAPAD-2	CHAKAPADA RF	CHKP17	551.55
TIKABALI	CHAKAPAD-2	CHAKAPADA RF	CHKP18	442.32
TIKABALI	CHAKAPAD-2	CHAKAPADA RF	CHKP14	577.87
TIKABALI	CHAKAPAD-2	CHAKAPADA RF	CHKP19	136.48

TIKABALI	CHAKAPAD-2	CHAKAPADA RF	CHKP19	483.25
TIKABALI	CHAKAPAD-2	CHAKAPADA RF	CHKP20	563.46
TIKABALI	CHAKAPAD-2	CHAKAPADA RF	CHKP21	298.05
TIKABALI	CHAKAPAD-2	CHAKAPADA RF	CHKP21	346.03
TIKABALI	CHAKAPAD-2	CHAKAPADA RF	CHKP9	599.23
TIKABALI	CHAKAPAD-2	CHAKAPADA RF	CHKP15	756.7
TIKABALI	CHAKAPAD-2	CHAKAPADA RF	CHKP16	699.8
TIKABALI	CHAKAPAD-2	CHAKAPADA RF	CHKP2	573.89
TIKABALI	CHAKAPAD-2	CHAKAPADA RF	CHKP3	511.76
TIKABALI	CHAKAPAD-2	BUDUKAKHOLE PRF		59.73
			TOTAL	**6600.12**
SUDURUKUMPA	DONGA	DONGA RF	DONG11	388.43
SUDURUKUMPA	DONGA	DONGA RF	DONG7	413.99
SUDURUKUMPA	DONGA	DONGA RF	DONG12	409.58
SUDURUKUMPA	DONGA	DONGA RF	DONG1	465.68
SUDURUKUMPA	DONGA	DONGA RF	DONG13	262.95
SUDURUKUMPA	DONGA	DONGA RF	DONG4	426.65
SUDURUKUMPA	DONGA	DONGA RF	DONG14	538.97
SUDURUKUMPA	DONGA	DONGA RF	DONG15	242.31
SUDURUKUMPA	DONGA	DONGA RF	DONG16	459.72
SUDURUKUMPA	DONGA	RANIPATHAR RF	RANP1	392.77
SUDURUKUMPA	DONGA	RANIPATHAR RF	RANP2	375.97
SUDURUKUMPA	DONGA	RANIPATHAR RF	RANP3	384.47
SUDURUKUMPA	DONGA	RANIPATHAR RF	RANP4	448.41
SUDURUKUMPA	DONGA	RANIPATHAR RF	RANP5	228.09
SUDURUKUMPA	DONGA	RANIPATHAR RF	RANP5	187.34
SUDURUKUMPA	DONGA	RANIPATHAR RF	RANP6	783.74
			TOTAL	**6409.07**
SUDURUKUMPA	RANIPATHAR	SUDURUKUMPA RF	SUDK1	445.18
SUDURUKUMPA	RANIPATHAR	SUDURUKUMPA RF	SUDK3	169
SUDURUKUMPA	RANIPATHAR	SUDURUKUMPA RF	SUDK3	235.29
SUDURUKUMPA	RANIPATHAR	SUDURUKUMPA RF	SUDK7	480.65
SUDURUKUMPA	RANIPATHAR	SUDURUKUMPA RF	SUDK8	582.84
SUDURUKUMPA	RANIPATHAR	SUDURUKUMPA RF	SUDK4	361.61
SUDURUKUMPA	RANIPATHAR	SUDURUKUMPA RF	SUDK5	102.79
SUDURUKUMPA	RANIPATHAR	SUDURUKUMPA RF	SUDK5	344.96
SUDURUKUMPA	RANIPATHAR	SUDURUKUMPA RF	SUDK5	264.32
SUDURUKUMPA	RANIPATHAR	RANIPATHAR RF	RANP12	413.62
SUDURUKUMPA	RANIPATHAR	RANIPATHAR RF	RANP7	367.02
SUDURUKUMPA	RANIPATHAR	RANIPATHAR RF	RANP8	338.01
SUDURUKUMPA	RANIPATHAR	RANIPATHAR RF	RANP9	331.72
SUDURUKUMPA	RANIPATHAR	RANIPATHAR RF	RANP10	380.34
SUDURUKUMPA	RANIPATHAR	RANIPATHAR RF	RANP11	162.597
SUDURUKUMPA	RANIPATHAR	RANIPATHAR RF	RANP11	280.37

SUDURUKUMPA	RANIPATHAR	DONGA RF	DONG3	396.91
			TOTAL	**5657.227**
PHIRINGIA	KIAMUNDA	KIAMUNDA PRF	KMD2	433.29
PHIRINGIA	KIAMUNDA	KIAMUNDA PRF	KMD2	446.62
PHIRINGIA	KIAMUNDA	KIAMUNDA PRF	KMD2	548.88
PHIRINGIA	KIAMUNDA	KIAMUNDA PRF	KMD2	551.24
PHIRINGIA	KIAMUNDA	KIAMUNDA PRF	KMD2	449.95
PHIRINGIA	KIAMUNDA	KIAMUNDA PRF	KMD2	311.21
PHIRINGIA	KIAMUNDA	KERANDIBALI EAST RF	KERN2-E	300.24
PHIRINGIA	KIAMUNDA	KERANDIBALI EAST RF	KERN2-E	280.21
PHIRINGIA	KIAMUNDA	KERANDIBALI EAST RF	KERN7-E	309.23
PHIRINGIA	KIAMUNDA	KERANDIBALI EAST RF	KERN7-E	314.92
			TOTAL	**3945.79**
RAIKIA	KARADA	KARADA PRF	KRD3	478.73
RAIKIA	KARADA	KARADA PRF	KRD3	495.28
RAIKIA	KARADA	KARADA PRF	KRD3	303.75
RAIKIA	KARADA	KARADA PRF	KRD3	290.43
RAIKIA	KARADA	SIKABADI PRF	SKBD2	380.86
RAIKIA	KARADA	SIKABADI PRF	SKBD2	304.27
RAIKIA	KARADA	KARADA PRF	KRD2	643.77
RAIKIA	KARADA	KARADA PRF	KRD2	270.28
RAIKIA	KARADA	KARADA PRF	KRD3	96.39
RAIKIA	KARADA	KARADA PRF	KRD3	469.11
RAIKIA	KARADA	KARADA PRF	KRD3	554.06
			TOTAL	**4286.93**
		GRAND TOTAL		**45943.04**

2.5.2 JFM areas

Usufructuary Benefits to VanaSurakhyaSamiti in the above Forest blocks, where the VanaSurakhyaSamiti / Community Forest Rights holder are protecting the forest, they will enjoy usufructuary benefits, provided they discharge their duties and responsibilities as laid down in the Scheme. The detail list of JFM areas of different RF and PRF of selection working circle assigned to different VSS are furnished in **Annexure-XIII.**

2.5.2.1 The VSS members/ CFR holders will not get the benefits from forest unless they actively protect the forest and wildlife. Further duties and responsibilities in the task of regeneration and protection of the forests should be intimated by DFO through concerned Range Officerto the executive body of VSS/ CFR groups from time

to time. The executive committee of VSS /CFR group will be responsible for distribution of the usufructs equally among the members, each household being treated as one member. If a particular household has not discharged the duties and responsibilities assigned to him, the executive committee may lessen or do away with its share through resolution. Timber and poles as may be obtained from a major harvest or final felling shall be shared between the Forest Department and the VanaSurakhyaSamiti in equal shares within the territory protected by VSS. The executive committee on behalf of the Samiti will have the option either to distribute the said 50 % of the total produce among the members of the Samiti in equal shares or to request the Forest Department to dispose of the same and make the net sale-proceeds available for distribution among the members.

2.6 Special objectives of management

The special objectives of the management of the Selection Working Circle are as follows:

1. To improve the density of the forest crop as well as stand structure by silvicultural operations.
2. To help natural regeneration for establishment of various species.
3. To remove mature and silviculturally available trees before they become unsound.
4. To remove unsound, diseased and dead trees already existing.
5. To carry out subsidiary silvicultural operations, so that suitable situation is created for better growth of existing crop and natural regeneration.It was suggested that Rotation period of 120 years be re-examined and exploitable diameter be fixed for different site qualities.

2.6.1 Analysis of the crop:-

2.6.1.1 The entire working circle has been stock mapped based on reconnaissance survey and satellite imagery. Stock maps have been attached to respective compartment history files. The average density of the crop included in this working circle is 0.5 though it varies from 0.4 to above 0.8

2.6.1.2 The entire forest area of the division was stratified on the basis of the Forest type layer prepared from multi-spectral IRS LISS-III data and Forest canopy density developed from panchromatic IRS PAN data. The two input layers were integrated

along with the layer containing the administrative boundaries and forest blocks of the division. Based on the stratified layer, sample points were allotted in compartments and blocks for carrying out 0.1ha field inventory. Inventory points were located on the ground by using GPS receivers. At first, field work for pre-inventory sample points were taken up. Based on the results of pre-inventory and reconnaissance survey allotment of blocks and compartment to the Selection WC was carried out. 2nd and 3rd set of sample points were taken up in the blocks allotted to the Selection Working Circle on the basis of the results obtained. Sampling intensity varied from 0.25 to 0.4 % in the blocks depending on the crop composition and density. The field inventory data Annexure was analysed by segregating the areas into Sal dominated (75%) and mixed Sal strata (25%) and based on the result stand density, basal areas and volumes for blocks and compartment were computed.

2.6.1.3 Stand and stock tables have been computed based on the inventory data giving number of trees in different girth classes varying from 30 cm to 180 cm and above with a 30 cm interval. The principal species seen in the selection forest are Sal, Asan, Dhaura, Kusum, Pahadi Sisso, Kurum etc as predominant & co-dominant species. The number of trees available in different girth classes and the computation of volumes and growing stock estimates was done .In the entire division, it is generally observed that the numbers of trees are more in the interior compartments than the compartments adjoining to the villages. That is why, in the enumeration, in some compartments number of high girth trees per ha are found to be more than that of other compartments.

2.6.1.4 The regeneration is generally found to be moderate to good and in some compartments excellent regeneration is found. The details of the regeneration survey are given in the chapter 2. The enumeration results reveal that there exists fairly good number of trees in the exploitable and above exploitable girth classes. These trees need to be felled, otherwise there will be an increased tendency of their getting unsound with over maturity.

2.6.2 Sivicultural system

The Selection system will be adopted with emphasis on sustainable production and stability of the ecosystem. The crop and soil condition will be improved by selective opening up of the canopy. No felling has been prescribed in eroded and steep hill slopes, blank areas and along nallah banks. Marking is a very

important exercise, requiring judicious application of skill. It should therefore, be carried out by a Range Officer under proper supervision of the Assistant Conservator of Forests and concerned DFO of the Division

2.6.3 Rotation period

The rotation period can be fixed at 120 years.

2.6.4 Harvestable diameters

The exploitable girth class fixed for various species is based on the silvicultural rotation. The other factors such as site quality, production capacity, growth, yield and market demands etc. have also been taken into account. The exploitable girth of different species as well as list of 11 species submitted to NRSC, Hyderabad for stand and stock table are reflected below:

LIST OF ELEVEN SPECIES FOR STAND AND STOCK TABLE
PHULBANI FOREST DIVISION

Table No: SWC.2		
Sl. No.	**Local Name**	**Botanical Name**
1	**2**	**3**
01	Mundi	Mitragyna parviflora
02	Sal	Shorea robusta
03	Piasal	Pterocarpus marsupium
04	Bandhan	Ougeinia oojeinensis
05	Mahula	Madhuca indica
06	Sisso	Dalbergia latifolia
07	Kendu	Diospyros melanoxylon
08	Dhaura	Anogeissus latifolia
09	Haland (Haldu)	Haldina cordifolia
10	Sahaj (Asan)	Terminalia tomentosa
11	Bali sisoo	Dalbergia sisoo

LIST OF EXPLOITABLE GIRTH CLASS OF PRINCIPAL SPECIES IN SELECTION WORKING CIRCLE OF PHULBANI FOREST DIVISION.

Table-SWC.3			
Sl. No.	**Local Name**	**Botanical Name**	**Exploitable girth in cms**
1	**2**	**3**	**4**
01	Sal	*Shorea robusta*	150

02	Piasal	*Pterocarpus marsupium*	150
03	Bandhan	*Ougeinia oojeinensis*	120
04	Asan	*Terminalia tomentosa*	140
05	Dhaura	*Anogeissus latifolia*	145
06	Kurum	*Haldina cordifolia*	150
07	Mitkunia	*Mitragyna parviflora*	135
08	Mai	*Lannea caromandelica*	135
09	Sidha	*Lagerstroemia parviflora*	135
10	Kasi	*Bridelia retusa*	135

Table SWC-4- Girth of approach class

Sl. No.	Name of the species	GBH Class of Approach class	
		Lower limit	Upper limit
1	Sal	121	149
2	Piasal	121	149
3	Kuruma	121	149
4	Asana	121	139
5	Dhaura	121	144
6	Bandhan	91	119
7	Mitkunia	105	134
8	Mai	105	134
9	Sidha	105	134
10	Kasi	105	134

2.6.5 Reducing Factors& reduced areas

2.6.5.1 Reducing Factors: Reducing factor is used to determine the quality of the trees. But in this revision the quality of sal is assessed based on its girth. Therefore reducing factor has not been used in this revision.

2.6.5.2 Reduced Area: Reduced area is used to determine the density of the crop with the help of basal area. The density of the forest managed in this revision has been assessed based on crown cover and ground area. Therefore reduced area has not been used in this revision to determine the density of the crop.

2.6.6 Felling cycle

The felling cycle has been fixed at 10 years, which synchronizes with the Plan period. In case of a longer felling cycle, the crop will remain unattended for over a long period of time. With a shorter felling cycle silvicultural operations can be taken up at shorter intervals to maintain the forests in a healthy condition.

2.6.7 Division into periods and allotment to periodic blocks (PB)

Not related to this Division

2.6.8 Calculation of the yield

The yield will be regulated by area with a percentage check on the removal of exploitable trees as calculated by ***Smythies' safeguarding formula***. This formula is also known as U. P. safeguarding formula. Smythies evolved it for the Sal forests of Uttar Pradesh for sustainable yield. The formula is based on the following assumptions, which holds true for the forest blocks allotted to this Working circle.

(i) The exploitable (Selection) trees already exist and are being recruited everywhere (and not in any particular compartments only) and that fellings pass regularly through the forests in consecutive annual coupes in a felling cycle of 10 years.

(ii) The basic object of management is to ensure, as far as possible, sustained yield of exploitable trees and volume above the exploitation limit at every felling cycle.

(iii) The middle aged and younger diameter classes are well represented and the present rate of recruitment into the two highest diameter classes (I and II) is not likely to decrease in the near future.

(iv) Sustained yield of Selection trees is adequately safeguarded, if in any area, the number that may be felled is limited to the number that will pass up from below by the time fellings come round again.

According to the Smythies' safeguarding formula the number of approach Class - II trees (x) per hectare that pass into Class - I within the felling cycle is determined by following formula.

$$X = \frac{F}{T} (II - Z\% \text{ of } II) \quad \text{----------} \quad (1)$$

Where

X = Number of trees in approach class that passes into the exploitable class

II = No. of trees in pre- exploitable girth class or approach class

F = Felling cycle (10 years)

T = Time period in years that takes approach class to pass into exploitable class (40 years)

Z = Percentage of Class II trees that do not pass into class I in 'T' years, due to mortality or removal in thinnings etc.

The percentage of the trees available for exploitation (Y) is calculated as follow:

$$Y = \frac{X}{(I + X / 2)} \times 100 \pm A \text{ ----------} \quad (2)$$

Where,

A = Arbitrary value to get the round figure of 'Y'

X =Number of trees in approach class which passes into the exploitable class

I = Number of trees already existing in the exploitable class.

If the value of 'X' as in equation (1) is substituted in the equation (2) the resulting equation is as follows

$$Y = \frac{2 F II (100 - Z)}{200 I T + F II (100 - Z)} \times 100 \pm A \text{ ----------} \quad (3)$$

The value of 'T' is 40 years for average site quality III in respect of irregular Sal forests of this Division. This is slightly less than that obtained from the yield table. The values of 'T' and 'Z' as per yield table are 39 years and 43 %. Since it is hill forests, the value of 'T' and 'Z' is taken as 40 years and 50 %. Substitution of these values of 'T' and 'Z' in equation (3), we get

$$Y = \frac{1100 II}{8000 I + 550 II} X 100 \pm A$$

Or,

$$22 II$$

$$Y = \frac{}{160\ I + 11\ II} \times 100 \pm A$$

The values of class II and Class I for all the Felling series and consequent yield is calculated and given in Annexure. The average number of trees that can be removed for Sal and Others is three tree per 5 ha. 50% trees would be retained as a safeguard measure against biotic pressure and for conservation purpose. After retaining 50%, the total number of trees actually to be removed depends on approachable class, exploitable class and areas coming under greater than 30 degree slopes. Calculation of yield is reflected in **Annexure-XIV**.

2.6.9 Table of felling

The forest area allotted to the Selection working circle has been distributed into different felling series. While constituting the felling series care has been taken to restrict the area to about 5000 hect. within jurisdiction. This would facilitate better implementation of the prescriptions, administrative convenience and would ensure that the annual coupes are of manageable size which could be worked during one working season. The annual coupes in each felling series have been demarcated by taking the natural features, compartment boundaries, administrative boundaries of different ranges and the crop condition and attempt has been made to make the coupes equi-productive. Each Felling Series is divided into 10 annual coupes so that the entire area of the Felling Series is covered in the Plan period. The coupe working would commence from 2021-22 subject to approval of the plan by the State and Central Governments. The sequence of felling in different years is given in the **Table No: SWC-5and figures from SWC-1 to along with corresponding figures.**

Year wise sequence of felling in different felling series under selection felling series

Table no-SWC.5Baraba Felling Series						
Range	**Forest Block**	**Compartment No.**	**Year**	**Coupe No.**	**Area in ha**	
					Compt. Area	**Coupe Area**
Karada	Baraba RF	BARB5	2021-22	BRB-I	192.76	192.76
Karada	Baraba RF	BARB5	2022-23	BRB-II	325.33	325.33
Karada	Badegada PRF	BDG1	2023-24	BRB-III	316.23	316.23
Karada	Badegada PRF	BDG1	2024-25	BRB-IV	76.8	357.59

Karada	BadegadaPRF	BDG2			280.79	
Karada	BadegadaPRF	BDG2	2025-26	BRB-V	303.42	303.42
Karada	BadegadaPRF	BDG2	2026-27	BRB-VI	339.39	339.39
Karada	Baraba RF	BARB1	2027-28	BRB-VII	336.48	336.48
Karada	Baraba RF	BARB2	2028-29	BRB-VIII	368.435	368.435
Karada	Baraba RF	BARB3	2029-30	BRB-IX	218.42	218.42
Karada	Baraba RF	BARB4	2030-31	BRB-X	244.6	244.6
Total					**3002.655**	**3002.655**

Table no –SWC-5 Burtang North Felling Series

Range	Forest Block	CompartmentNo.	Year	Coupe No.	Area in ha	
					Compt. Area	Coupe Area
Phulbani	Khajuripada	KHPD3	2021-22	BURT(N)-I	240.79	240.79
	Khajuripada	KHPD3	2022-23	BURT(N)-II	240.54	240.54
	Khajuripada	KHPD3	2023-24	BURT(N)-III	285.4	285.4
	Kalabagh	KLBG4	2024-25	BURT(N)-IV	299.19	529.13
	Kalabagh	KLBG5			229.94	
	Kalabagh	KLBG13	2025-26	BURT(N)-V	705.61	705.61
	Kalabagh	KLBG14	2026-27	BURT(N)-VI	555.55	555.55
Tikabali	Archangi A		2027-28	BURT(N)-VII	225.84	436.23
	Archangi B				210.39	
Phulbani	Burtang North	BURN2-N	2028-29	BURT(N)-VIII	593.51	593.51
	Burtang North	BURN3-N	2029-30	BURT(N)-IX	560.07	560.07
	Burtang North	BURN1-N	2030-31	BURT(N)-X	211.01	471.81
	Khajuripada	KHPD3			260.8	
				TOTAL	**4618.64**	**4618.64**

Table no –SWC-6 Chakapad-1 Felling Series

Range	Forest Block	Compartment No.	Year	Coupe No.	Area in ha	
					Compt. Area	Coupe Area
Tikabali	Chakapada	CHKP6	2021-22	CHKP1-I	457.275	457.275

Tikabali	Chakapada	CHKP7	2022-23	CHKP1-II	536.32	536.32
Tikabali	Chakapada	CHKP8	2023-24	CHKP1-III	161.51	161.51
Tikabali	Chakapada	CHKP8	2024-25	CHKP1-IV	140.32	140.32
Tikabali	Chakapada	CHKP8	2025-26	CHKP1-V	107.93	107.93
Tikabali	Chakapada	CHKP8	2026-27	CHKP1-VI	158.47	158.47
Tikabali	Chakapada	CHKP1	2027-28	CHKP1-VII	682.26	682.26
Tikabali	Burtang South RF	BURN5-S	2028-29	CHKP1-VIII	426.38	426.38
Tikabali	Chakapada	CHKP4	2029-30	CHKP1-IX	295.56	295.56
Tikabali	Chakapada	CHKP5	2030-31	CHKP1-X	610.917	610.917
				TOTAL	**3576.942**	**3576.942**

Table no –SWC-7 Chakapad-2 Felling Series

Range	Forest Block	Compartment No.	Year	Coupe No.	Area in ha	
					Compt. Area	Coupe Area
Tikabali	ChakapadaRF	CHKP17	2021-22	CHKP2-I	551.55	551.55
Tikabali	Chakapada RF	CHKP18	2022-23	CHKP2-II	442.32	502.05
Tikabali	Budukakhole PRF				59.73	
Tikabali	Chakapada RF	CHKP14	2023-24	CHKP2-III	577.87	577.87
Tikabali	Chakapada RF	CHKP19	2024-25	CHKP2-IV	619.73	619.73
Tikabali	Chakapada RF	CHKP20	2025-26	CHKP2-V	563.46	563.46
Tikabali	Chakapada RF	CHKP21	2026-27	CHKP2-VI	644.08	644.08
Tikabali	Chakapada RF	CHKP9	2027-28	CHKP2-VII	599.23	599.23
Tikabali	Chakapada RF	CHKP15	2028-29	CHKP2-VIII	756.7	756.7
Tikabali	Chakapada RF	CHKP16	2029-30	CHKP2-IX	699.8	699.8
Tikabali	Chakapada RF	CHKP2	2030-31	CHKP2-X	573.89	1085.65
Tikabali	Chakapada RF	CHKP3			511.76	
				TOTAL	**6600.12**	**6600.12**

Table no –SWC-8 Donga Felling Series						
Range	**Forest Block**	**Compartment No.**	**Year**	**Coupe No.**	**Area in ha**	
					Compt. Area	**Coupe Area**
Sudurukumpa	Donga RF	DONG11	2021-22	DONG-I	388.43	388.43
Sudurukumpa	Donga RF	DONG7	2022-23	DONG-II	413.99	823.57
Sudurukumpa	Donga RF	DONG12			409.58	
Sudurukumpa	RanipatharRF	RANP1	2023-24	DONG-III	392.77	768.74
Sudurukumpa	RanipatharRF	RANP2			375.97	
Sudurukumpa	RanipatharRF	RANP3	2024-25	DONG-IV	384.47	832.88
Sudurukumpa	RanipatharRF	RANP4			448.41	
Sudurukumpa	RanipatharRF	RANP5	2025-26	DONG-V	415.43	415.43
Sudurukumpa	RanipatharRF	RANP6	2026-27	DONG-VI	783.74	783.74
Sudurukumpa	Donga RF	DONG1	2027-28	DONG-VII	465.68	728.63
Sudurukumpa	Donga RF	DONG13			262.95	
Sudurukumpa	Donga RF	DONG4	2028-29	DONG-VIII	426.65	426.65
Sudurukumpa	Donga RF	DONG14	2029-30	DONG-IX	538.97	538.97
Sudurukumpa	Donga RF	DONG15	2030-31	DONG-X	242.31	702.03
Sudurukumpa	Donga RF	DONG16			459.72	
				TOTAL	**6409.07**	**6409.07**

Table no –SWC-9 Kiamunda Felling Series						
Range	**Forest Block**	**Compartment No.**	**Year**	**Coupe No.**	**Area in ha**	
					Compt. Area	**Coupe Area**
Phiringia	Kiamunda PRF	KMD2	2021-22	KMD-I	433.29	433.29
Phiringia	Kiamunda PRF	KMD2	2022-23	KMD-II	446.62	446.62
Phiringia	Kiamunda PRF	KMD2	2023-24	KMD-III	548.88	548.88
Phiringia	Kiamunda PRF	KMD2	2024-25	KMD-IV	551.24	551.24
Phiringia	Kiamunda PRF	KMD2	2025-26	KMD-V	449.95	449.95
Phiringia	Kiamunda PRF	KMD2	2026-27	KMD-VI	311.21	311.21
Phiringia	Kerandibali East RF	KERN2-E	2027-28	KMD-VII	300.24	300.24
Phiringia	Kerandibali East RF	KERN2-E	2028-29	KMD-VIII	280.21	280.21
Phiringia	Kerandibali East RF	KERN7-E	2029-30	KMD-IX	309.23	309.23
Phiringia	Kerandibali East RF	KERN7-E	2030-31	KMD-X	314.92	314.92
				Total	**3945.79**	**3945.79**

Table no –SWC-10 Karada Felling Series						
Range	Forest Block	Compartment No.	Year	Coupe No.	Area in ha	
					Compt. Area	Coupe Area
Raikia	KaradaPRF	KRD3	2021-22	KRD-I	478.73	478.73
Raikia	KaradaPRF	KRD3	2022-23	KRD-II	495.28	495.28
Raikia	KaradaPRF	KRD3	2023-24	KRD-III	303.75	303.75
Raikia	KaradaPRF	KRD3	2024-25	KRD-IV	290.43	290.43
Raikia	SikabadiPRF	SKBD2	2025-26	KRD-V	380.86	380.86
Raikia	SikabadiPRF	SKBD2	2026-27	KRD-VI	304.27	304.27
Raikia	KaradaPRF	KRD2	2027-28	KRD-VII	643.77	643.77
Raikia	KaradaPRF	KRD2	2028-29	KRD-VIII	270.28	366.67
Raikia	KaradaPRF	KRD3			96.39	
Raikia	KaradaPRF	KRD3	2029-30	KRD-IX	469.11	469.11
Raikia	KaradaPRF	KRD3	2030-31	KRD-X	554.06	554.06
				Total	**4286.93**	**4286.93**

Table no –SWC-11 Nandabali Felling Series						
Range	Forest Block	Compartment No.	Year	Coupe No.	Area in ha	
					Compt. Area	Coupe Area
Karada	NandabaliPRF	NDBL2	2021-22	NDBL-I	311.36	311.36
Karada	NandabaliPRF	NDBL2	2022-23	NDBL-II	350.32	350.32
Karada	NandabaliPRF	NDBL2	2023-24	NDBL-III	285.41	285.41
Karada	NandabaliPRF	NDBL2	2024-25	NDBL-IV	308.23	308.23
Karada	NandabaliPRF	NDBL2	2025-26	NDBL-V	264.28	264.28
Karada	NandabaliPRF	NDBL2	2026-27	NDBL-VI	182.8	182.8
Karada	NandabaliPRF	NDBL1	2027-28	NDBL-VII	303.159	303.159
Karada	NandabaliPRF	NDBL1	2028-29	NDBL-VIII	340.49	340.49
Karada	NandabaliPRF	NDBL1	2029-30	NDBL-IX	426.23	426.23
Karada	NandabaliPRF	NDBL1	2030-31	NDBL-X	352.75	352.75
				TOTAL	**3125.029**	**3125.029**

Table no –SWC-12 Ranipathar Felling Series						
Range	Forest Block	Compartment No.	Year	Coupe No.	Area in ha	
					Compt. Area	Coupe Area
Sudurukumpa	SudurukumpaRF	SUDK1	2021-22	RANP-I	445.18	614.18
Sudurukumpa	SudurukumpaRF	SUDK3			169	
Sudurukumpa	Donga RF	DONG3	2022-23	RANP-II	396.91	632.2
Sudurukumpa	SudurukumpaRF	SUDK3			235.29	
Sudurukumpa	SudurukumpaRF	SUDK7	2023-24	RANP-III	480.65	480.65
Sudurukumpa	SudurukumpaRF	SUDK8	2024-25	RANP-IV	582.84	582.84
Sudurukumpa	SudurukumpaRF	SUDK4	2025-26	RANP-V	361.61	464.4

Sudurukumpa	SudurukumpaRF	SUDK5			102.79	
Sudurukumpa	SudurukumpaRF	SUDK5	2026-27	RANP-VI	609.28	609.28
Sudurukumpa	RanipatharRF	RANP12	2027-28	RANP-VII	413.62	780.64
Sudurukumpa	RanipatharRF	RANP7			367.02	
Sudurukumpa	RanipatharRF	RANP8	2028-29	RANP-VIII	338.01	669.73
Sudurukumpa	RanipatharRF	RANP9			331.72	
Sudurukumpa	RanipatharRF	RANP10	2029-30	RANP-IX	380.34	380.34
Sudurukumpa	RanipatharRF	RANP11	2030-31	RANP-X	442.967	442.967
				TOTAL	**5657.227**	**5657.227**

Table no –SWC-13 Ranaba Felling Series

Range	Forest Block	Compartment No.	Year	Coupe No.	Area in ha	
					Compt. Area	Coupe Area
Karada	RanabaRF	RANB-4	2021-22	RNB-I	539.86	539.86
Karada	RanabaRF	RANB-4	2022-23	RNB-II	212.596	776.249
Karada	RanabaRF	RANB-5			563.653	
Karada	MachhaghatRF	MAGH-1	2023-24	RNB-III	322.26	322.26
Karada	MachhaghatRF	MAGH-1	2024-25	RNB-IV	331.52	449.39
Karada	MachhaghatRF	MAGH-3			117.87	
Karada	MachhaghatRF	MAGH-2	2025-26	RNB-V	442.17	529.62
Karada	MachhaghatRF	MAGH-4			87.45	
Karada	MachhaghatRF	MAGH-3	2026-27	RNB-VI	369.19	572.94
Karada	MachhaghatRF	MAGH-4			203.75	
Karada	RanabaRF	RANB-1	2027-28	RNB-VII	184.4	355.73
Karada	RanabaRF	RANB-2			171.33	
Karada	RanabaRF	RANB-2	2028-29	RNB-VIII	361.61	361.61
Karada	RanabaRF	RANB-1	2029-30	RNB-IX	233.71	233.71
Karada	RanabaRF	RANB-3	2030-31	RNB-X	579.27	579.27
				TOTAL	**4720.639**	**4720.639**
				GRAND TOTAL	**45943.042**	**45943.042**

2.6.10 Method of executing the felling

2.6.10.1 Demarcation of annual coupes:

1) The annual coupes shall be demarcated in the winter season (October to December) in the year preceding to the year of working.

2) If any portion of the coupe line coincides with compartment line, it need not be laid on the ground. In majority of the cases the coupes are divided on the basis of compartments. Hence it is essential to maintain the compartment line and sub-compartment line by putting double white paint rings.

3) The other portions of coupe line shall be laid down by clearance of 1.5 mtr widths along with stone Cairns (white painted) at visible distance. Clearance shall be restricted for the purpose of identification and visibility. No felling of any kind shall be done on the strip. Double coaltar rings shall be given on the trees standing on the strip.

4) In case, a coupe overlaps two or more compartments, each portion shall be treated as a separate lot. This will ensure the proper maintenance of compartment history. In all these cases, the lot line should be demarcated with single coaltar ring along the compartment / sub-compartment line.

5) Coupes shall be indicated by signboards at corners or at points of intersection with roads, inspection paths and boundary lines of reserved forests. The signboards should contain the name of the felling series, the serial number of the coupe, its area, year of working and number of the compartment.

6) Coupes shall be demarcated by a Forest Officer not below the rank of a Forest Ranger and demarcation shall be checked by an Officer not below the rank of Assistant Conservator of Forests before the marking is taken up.

2.6.10.2Marking rules:

1. The Marking officer shall assess the illicit felling inside the annual coupe prior to marking. The quantum of marking of trees shall be reduced by the extent of trees illicitly felled during the period between last felling of the coupe and the time of marking. The net trees to be marked should be the difference between the permissible number of trees due for marking as per plan and the number of tree illicitly felled in the coupe area. In case the difference is negative then no marking shall be done.

2. All dead, dying, seriously diseased standing, uprooted and fallen trees shall be marked for felling. A tree whose top one third is already dead shall be treated as a dying tree. Marking of unsound trees shall be preferred over sound trees in annual coupes.

3. All trees above the exploitable girth class shall be marked. Out of the exploitable girth trees available, 4 Sal and 6 non-Sal trees per 10 hectare shall be marked for

felling on an average. The individual coupe wise yield is given elaborately in the tables above.

4. The trees retained should be sound, dominant and growing vigorously. The reserved trees shall be painted with single white paint ring at breast height (137 cm from ground level) and at base and serially numbered in each coupe. The list of such trees shall be maintained in the compartment history and coupe register.
5. If a tree is forked below breast height, it shall be taken as two trees but, if it is forked above the breast height, then it will be taken as one tree.
6. All trees to be marked for felling shall be given two blazes approximately of size 15 cm x 15 cm, one at the breast height and the other as close to the ground as possible and marked with a departmental hammer and numbered serially.
7. Marking shall not be done within 50 meters of roadside and either side of nallah banks. Marking shall not be done within 50 meters radius around the key habitat of wild animals such as den, saltlick, wallows, game tank and water holes.
8. If a tree is marked for felling, no other tree should be marked for felling within the radius of 15 meters.
9. Marking should not be done in areas where the slope of terrain is more than 30º, except for dead and uprooted trees.
10. Marking should be done only for those trees whose removal will not create a permanent gap in the canopy and will not affect regeneration and the flora.
11. Fruit trees such as Mahula, Mango, Aonla, Chara, Kendu, Bahada, Harida and Bela etc. shall not be marked for felling.
12. All climbers except climbers providing NTFP and necessary for livelihood options shall be cut prior to marking and it is mandatory.
13. Trees standing on the blank patch having no established regeneration of any species underneath shall not be marked.
14. Trees standing on the bank of nallahs, streams, rivers and 10 meters from their banks shall not be marked for felling.

2.6.10.3 Execution of marking and felling:

(i) The marking shall be done by an officer not below the rank of Range Officer and shall be checked as per provisions of the Orissa Forest Department Code, 2020, as modified by Government from time to time.

(ii) The method of disposal of trees marked for felling shall be as per Chapter - XIV of the Orissa Forest Department Code, 2020 as modified by Government from time to time.

(iii) Felling and extraction in any annual coupe shall only be allowed from 1st October to 30th June (Nine Month). No felling, logging, passing and dragging shall be allowed during the period from 1stJuly to 30th September. If the execution of coupe working cannot be completed within 30th June, the competent authority shall consider any proposal for extension of time only after the physical verification of stock conducted inside the annual coupe by the DFO. Maximum Nine month will be allowed for working of a timber coupe as per provision laid in the Forest Contract Rule .

(iv) Trees shall be lopped before felling to avoid damage to the regeneration and the standing crops. The trees should be felled towards upper hill slope in hilly coupes.

(v) Works undertaken, number of lots formed, detailed passing list, deviations if any must be mentioned in the compartment history and control forms.

2.6.11 Subsidiary silvicultural operations cleaning and thinning

Subsidiary silvicultural operation shall be done in the year following the main felling. This departmental operation shall be done over the entire coupe area except in much degraded areas and steep slopes. The following operations are prescribed.

(i) In order to take up subsidiary silvicultural operations systematically, an annual action plan in advance shall be prepared along with treatment plan and treatment map.

(ii) All marked trees left standing by the OFDC Ltd/lessee shall be felled and removed from the annual coupe.

(iii) All the trees damaged in the main felling and which does not have any scope for survival shall be felled and removed from the annual coupe.

(iv) All high stumps shall be cut flush to the ground.

(v) All climbers left by oversight during marking shall be cut back.

(vi) All fallen pieces of branches, lops and tops, small wood left during the main felling which could cause fire hazard shall be removed.

(vii) Soil and moisture conservation measures required shall be assessed. DLT (Drainage line treatment) will be the basis of SMC measures in the coupe

area. The cultural operation such as gully plugging, contour bunding, dry stone packing, construction of check dams, digging of staggerd trenches etc. shall be carried out in subsequent years.

(viii) The blank areas created due to shifting cultivation or any other reasons (more than half hectare of any blank patch can be considered as a blank area) shall be planted by local indigenous species available in the area.

2.6.12 Regeneration

In order to facilitate regeneration of growing stock high stump cutting & singling out of coppice shoot have been prescribed under subsidiary silvicultural operation. In addition to this Assisted Natural Regeneration may be taken up in the areas where there is permanent gap/opening of area more than 0.4 ha.. The species indigenous to the area may be planted to augment regeneration.

2.6.13 Associated regulations and measures

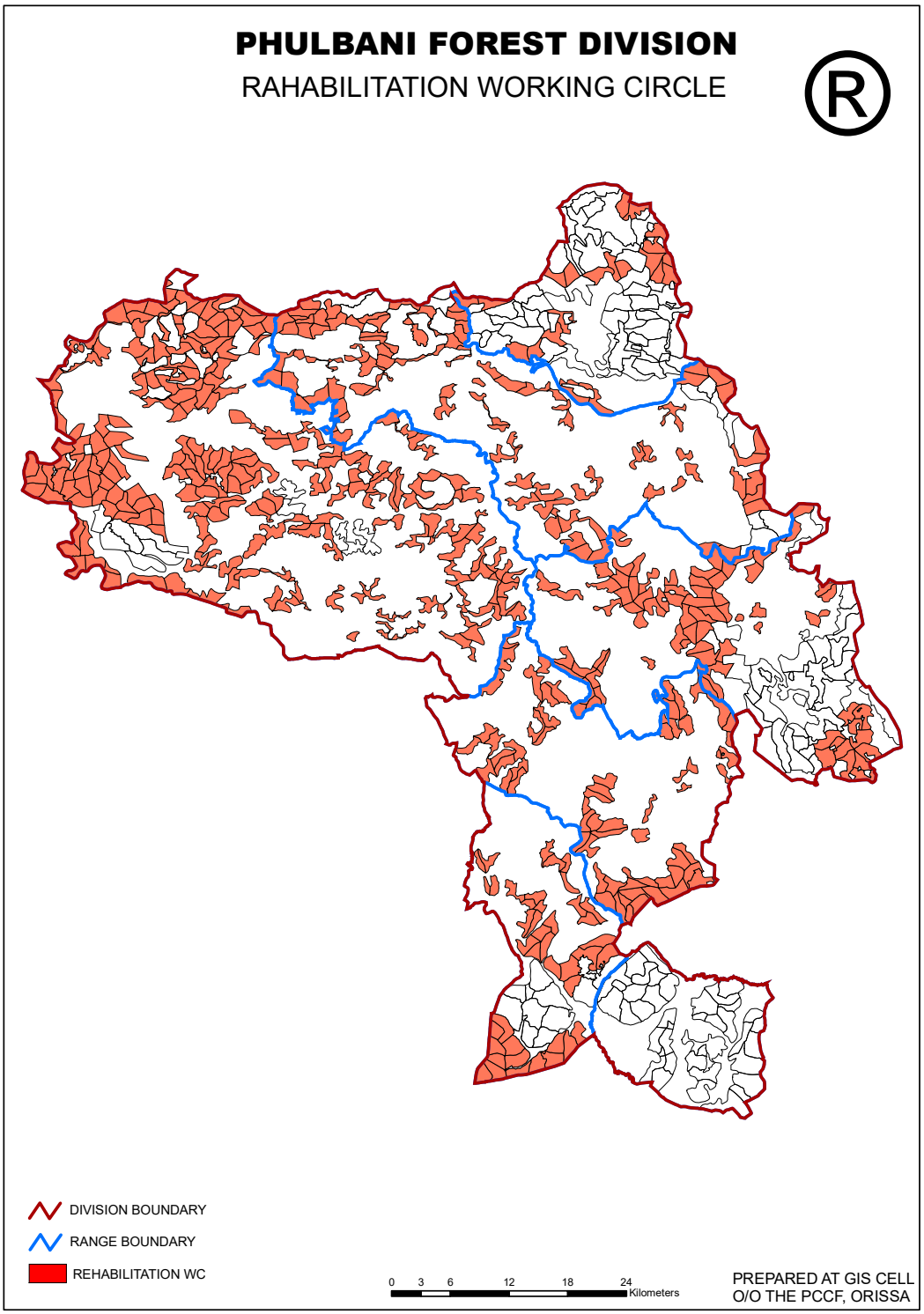
2.6.13.1 Grazing: The coupes shall be closed for grazing for five years including the year of working. Grazing shall be regulated in other area on the basis of rotation. Lopping is strictly prohibited.

2.6.13.2 Fire Protection: The coupes shall be protected against fire for five years after the completion of main felling. The Orissa Forest (Fire Protection) Rules 1979 shall be strictly followed. The coupe and plantations area should be rigidly protected from fire. Awareness regarding fire hazard and fire safety should be created in the villages adjacent to the forest area. Appointment of suitable temporary firewatchers from the village adjoining to the forest blocks should form a part of the subsidiary operations.

CHAPTER-3

THE REHABILITATION WORKING CIRCLE

3.1

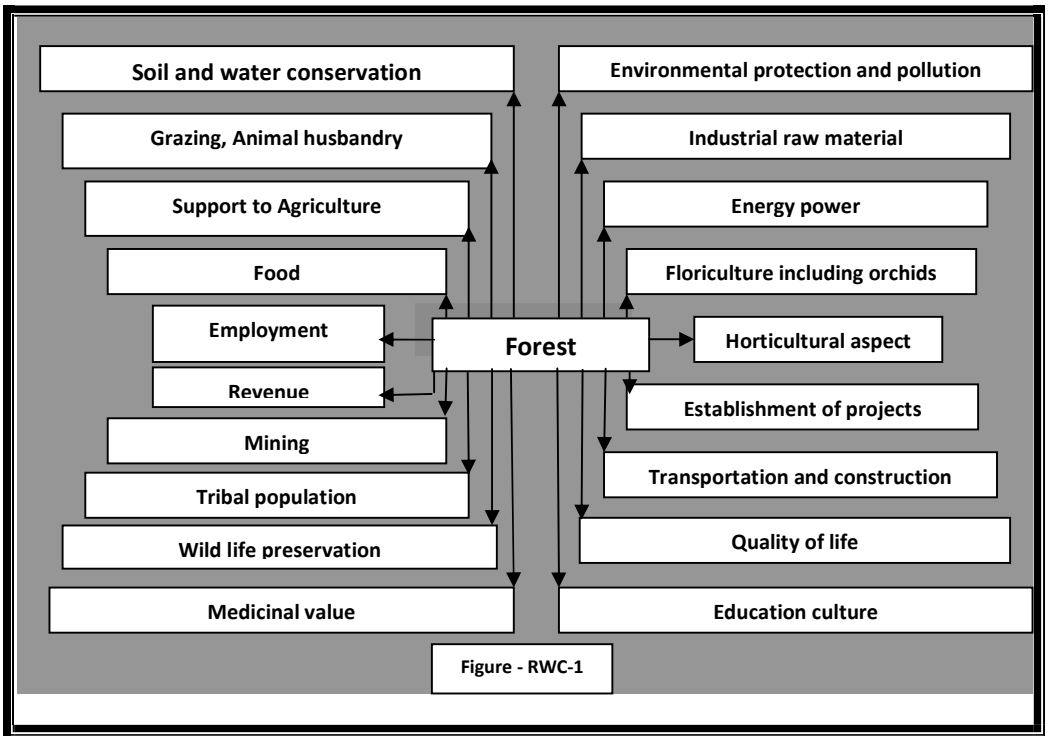


3.2 General Constitution of Working Circle:-

3.2.1 Most of the forest destruction of the Division is caused by poor people who are denied access to good agricultural land or other means of production for themselves and their families and have no choice but to clear forests in an attempt to eke out an exercise. Forest is a renewable resource, to be used to the greatest extent possible; so long this is in a sound manner.

3.2.2 Driven by population pressure, uncontrolled extension of agriculture, primitive practice of shifting cultivation, fuelwood collection, uncontrolled grazing and a lack of overall forest management, has resulted in deforestation with cascading adverse environmental effects. Upland degradation has altered the water regimes, resulting in increasing floods and other problems including sedimentation, siltation of irrigation systems and landslides. Desertification, soil erosion, water logging, salinization and alkalization, and loss of plant and animal genetic resources threaten to undermine the potential for achievement of long term food security. Exploitation without adequate investment towards regeneration is a major problem, causing degradation of forest area.

3.2.3A strategy for restoration of degraded forest areas needs to pay particular attention in tackling the problem as part of the whole package of rural development. The importance of increasing agricultural productivity on existing crop land cannot be over stressed as a manner of reducing the pressure for land clearing. The productivity of common property resources must be raised whole simultaneously ensuring access for the poor section of the society, whose dependence on them is high. The forests are subjected to multifarious demands, the majority of which, are reflected in Fig-1.



3.2.4 Forests will survive only if they are seen by people concerned to be more valuable than other forms of land use. Thus, future survival of the forests depends on their productive utilization and at the same time ensuring conservation of genetic resources and maintenance of environmental functions.

3.2.5. The forest blocks allotted to this Working Circle are those whose forest crops are in various stages of degradation. These forest blocks still contain enough potential, in terms of sufficient root stock and natural regeneration, which, if tended and protected could be converted into high forests. Most of these blocks are in urgent need of attention to arrest the process of degradation. Attempt should be made to involve local villagers in rehabilitation of these forests by formation of V.S.S. with fully participatory approach and active involvement in protection.

3.3 General Characteristics of vegetation:-

3.3.1 The areas included in this Working Circlecanbe improved by proper treatment and cultural operations. These forests are mostly open mixed miscellaneous forest in various stages of degradation. The crop density would vary from 0.1 to 0.4 and these forest blocks are generally found in close proximity to human habitation. Mature trees may be available in a scattered manner in some of these forest blocks, interspersed with pole crop and bushy growth. The regeneration study reveals that

the regeneration of few species like Sal, Kendu, Asan, etc is moderate to good in majority of the blocks. But the young shoots are affected due to frequent fires.

3.3.2The detailed description of the vegetation has been dealt in Chapter 2 of Part 1 of this plan. The forest blocks of this working circle are spread over all the ranges. The forests are mainly of two types.

(1) 3c/C_2 moist peninsular sal.

(2) Moist mixed deciduous forest.

3.3.3 Basing on the moisture regime of the soil, the crop composition varies. In moist areas, the main species are Sal, associated with Asan, Kurum, Piasal, Mahul, Semal, Mango and Kasi in the top storey along with Aonla, Sunari, Jamun, Karada and Kendu in the second storey. Here, all age classes are represented. Due to requisite soil depth and favourable moisture conditions, general condition of the crop is healthy with luxuriant growth. Site quality of Sal is III. The undergrowth constitutes *Indigofera pulcherima, Woodfordia fruticosa, Helicteres isora* and*Clerodendron viscosum*. The climbers found in common are *Millettia auriculata, Bauhinia vahlii, Smilax macrophylla* and*Combretum decandrum*.

3.3.4 In the upper hills, occurrence of Sal is scarce. The miscellaneous nature of the crop is represented. The associates of Sal are Asan, Kurum, Dhaura, Sidha, Kansa, Mahula and Sirish. General condition of the crop is poor. Site quality of Sal is III to IV.

3.3.5 The under growth are *Holarrhena antidysenterica, Eupatorium odoratum* and BanaTulsi etc. The climbers are *Millettia auriculata, Combraetum decandrum* and *Butea superba*, Salia bamboo is found gregariously as under storey.

3.3.6 The vegetation is mostly open with sufficient root stock and some natural regeneration. These blocks are found in close proximity to human inhabitation and hence involvement of the forest fringe dwellers through JFM is of paramount importance in this circle.

3.3.7 Soil profile, soil depth, organic and inorganic properties of soil of some of the forest blocks have been studied and dealt in **Chapter 1.** Top soil is generally disturbed due to heavy biotic interference. The water retaining capacity of these soils is generally low and they are highly prone to erosion due to formation of large number of gullies and ravines.

3.4 Felling Series, Cutting sections and JFM areas:-

The area allotted to this WC is **91946.806** ha.to facilitate proper and systematic treatment to the degraded forest **44**nos. of Treatment Series have been constituted in all the ranges. These series have been constituted taking into account silvicultural operations to be carried out along with administrative feasibility and availability of funds. Care has been taken to restrict the series as far as possible within the Range jurisdiction to which a particular block belongs. Each Treatment Series is divided into 10 coupes to synchronize the Plan period of 10 years. These Treatment series with annual treatment coupes have been shown in the **management map.**

3.5 Blocks, Compartments and JFM area (marked on GIS bases Maps)

This Working Circle includes mainly denuded/degraded forest blocks with degraded Sal and other miscellaneous forests. These blocks have adequate rooted waste and coppice growth which can be improved by cultural operations supplemented with artificial regeneration. These areas are in need of urgent rehabilitation and restoration measures. All such areas are found to be in close proximity to human habitation and therefore attempt has to be made to involve the local in the protection and regeneration of these degraded forests by formation of V.S.S. and their effective functioning. An area of 919946.806 ha hectares has been allotted to this working circle which is approximately 63.08 % of the total forest area covered in the plan.

Table No. RWC-01 Range wise Blocks and compartments allotted to Selection Working Circle

Range	Treatment Series	Forest Block	Compartment	
			Number	Area (in ha.)
PHIRINGIA	BAGHANADI T.S-1	BAGHANADI RF	BAGH1	789.996
PHIRINGIA	BAGHANADI T.S-1	BAGHANADI RF	BAGH14	1167.91
PHIRINGIA	BAGHANADI T.S-2	BAGHANADI RF	BAGH9	1270.476
PHIRINGIA	BAGHANADI T.S-2	BALANDAPADA (N) PRF	BPDN1	708.08
PHIRINGIA	BAGHANADI T.S-3	BAGHANADI RF	BAGH10	973.81
PHIRINGIA	BAGHANADI T.S-3	BAGHANADI RF	BAGH11	307.09
PHIRINGIA	BAGHANADI T.S-3	BAGHANADI RF	BAGH12	430.38
PHIRINGIA	BAGHANADI T.S-3	BAGHANADI RF	BAGH13	622.815
PHIRINGIA	BAGHANADI T.S- 4	BAGHANADI RF	BAGH2	462.67
PHIRINGIA	BAGHANADI T.S- 4	BAGHANADI RF	BAGH3	385.15

PHIRINGIA	BAGHANADI T.S- 4	BAGHANADI RF	BAGH4	730.65
PHIRINGIA	BAGHANADI T.S- 4	BAGHANADI RF	BAGH5	533.87
PHIRINGIA	BAGHANADI T.S- 5	BAGHANADI RF	BAGH6	487.82
PHIRINGIA	BAGHANADI T.S- 5	BAGHANADI RF	BAGH7	664.38
PHIRINGIA	BAGHANADI T.S- 5	BAGHANADI RF	BAGH8	819.68
PHIRINGIA	BALANDAPADA T.S-1	BALANDAPADA SOUTH PRF	BPDS1	1549.79
PHIRINGIA	BALANDAPADA T.S-1	BALANDAPADA NORTH PRF	BPDN2	510.415
PHIRINGIA	BALANDAPADA T.S-2	BALANDAPADA SOUTH PRF	BPDS2	2141.25
PHIRINGIA	BALANDAPADA T.S-3	BALANDAPADA SOUTH PRF	BPDS3	1013.55
PHIRINGIA	BALANDAPADA T.S-3	BALANDAPADA SOUTH PRF	BPDS4	989.45
PHIRINGIA	BANDHAGARH T.S-1	BANDHAGARHA A PRF	BNDH4	1095.754
G.UDAYAGIRI	BANDHAGARH T.S-1	GODINGIA-A RF		719.79
PHIRINGIA	BANDHAGARH T.S-1	BANDHAGARHA B RF		265.5
PHIRINGIA	BANDHAGARH T.S-2	BANDHAGARHA A PRF	BNDH1	578.17
PHIRINGIA	BANDHAGARH T.S-2	BANDHAGARHA A PRF	BNDH2	759.26
PHIRINGIA	BANDHAGARH T.S-2	BANDHAGARHA A PRF	BNDH3	965.23
PHIRINGIA	DAMINGIA T.S	DAMINGIA PRF		1127.45
PHIRINGIA	DAMINGIA T.S	LADAPADAR RF	LADA1	340.7
PHIRINGIA	DAMINGIA T.S	LADAPADAR RF	LADA2	208.71
PHIRINGIA	DAMINGIA T.S	LADAPADAR RF	LADA3	246.11
PHIRINGIA	DAMINGIA T.S	LADAPADAR RF	LADA4	450.38
PHIRINGIA	DAMINGIA T.S	LADAPADAR RF	LADA5	271.772
PHIRINGIA	GOCHHAPADA T.S-1	GOCHHAPADA RF	GOCH7	676.039
PHIRINGIA	GOCHHAPADA T.S-1	GOCHHAPADA RF	GOCH8	423.44
PHIRINGIA	GOCHHAPADA T.S-1	GOCHHAPADA RF	GOCH9	627.3
PHIRINGIA	GOCHHAPADA T.S-1	GOCHHAPADA RF	GOCH10	264.89
PHIRINGIA	GOCHHAPADA T.S-2	GOCHHAPADA RF	GOCH3	409.22
PHIRINGIA	GOCHHAPADA T.S-2	GOCHHAPADA RF	GOCH4	492.77
PHIRINGIA	GOCHHAPADA T.S-2	GOCHHAPADA RF	GOCH5	514.58
PHIRINGIA	GOCHHAPADA T.S-2	GOCHHAPADA RF	GOCH6	390.06
PHIRINGIA	KERANDIBALI T.S-1	KERANDIBALI EAST RF	KERN1	602.861
PHIRINGIA	KERANDIBALI T.S-1	KERANDIBALI EAST RF	KERN3	532.86
PHIRINGIA	KERANDIBALI T.S-1	KERANDIBALI EAST RF	KERN4	320.54
PHIRINGIA	KERANDIBALI T.S-1	KERANDIBALI EAST RF	KERN5	351.01
PHIRINGIA	KERANDIBALI T.S-1	KERANDIBALI EAST RF	KERN6	273.37
PHIRINGIA	KERANDIBALI T.S-1	DAISARA RF		214.78
PHIRINGIA	MALLIKPADA T.S	GOCHHAPADA RF	GOCH1	630.01
PHIRINGIA	MALLIKPADA T.S	GOCHHAPADA RF	GOCH2	555.05
PHIRINGIA	MALLIKPADA T.S	MALIKAPADA PRF		650.16
PHIRINGIA	KIAMUNDA T.S	KIAMUNDA PRF	KMD1	1949.536
PHIRINGIA	KERANDIBALI T.S-2	KERANDIBALI WEST RF	KERN3-W	373.04
PHIRINGIA	KERANDIBALI T.S-2	KERANDIBALI WEST RF	KERN4-W	1209.69

PHIRINGIA	KERANDIBALI T.S-2	KERANDIBALI WEST RF	KERN6-W	671.77
PHIRINGIA	KERANDIBALI T.S-3	KERANDIBALI WEST RF	KERN1-W	555.54
PHIRINGIA	KERANDIBALI T.S-3	KERANDIBALI WEST RF	KERN2-W	571.16
PHIRINGIA	KERANDIBALI T.S-3	KERANDIBALI WEST RF	KERN7-W	732.64
PHIRINGIA	SADINGIA T.S	NUAPADAR RF		625.72
PHIRINGIA	SADINGIA T.S	DAMINGIA EXTN PRF		605.22
PHIRINGIA	SADINGIA T.S	SADINGIA RF		737.19
PHIRINGIA	SADINGIA T.S	KERANDIBALI WEST RF		843.69
		Total		**40392.194**
G.UDAYAGIRI	BAKINGIA T.S	BAKINGIA PRF	BKG-1	599.962
G.UDAYAGIRI	BAKINGIA T.S	BAKINGIA PRF	BKG-2	1116.968
G.UDAYAGIRI	KATINGIA T.S-1	KATINGIA PRF	KTG-1	1773.43
G.UDAYAGIRI	KATINGIA T.S-1	GIDIPABALI RF		326.29
G.UDAYAGIRI	KATINGIA T.S-2	KATINGIA PRF	KTG-2	1317.1
G.UDAYAGIRI	KATINGIA T.S-2	DAKPALLA RF		265.89
G.UDAYAGIRI	KATINGIA T.S-2	PUKULINGIA RF		149.47
G.UDAYAGIRI	KATINGIA T.S-2	ROTINGIA RF		116.31
G.UDAYAGIRI	KATINGIA T.S-2	KURMINGIA RF		119.99
G.UDAYAGIRI	KATINGIA T.S-2	SUJELI RF		53.75
G.UDAYAGIRI	PABURIA T.S	PABURIA PRF	PBR1	874.632
G.UDAYAGIRI	PABURIA T.S	PABURIA PRF	PBR2	455.513
G.UDAYAGIRI	PABURIA T.S	GUTINGIA 'B' RF		734.067
G.UDAYAGIRI	PODANGI T.S	PADANGI RF		1832.44
G.UDAYAGIRI	TALARIMAHA T.S	TALARIMAHA PRF		1016.32
G.UDAYAGIRI	TALARIMAHA T.S	JOBEDI RF		198.53
G.UDAYAGIRI	TALARIMAHA T.S	GOTINGIA RF		81.88
G.UDAYAGIRI	TALARIMAHA T.S	BHANJAPADAR PRF		707.369
G.UDAYAGIRI	TALARIMAHA T.S	BALIAPATA RF		197.98
		Total		**11937.891**
TIKABALI	BURTANGA T.S-1	BURTANG SOUTH RF	BURN1-S	1051.14
TIKABALI	BURTANGA T.S-1	BURTANG SOUTH RF	BURN2-S	806.96
TIKABALI	BURTANGA T.S-2	BURTANG SOUTH RF	BURN3-S	1199.68
TIKABALI	BURTANGA T.S-2	BURTANG SOUTH RF	BURN4-S	863.9
TIKABALI	BURTANGA T.S-3	TADIPAJU PRF		489.2
TIKABALI	BURTANGA T.S-3	BURTANG SOUTH RF	BURN6-S	819.53
TIKABALI	BURTANGA T.S-3	BARADIKIA PRF		56.09
TIKABALI	BURTANGA T.S-3	NANDINI A PRF		81.71
TIKABALI	BURTANGA T.S-3	NANDINI B PRF		46.94
TIKABALI	BURTANGA T.S-3	GHUDUKAPADAR RF		199.81
TIKABALI	BURTANGA T.S-3	MUNDULA PRF	MNDL1	146.93
TIKABALI	BURTANGA T.S-3	MUNDULA PRF	MNDL2	128.43
TIKABALI	CHAKAPAD T.S	CHAKAPADA RF	CHKP10	521.91
TIKABALI	CHAKAPAD T.S	CHAKAPADA RF	CHKP11	985.22
TIKABALI	CHAKAPAD T.S	CHAKAPADA RF	CHKP12	467.51
TIKABALI	CHAKAPAD T.S	CHAKAPADA RF	CHKP13	748.75

TIKABALI	LAINPADA T.S-1	CHAKAPADA RF		1390.22
TIKABALI	LAINPADA T.S-1	SANKARAKHOL RF		456.72
TIKABALI	TUDUBALI T.S	TUDUBALI RF		1379.906
TIKABALI	LAINPADA T.S-2	LINEPADA RF		1582.17
TIKABALI	LAINPADA T.S-2	RAGHAGUDA RF		180.87
		Total		**13603.596**
SUDRUKUMPA	DONGA T.S	DONGA RF	DONG5	255.49
SUDRUKUMPA	DONGA T.S	DONGA RF	DONG6	433.04
SUDRUKUMPA	DONGA T.S	DONGA RF	DONG8	374.22
SUDRUKUMPA	DONGA T.S	DONGA RF	DONG9	458.37
SUDRUKUMPA	DONGA T.S	DONGA RF	DONG10	458.8
SUDRUKUMPA	DONGA T.S	DONGA RF	DONG17	465.44
SUDRUKUMPA	SUDRUKUMPA T.S	SUDREJU RF		437.55
SUDRUKUMPA	SUDRUKUMPA T.S	SUDURUKUMPA RF	SUDK2	753.17
SUDRUKUMPA	SUDRUKUMPA T.S	SUDURUKUMPA RF	SUDK6	445.18
SUDRUKUMPA	SUDRUKUMPA T.S	SUDURUKUMPA RF	SUDK9	515.12
SUDRUKUMPA	SUDRUKUMPA T.S	DONGA RF	DONG2	418.25
		Total		**5014.63**
PHULBANI	GANJUGUDA 'B' T.S	GANJUGUDA B PRF	GNGUB1	557.623
PHULBANI	GANJUGUDA 'B' T.S	GANJUGUDA B PRF	GNGUB2	476.89
PHULBANI	GANJUGUDA 'B' T.S	KHAJURIPADA RF	KHPD1	527.66
PHULBANI	GANJUGUDA 'B' T.S	KHAJURIPADA RF	KHPD2	536.26
PHULBANI	GANJUGUDA 'B' T.S	KHAJURIPADA RF	KHPD4	546.26
PHULBANI	GUMAGARH T.S	GUMAGARH RF	GUMG1	751.83
PHULBANI	GUMAGARH T.S	GUMAGARH RF	GUMG2	352.62
PHULBANI	GUMAGARH T.S	GUMAGARH RF	GUMG3	486.95
PHULBANI	GUMAGARH T.S	GUMAGARH RF	GUMG4	1021.95
PHULBANI	KALABAGH T.S-1	KALABAGH RF	KLBG8	270.61
PHULBANI	KALABAGH T.S-1	KALABAGH RF	KLBG9	301.79
PHULBANI	KALABAGH T.S-1	KALABAGH RF	KLBG10	413.78
PHULBANI	KALABAGH T.S-1	KALABAGH RF	KLBG11	448.69
PHULBANI	KALABAGH T.S-1	KALABAGH RF	KLBG12	307.84
PHULBANI	KALABAGH T.S-2	KALABAGH RF	KLBG1	120.25
PHULBANI	KALABAGH T.S-2	KALABAGH EXTN PRF	KLBG1	215.68
PHULBANI	KALABAGH T.S-2	KALABAGH RF	KLBG2	348.53
PHULBANI	KALABAGH T.S-2	KALABAGH RF	KLBG3	407.09
PHULBANI	KALABAGH T.S-2	KALABAGH RF	KLBG6	416.88
PHULBANI	KALABAGH T.S-2	KALABAGH RF	KLBG7	174.37
PHULBANI	KATRINGIA T.S	KATRINGIA PRF	KTNG1	1007.95
PHULBANI	KATRINGIA T.S	KATRINGIA PRF	KTNG2	1413.91
PHULBANI	PALCHI T.S	PALCHI RF	PALC1	409.42
PHULBANI	PALCHI T.S	PALCHI RF	PALC2	637.19
PHULBANI	PALCHI T.S	PALCHI RF	PALC3	433.42
PHULBANI	PALCHI T.S	PALCHI RF	PALC4	408.87
PHULBANI	PHULBANI T.S	DARKI RF		370.57

PHULBANI	PHULBANI T.S	KALAMURI RF		60.33
PHULBANI	PHULBANI T.S	PHULBANI PRF		749.2
PHULBANI	PHULBANI T.S	GHUGHULASAHI RF		116.76
PHULBANI	PHULBANI T.S	MUSKULI RF		161.38
PHULBANI	PHULBANI T.S	PILASALUNKI WEST PRF		184.27
PHULBANI	PHULBANI T.S	PILASALUNKI EAST PRF		170.82
PHULBANI	PHULBANI T.S	BURTANG NORTH RF	BURN4-N	412.014
		Total		**15219.657**
RAIKIA	KARADA T.S	KARADA PRF	KRD1	2305.65
RAIKIA	RAIKIA T.S	GANJUGUDA A PRF	GNGU-A2	369.307
RAIKIA	RAIKIA T.S	GANJUGUDA A PRF	GNGU-A1	226.85
RAIKIA	RAIKIA T.S	MANIKESWAR PRF		557.52
RAIKIA	SIKABADI T.S	SIKABADI PRF	SKBD1	1307.402
RAIKIA	SIKABADI T.S	KARADA PRF	KRD4	1012.1
		Total		**5778.829**
		Grand Total		**91946.806**

3.6 Special objectives of management

The special objectives of Management set for this Working Circle are within the general objectives of management. These are as follows:

(i) To rehabilitate and restock the degraded forests for environmental stability in the locality.

(ii) To provide protection to the degraded forests with participation of villagers of the adjoining villages through Joint Forest Management. (J.F.M.).

(iii) To improve site quality through soil and moisture conservation measures.

(iv) To improve/restore the micro-climate and micro-edaphic conditions.

(v) To increase the biodiversity in the forest crop by encouraging natural regeneration.

(vi) To tend and improve the existing growing stock through suitable silvicultural measures in order to get better growth.

(vii) To meet the need of local people with regard to firewood and small timber to the extent possible, depending on the productivity, to ensure people's participation in protection of forests.

3.6.1 Analysis of the crop:-

In all the blocks allotted to this Working Circle, the study on vegetation, crop condition and extent of erosion, degradation has been conducted. Detailed

assessment of growing stock, biodiversity and regeneration study was carried out in all these blocks. As already mentioned, there exists variation in the crop condition in the various blocks included in this circle. These blocks require treatment to promote natural regeneration and also artificial regeneration in areas where there are permanent blanks. Simultaneously, appropriate treatment will be required to conserve soil and moisture. The growing stock of trees available in the various blocks allotted to this working circle as estimated from sample point inventory have been submitted by NRSA, Hyderabad and reflected in Stand Table .

3.6.2 Sivicultural system

The prime objective is to restock these forest blocks and to reduce biotic pressure due to which these blocks have become degraded. There will be no exploitation of mature trees except for removal of dead and uprooted trees. No formal silvicultural system is prescribed. However, to achieve major objectives, operations like regeneration cleaning, soil and moisture conservation, gap planting, block planting along with tending will be carried out. In addition to it steps will have to be taken to protect the area from grazing, theft and fire with the active support of the people, wherever possible.

3.6.3 Rotation period

As timber production is not a consideration in this working circle, no rotation period or conversion period is prescribed. However, as part of the rehabilitation treatment, high stump cutting, removal of dead, fallen trees and singling out of coppice shoots in very congested pole crop is prescribed as per site specific treatment plan is prescribed.

3.6.4 Harvestable diameters

There is no harvesting in this Working Circle.

3.6.5 Reducing factors and reduced areas

No yield is projected for the area assigned to this Working Circle. Hence no reduction Factor / Reduced area concept is applicable to this Working Circle.

3.6.6 Treatment type(Felling cycle)

This Working Circle mostly consists of forest areas degraded in varying forms and need site specific treatment. All areas may, therefore, not require uniform treatments. The areas included in this Working Circle, has been divided into six categories as reflected below:

Category 'A':

It includes areas, previously worked under Coppice system, having good sal and other principal species, which require singling out of coppice shoots, removal of high stumps, climber cutting, pruning and other tending operations. These types of areas are prominently seen in Bandhagada 'A' PRF, Kelapada 'A' PRF, Kelapada 'B' PRF, Kelapada 'C' PRF, Kalamuri RF, Dakapala 'A' RF, Dakapala 'B' RF.

Category 'B':

It includes areas of sal-rooted waste and requires tending operations. Such areas are prominently seen in Kanabagedi RF, Godingia RF, Musukuli RF, Ganjuguda 'A' PRF forest blocks.

Category 'C':

It includes areas completely devoid of vegetation or with scanty forest growth, where soil conservation and planting operation are mainly required. These areas are seen in Rotingia RF, Sujeli RF, Raikia RF, Sikabadi PRF.

Category 'D':

It includes hill slopes completely devoid of vegetation or with scanty forest growth, highly infested by obnoxious weeds which can be restocked with fast growing species after taking up deweeding operation. The forest blocks coming under this category are Katingia PRF, Bakingia PRF, Karada PRF.

Category 'E':

It includes areas already planted up, but plantations are in bad condition and require tending operations. It is prominently seen in forest blocks like Musukuli RF, GhugulaSahi RF, Khaumunda RF, Gerupada 'E' RF, Gerupada 'W' RF.

Category 'F':

It includes Teak plantations, which have been neglected without any silvicultural operation since long and require tending and re-planting. The forest

blocks like Pukulingia RF, Malikpada PRF, Ranipathar RF are included in this category.

3.6.7. Division into periods and allotment to periodic blocks (PB)

Not related to this Division.

3.6.8. Calculation of the yield(Rehabilitation treatment)

3.6.8.1.Proposed treatment for different category areas:

3.6.8.1.1 Operations in category A & B areas:

Since it includes areas having good coppice regeneration of sal and miscellaneous species and sal-rooted waste, the following operations shall be taken up.

(a) Cutting of high stumps flush to ground level.
(b) Singling out of all coppice shoots.
(c) Cutting of all climbers.
(d) 'C' grade thinning in congested patches, which shall include removal of dead, diseased, defective trees without making gaps in the canopy.
(e) Suitable soil conservation measures like gully plugging, contour trenching, staggered trenching, check damming and contour bunding shall be taken up.
(f) Planting of two-year-old seedlings preferably of fruit bearing, NTFP yielding species and bamboo in the gaps, which are more than 0.4 Ha in size.
(g) Removal of weeds.

3.6.8.1.2 Operations in Category 'C' areas:

Since it includes barren eroded area without much vegetation, the following site-specific operations shall be taken up.

(a) Digging of pits having size 45cm X 45cm X 45cm at a spacing of 2.5m X 2.5m.
(b) In less eroded plain areas *Acaciaauriculiformis, Eucalyptus hybrid, Cassia siamea*, Neem, Jamu, Siris shall be planted. Piasal, Gambhari, Asan, Semal, Jamu, Mahula shall be planted in the fertile area which are devoid of vegetation. In the highly eroded areas with black cotton soil, species like Babul, Khair, Rohini, Eucalyptus and Cassia siamea shall be planted. In the water-logged areas and on the banks of streams, nallas, species like Jamu,

Arjuna, Neem, Karanja shall be planted. Plantable size seedlings of Mango, Jackfruit, Sitaphal, char, Mahula, Tamarind, Aonla etc. shall be mixed with above species. Sabai grass slips shall be planted on highly eroded areas without any vegetation.

(c) Casualty replacement, weeding, soil working and manuring shall be taken up in the first and second year of plantation and pruning shall be carried out in the third year.

(d) Suitable soil conservation measures like half-moon trench, mulching, contour bonding, staggered trenches, check dams etc. shall be taken up, depending upon the terrain and undulation of slope.

(e) Planting of bamboo will be taken up wherever possible.

(f) Removal of weeds.

3.6.8.1.3 Operations in Category 'D' areas:

Since these areas consist of barren hills, the following treatments are proposed.

(a) Suitable soil conservation measures shall be taken up like gully plugging, staggered trenches, contour bonding and check damming depending upon the terrain.

(b) The existing scrub vegetation, if any, shall not be disturbed but shall be supplemented by tree planting. Staggered contour trenches of 2.0m (length) X 0.5m (depth) X 0.5m (width) shall be dug (approximately 60 trenches/ha). They shall be half filled, sloping inwards to hold water and sown with leguminous species, grasses and other soil binding species. Pits of size 45 cm X 45 cm X 45 cm shall be made in between the spaces and filled with good local soil mixed with farmyard manure after removing stone pebbles. Suitable site specific species shall be planted in the pits. Gully plugging and nalla bonding shall be carried out by using loose rubbles and wire-mesh, wherever necessary.

(c) The beds of gullies shall be planted with the species like Sabai grass, Agave, Acacia, Ailanthus excelsa. In areas having more than 15^0 slope, species like Bamboo, Acacia, Cassia, Sisoo, Siris etc. with Agave and Sabai grass will be planted in the intervening spaces of contour trenches.

(d) Removal of weeds.

3.6.8.1.4 Operations in Category 'E' areas:

Necessary tending and thinning operations shall be taken up depending upon the crop condition. The thinning and tending materials shall be handed over to the people for their bona fide domestic use. If any village forest protection committee or VSS protects the area, the materials will be delivered to them to meet their demands of firewood and small timber along with maintenance of records in the aspect of outturn. In places where there is high infestation of weeds, specific weed removal operation are to be taken up.

3.6.8.1.5 Operations in category 'F' areas:

In the case of natural Teak forests, the area is much limited. Here, the matured and over matured trees shall be removed in one year followed by improvement operations in a 5-year cycle. Regeneration by natural means is a continuous process and requires constant tending. As the species is a strong light demander, the pole and sapling crop shall require thinning.In places where there is high infestation of weeds, specific weed removal operation are to be taken up.

3.6.8.1.6Treatment Plan:

A site specific treatmentplan has to be developed before any treatment is taken up. Microplans for VSS allotted areas should be consulted in case the VSS allotted areas form part of the rehabilitation treatment area. These site specific treatment plans will be made in order as to achieve the major objectives of management of this Working Circle. The concerned Range Officer shall prepare an annual Treatment plan in the 0^{th} year but will cover the treatment to be taken up at the site in the next 3-4 years. The plan shall include all vital information like:

- **a)** Site identification i.e. Forest block/ Compartment. No.
- **b)** Area and Treatment Map.
- **c)** Site category (i.e. Category I, II).
- **d)** Site characteristics (terrain, slope, drainage, soil type and depth).
- **e)** Vegetation and extent of regeneration.
- **f)** Extent of degradation of site/vegetation.
- **g)** Year of operations (including maintenance, if any).
- **h)** Major operations to be undertaken.
- **i)** Cost norms and a calendar of operations.

3.6.8.1.7 The Treatment Plan shall also include provisions for monitoring of the execution of operations, e.g. operations actually performed, costs incurred, time schedule followed and the overall results of operations. The ACF shall check the annual action plan and it will be approved by the DFO. Range wise abstract of treatment plans will be sent to the Conservator of Forests for information.

3.6.9 Table of Annual treatment areas

Year	Coupe No.	Range	Forest Block	Status	Compartment No.	Area in ha	
						Compt. Area	Coupe Area
BAGHANADI TREATMENT SERIES –(1)							
2021-22	BAG1-I	PHIRINGIA	BAGHANADI RF	RF	BAGH14	237.2	237.2
2022-23	BAG1-II	PHIRINGIA	BAGHANADI RF	RF	BAGH14	179.54	179.54
2023-24	BAG1-III	PHIRINGIA	BAGHANADI RF	RF	BAGH14	234.06	234.06
2024-25	BAG1-IV	PHIRINGIA	BAGHANADI RF	RF	BAGH14	161.25	161.25
2025-26	BAG1-V	PHIRINGIA	BAGHANADI RF	RF	BAGH14	188.29	188.29
2026-27	BAG1-VI	PHIRINGIA	BAGHANADI RF	RF	BAGH14	167.57	167.57
2027-28	BAG1-VII	PHIRINGIA	BAGHANADI RF	RF	BAGH1	187.16	187.16
2028-29	BAG1-VIII	PHIRINGIA	BAGHANADI RF	RF	BAGH1	172.84	172.84
2029-30	BAG1-IX	PHIRINGIA	BAGHANADI RF	RF	BAGH1	262.78	262.78
2030-31	BAG1-X	PHIRINGIA	BAGHANADI RF	RF	BAGH1	167.216	167.216
					TOTAL	**1957.906**	**1957.906**
BAGHANADI TREATMENT SERIES- (2)							
2021-22	BAG2-I	PHIRINGIA	BAGHANADI RF	RF	BAGH9	346	346
2022-23	BAG2-II	PHIRINGIA	BAGHANADI RF	RF	BAGH9	186.216	186.216
2023-24	BAG2-III	PHIRINGIA	BAGHANADI RF	RF	BAGH9	210.11	210.11
2024-25	BAG2-IV	PHIRINGIA	BAGHANADI RF	RF	BAGH9	241.33	241.33
2025-26	BAG2-V	PHIRINGIA	BAGHANADI RF	RF	BAGH9	123.88	123.88
2026-27	BAG2-VI	PHIRINGIA	BAGHANADI RF	RF	BAGH9	33.5	162.94
						129.44	
2027-28	BAG2-VII	PHIRINGIA	BALANDAPADA NORTH PRF	PRF	BPD-N1	186.22	186.22
2028-29	BAG2-VIII	PHIRINGIA	BALANDAPADA NORTH PRF	PRF	BPD-N1	188.54	188.54
2029-30	BAG2-IX	PHIRINGIA	BALANDAPADA NORTH PRF	PRF	BPD-N1	155.34	155.34
2030-31	BAG2-X	PHIRINGIA	BALANDAPADA NORTH PRF	PRF	BPD-N1	177.98	177.98
					TOTAL	**1978.556**	**1978.556**
BAGHANADI TREATMENT SERIES- (3)							
2021-22	BAG3-I	PHIRINGIA	BAGHANADI RF	**RF**	BAGH11	145.88	226.29

		PHIRINGIA	BAGHANADI RF	**RF**	BAGH11	80.41	
2022-23	BAG3-II	PHIRINGIA	BAGHANADI RF	**RF**	BAGH12	283.58	283.58
2023-24	BAG3-III	PHIRINGIA	BAGHANADI RF	**RF**	BAGH11	80.8	227.6
		PHIRINGIA	BAGHANADI RF	**RF**	BAGH12	146.8	
2024-25	BAG3-IV	PHIRINGIA	BAGHANADI RF	**RF**	BAGH13	175.045	175.045
2025-26	BAG3-V	PHIRINGIA	BAGHANADI RF	**RF**	BAGH13	187.42	187.42
2026-27	BAG3-VI	PHIRINGIA	BAGHANADI RF	**RF**	BAGH13	81.84	260.35
		PHIRINGIA	BAGHANADI RF	**RF**	BAGH13	178.51	
2017-18	BAG3-VII	PHIRINGIA	BAGHANADI RF	**RF**	BAGH10	195.76	195.76
2018-19	BAG3-VIII	PHIRINGIA	BAGHANADI RF	**RF**	BAGH10	287.87	287.87
2019-20	BAG3-IX	PHIRINGIA	BAGHANADI RF	**RF**	BAGH10	232.66	232.66
2020-21	BAG3-X	PHIRINGIA	BAGHANADI RF	**RF**	BAGH10	257.52	257.52
			Total			**2334.095**	**2334.095**
BAGHANADI TREATMENT SERIES –(4)							
2021-22	BAG4-I	PHIRINGIA	BAGHANADI RF	RF	BAGH4	222.86	222.86
2022-23	BAG4-II	PHIRINGIA	BAGHANADI RF	RF	BAGH4	267.55	267.55
2023-24	BAG4-III	PHIRINGIA	BAGHANADI RF	RF	BAGH4	240.24	240.24
2024-25	BAG4-IV	PHIRINGIA	BAGHANADI RF	RF	BAGH5	188	188
2025-26	BAG4-V	PHIRINGIA	BAGHANADI RF	RF	BAGH5	206.94	206.94
2026-27	BAG4-VI	PHIRINGIA	BAGHANADI RF	RF	BAGH5	138.93	138.93
2027-28	BAG4-VII	PHIRINGIA	BAGHANADI RF	RF	BAGH2	260.79	260.79
2028-29	BAG4-VIII	PHIRINGIA	BAGHANADI RF	RF	BAGH2	201.88	201.88
2029-30	BAG4-IX	PHIRINGIA	BAGHANADI RF	RF	BAGH3	180.58	180.58
2030-31	BAG4-X	PHIRINGIA	BAGHANADI RF	RF	BAGH3	204.57	204.57
			Total			**2112.34**	**2112.34**
BAGHANADI TREATMENT SERIES-(5)							
2021-22	BAG5-I	PHIRINGIA	BAGHANADI RF	RF	BAGH7	160.83	160.83
2022-23	BAG5-II	PHIRINGIA	BAGHANADI RF	RF	BAGH7	201.74	201.74
2023-24	BAG5-III	PHIRINGIA	BAGHANADI RF	RF	BAGH8	181.84	181.84
2024-25	BAG5-IV	PHIRINGIA	BAGHANADI RF	RF	BAGH8	218.28	218.28
2025-26	BAG5-V	PHIRINGIA	BAGHANADI RF	RF	BAGH8	174.29	174.29
2026-27	BAG5-VI	PHIRINGIA	BAGHANADI RF	RF	BAGH8	245.27	245.27

2027-28	BAG5-VII	PHIRINGIA	BAGHANADI RF	RF	BAGH6	191.32	191.32
2028-29	BAG5-VIII	PHIRINGIA	BAGHANADI RF	RF	BAGH6	232.78	232.78
2029-30	BAG5-IX	PHIRINGIA	BAGHANADI RF	RF	BAGH6	63.72	185.22
		PHIRINGIA	BAGHANADI RF	RF	BAGH7	121.5	
2030-31	BAG5-X	PHIRINGIA	BAGHANADI RF	RF	BAGH7	180.31	180.31
			Total			**1971.88**	**1971.88**
BALANDAPADA TREATMENT SERIES –(1)							
2021-22	BLP1-I	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S1	166.93	166.93
2022-23	BLP1-II	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S1	145.34	145.34
2023-24	BLP1-III	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S1	211.86	211.86
2024-25	BLP1-IV	PHIRINGIA	BALANDAPADA NORTH PRF	PRF	BPD-N2	141.255	141.255
2025-26	BLP1-V	PHIRINGIA	BALANDAPADA NORTH PRF	PRF	BPD-N2	136.63	136.63
2026-27	BLP1-VI	PHIRINGIA	BALANDAPADA NORTH PRF	PRF	BPD-N2	232.53	232.53
2027-28	BLP1-VII	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S1	287.26	287.26
2028-29	BLP1-VIII	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S1	246.05	246.05
2029-30	BLP1-IX	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S1	227.18	227.18
2030-31	BLP1-X	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S1	265.17	265.17
			Total			**2060.21**	**2060.21**
BALANDAPADA TREATMENT SERIES –(2)							
2021-22	BLP2-I	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S2	207.26	207.26
2022-23	BLP2-II	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S2	261.6	261.6
2023-24	BLP2-III	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S2	192.81	192.81
2024-25	BLP2-IV	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S2	147.53	147.53
2025-26	BLP2-V	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S2	224.32	224.32
2026-27	BLP2-VI	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S2	148.41	148.41
2027-28	BLP2-VII	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S2	238.74	238.74
2028-29	BLP2-VIII	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S2	246.4	246.4
2029-30	BLP2-IX	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S2	236.29	236.29
2030-31	BLP2-X	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S2	237.89	237.89
			Total			**2141.25**	**2141.25**

BALANDAPADA TREATMENT SERIES –(3)							
2021-22	BLP3-I	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S3	205.27	205.27
2022-23	BLP3-II	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S4	264.79	264.79
2023-24	BLP3-III	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S4	221.94	221.94
2024-25	BLP3-IV	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S4	179.03	179.03
2025-26	BLP3-V	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S4	136.35	136.35
2026-27	BLP3-VI	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S4	187.34	187.34
2027-28	BLP3-VII	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S3	195	195
2028-29	BLP3-VIII	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S3	152.96	152.96
2029-30	BLP3-IX	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S3	229.64	229.64
2030-31	BLP3-X	PHIRINGIA	BALANDAPADA SOUTH PRF	PRF	BPD-S3	230.68	230.68
			Total			**2003.00**	**2003.00**
BANDHAGARH TREATMENT SERIES (1)							
2021-22	BND1-I	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH4	141.06	141.06
2022-23	BND1-II	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH4	237.34	237.34
2023-24	BND1-III	G.UDAYAGIRI	GODINGIA-A RF	RF		198.56	198.56
2024-25	BND1-IV	G.UDAYAGIRI	GODINGIA-A RF	RF		164.97	164.97
2025-26	BND1-V	G.UDAYAGIRI	GODINGIA-A RF	RF		194.39	194.39
2026-27	BND1-VI	G.UDAYAGIRI	GODINGIA-A RF	RF		161.87	161.87
2027-28	BND1-VII	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH4	199.59	199.59
2028-29	BND1-VIII	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH4	218.424	218.424
2029-30	BND1-IX	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH4	160.26	160.26
2030-31	BND1-X	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH4	139.08	139.08
		PHIRINGIA	BANDHAGARH B RF	RF		265.5	265.5
			Total			**2081.044**	**2081.044**
BANDHAGARH TREATMENT SERIES (2)							
2021-22	BND2-I	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH2	265.78	265.78
2022-23	BND2-II	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH2	298.6	298.6
2023-24	BND2-III	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH3	215.26	215.26

2024-25	BND2-IV	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH3	220.2	220.2
2025-26	BND2-V	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH3	267.47	267.47
2026-27	BND2-VI	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH3	262.3	262.3
2027-28	BND2-VII	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH1	191.28	191.28
2028-29	BND2-VIII	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH1	229.55	229.55
2029-30	BND2-IX	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH1	157.34	157.34
2030-31	BND2-X	PHIRINGIA	BANDHAGARHA A PRF	PRF	BNDH2	194.88	194.88
			Total			**2302.66**	**2302.66**
DAMINGIA TREATMENT SERIES							
2021-22	DMG-I	PHIRINGIA	LADAPADAR RF	RF	LADA1	266.9	266.90
2022-23	DMG-II	PHIRINGIA	LADAPADAR RF	RF	LADA1	73.8	282.51
		PHIRINGIA	LADAPADAR RF	RF	LADA2	208.71	
2023-24	DMG-III	PHIRINGIA	LADAPADAR RF	RF	LADA3	246.11	246.11
2024-25	DMG-IV	PHIRINGIA	LADAPADAR RF	RF	LADA4	237.9	237.90
2025-26	DMG-V	PHIRINGIA	LADAPADAR RF	RF	LADA4	212.48	212.48
2026-27	DMG-VI	PHIRINGIA	LADAPADAR RF	RF	LADA5	271.772	271.77
2027-28	DMG-VII	PHIRINGIA	DAMINGIA PRF	PRF		176.17	176.17
2028-29	DMG-VIII	PHIRINGIA	DAMINGIA PRF	PRF		268.72	268.72
2029-30	DMG-IX	PHIRINGIA	DAMINGIA PRF	PRF		342.605	342.61
2030-31	DMG-X	PHIRINGIA	DAMINGIA PRF	PRF		339.95	339.95
			Total			**2645.12**	**2645.12**
GOCHHAPADA TREATMENT SERIES –(1)							
2021-22	GHP1-I	PHIRINGIA	GOCHHAPADA RF	RF	GOCH8	238.02	238.02
2022-23	GHP1- II	PHIRINGIA	GOCHHAPADA RF	RF	GOCH8	185.42	185.42
2023-24	GHP1- III	PHIRINGIA	GOCHHAPADA RF	RF	GOCH9	238.95	238.95
2024-25	GHP1- IV	PHIRINGIA	GOCHHAPADA RF	RF	GOCH9	207.01	207.01
2025-26	GHP1- V	PHIRINGIA	GOCHHAPADA RF	RF	GOCH9	181.34	181.34
2026-27	GHP1- VI	PHIRINGIA	GOCHHAPADA RF	RF	GOCH10	264.89	264.89
2027-28	GHP1-VII	PHIRINGIA	GOCHHAPADA RF	RF	GOCH7	202.6	202.6
2028-29	GHP1-VIII	PHIRINGIA	GOCHHAPADA RF	RF	GOCH7	151.92	151.92

2029-30	GHP1-IX	PHIRINGIA	GOCHHAPADA RF	RF	GOCH7	112.599	112.599
2030-31	GHP1- X	PHIRINGIA	GOCHHAPADA RF	RF	GOCH7	208.92	208.92
			Total			**1991.669**	**1991.669**
GOCHHAPADA TREATMENT SERIES –(2)							
2021-22	GHP2-I	PHIRINGIA	GOCHHAPADA RF	RF	GOCH4	162.03	162.03
2022-23	GHP2-II	PHIRINGIA	GOCHHAPADA RF	RF	GOCH5	200.05	200.05
2023-24	GHP2-III	PHIRINGIA	GOCHHAPADA RF	RF	GOCH5	174.58	174.58
2024-25	GHP2-IV	PHIRINGIA	GOCHHAPADA RF	RF	GOCH5	139.95	139.95
2025-26	GHP2-V	PHIRINGIA	GOCHHAPADA RF	RF	GOCH6	182.6	182.6
2026-27	GHP2-VI	PHIRINGIA	GOCHHAPADA RF	RF	GOCH6	207.46	207.46
2027-28	GHP2-VII	PHIRINGIA	GOCHHAPADA RF	RF	GOCH3	200.31	200.31
2028-29	GHP2-VIII	PHIRINGIA	GOCHHAPADA RF	RF	GOCH3	208.91	208.91
2029-30	GHP2-IX	PHIRINGIA	GOCHHAPADA RF	RF	GOCH4	163.73	163.73
2030-31	GHP2-X	PHIRINGIA	GOCHHAPADA RF	RF	GOCH4	167.01	167.01
			Total			**1806.63**	**1806.63**
KERANDIBALI TREATMENT SERIES-1							
2021-22	KDB1-I	PHIRINGIA	KERANDIBALI EAST RF	RF	KERRN3-E	258.88	258.88
2022-23	KDB1-II	PHIRINGIA	KERANDIBALI EAST RF	RF	KERN4-E	131.98	221.78
	KDB1-III	PHIRINGIA	KERANDIBALI EAST RF	RF	KERN5-E	89.8	
2023-24	KDB1-IV	PHIRINGIA	KERANDIBALI EAST RF	RF	KERN4-E	188.56	188.56
2024-25	KDB1-V	PHIRINGIA	KERANDIBALI EAST RF	RF	KERN5-E	261.21	261.21
2025-26	KDB1-VI	PHIRINGIA	KERANDIBALI EAST RF	RF	KERN6-E	273.37	273.37
2026-27	KDB1-VI	PHIRINGIA	DAISARA RF	RF		214.78	214.78
2027-28	KDB1-VII	PHIRINGIA	KERANDIBALI EAST RF	RF	KERN1-E	188.03	188.03
2028-29	KDB1-VIII	PHIRINGIA	KERANDIBALI EAST RF	RF	KERN1-E	233.37	233.37
2029-30	KDB1-IX	PHIRINGIA	KERANDIBALI EAST RF	RF	KERN1-E	181.461	181.461
2030-31	KDB1-X	PHIRINGIA	KERANDIBALI EAST RF	RF	KERRN3-E	273.98	273.98
			Total			**2295.421**	**2295.421**
MALIKAPADA TREATMENT SERIES							
2021-22	MLK-I	PHIRINGIA	GOCHHAPADA RF	RF	GOCH2	163.43	163.43

2022-23	MLK-II	PHIRINGIA	GOCHHAPADA RF	RF	GOCH2	219.55	219.55
2023-24	MLK-III	PHIRINGIA	GOCHHAPADA RF	RF	GOCH2	172.07	172.07
2024-25	MLK-IV	PHIRINGIA	GOCHHAPADA RF	RF	GOCH1	221.62	221.62
2025-26	MLK-V	PHIRINGIA	GOCHHAPADA RF	RF	GOCH1	178.5	178.5
2026-27	MLK-VI	PHIRINGIA	GOCHHAPADA RF	RF	GOCH1	229.89	229.89
2027-28	MLK-VII	PHIRINGIA	MALIKAPADA PRF	RF		204.09	204.09
2028-29	MLK-VIII	PHIRINGIA	MALIKAPADA PRF	RF		133.5	133.5
2029-30	MLK-IX	PHIRINGIA	MALIKAPADA PRF	RF		173.35	173.35
2030-31	MLK-X	PHIRINGIA	MALIKAPADA PRF	RF		139.22	139.22
			Total			**1835.22**	**1835.22**
KIAMUNDA TREATMENT SERIES							
2021-22	KIMD-I	PHIRINGIA	KIAMUNDA PRF	PRF	KMD1	220.03	220.03
2022-23	KIMD-II	PHIRINGIA	KIAMUNDA PRF	PRF	KMD1	256.38	256.38
2023-24	KIMD-III	PHIRINGIA	KIAMUNDA PRF	PRF	KMD1	194	194
2024-25	KIMD-IV	PHIRINGIA	KIAMUNDA PRF	PRF	KMD1	172.78	172.78
2025-26	KIMD-V	PHIRINGIA	KIAMUNDA PRF	PRF	KMD1	191.47	191.47
2026-27	KIMD-VI	PHIRINGIA	KIAMUNDA PRF	PRF	KMD1	175.686	175.686
2027-28	KIMD-VII	PHIRINGIA	KIAMUNDA PRF	PRF	KMD1	163.43	163.43
2028-29	KIMD-VIII	PHIRINGIA	KIAMUNDA PRF	PRF	KMD1	177.49	177.49
2029-30	KIMD-IX	PHIRINGIA	KIAMUNDA PRF	PRF	KMD1	246.82	246.82
2030-31	KIMD-X	PHIRINGIA	KIAMUNDA PRF	PRF	KMD1	151.45	151.45
			Total			**1949.536**	**1949.536**
KERANDIBALI TREATMENT SERIES –(2)							
2021-22	KRD2-I	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN4-W	198.26	198.26
2022-23	KRD2-II	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN4-W	271.78	271.78
2023-24	KRD2-III	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN4-W	214.72	214.72
2024-25	KRD2-IV	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN6-W	169.39	169.39
2025-26	KRD2-V	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN6-W	230.63	230.63
2026-27	KRD2-VI	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN6-W	271.75	271.75
2027-28	KRD2-VII	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN3-W	191.26	191.26

2028-29	KRD2-VIII	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN3-W	181.78	181.78
2029-30	KRD2-IX	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN4-W	305.39	305.39
2030-31	KRD2-X	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN4-W	219.54	219.54
			Total			**2254.5**	**2254.5**
SADINGIA TREATMENT SERIES							
2021-22	SDN-I	PHIRINGIA	NUAPADAR RF	RF		298.56	298.56
2022-23	SDN-II	PHIRINGIA	NUAPADAR RF	RF		327.16	327.16
2023-24	SDN-III	PHIRINGIA	SADINGIA RF	RF	SADI 1	403.27	403.27
2024-25	SDN-IV	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN5-W	401.23	401.23
2025-26	SDN-V	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN5-W	201.46	201.46
2026-27	SDN-VI	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN5-W	241	241.00
2027-28	SDN-VII	PHIRINGIA	DAMINGIA EXTN PRF	PRF		182.43	182.43
2028-29	SDN-VIII	PHIRINGIA	DAMINGIA EXTN PRF	PRF		172.65	172.65
2029-30	SDN-IX	PHIRINGIA	DAMINGIA EXTN PRF	PRF		250.14	250.14
2030-31	SDN-X	PHIRINGIA	SADINGIA RF	RF	SADI2	333.92	333.92
			Total			**2811.82**	**2811.82**
KERANDIBALI TREATMET SERIES –(3)							
2021-22	KRD3-I	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN1-W	203.44	203.44
2022-23	KRD3-II	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN1-W	159.39	159.39
2023-24	KRD3-III	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN7-W	134.32	134.32
2024-25	KRD3-IV	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN7-W	169.68	169.68
2025-26	KRD3-V	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN7-W	239.95	239.95
2026-27	KRD3-VI	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN7-W	188.69	188.69
2027-28	KRD3-VII	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN2-W	199.15	199.15
2028-29	KRD3-VIII	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN2-W	190.28	190.28
2029-30	KRD3-IX	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN2-W	181.73	181.73
2030-31	KRD3-X	PHIRINGIA	KERANDIBALI WEST RF	RF	KERN1-W	192.71	192.71
			Total			**1859.34**	**1859.34**
BAKINGIA TREATMENT SERIES							
2021-22	BKN-I	G.UDAYAGIRI	BAKINGIA PRF	PRF	BKG2	178.3	178.3

2022-23	BKN-II	G.UDAYAGIRI	BAKINGIA PRF	PRF	BKG2	154.88	154.88
2023-24	BKN-III	G.UDAYAGIRI	BAKINGIA PRF	PRF	BKG1	90.24	90.24
2024-25	BKN-IV	G.UDAYAGIRI	BAKINGIA PRF	PRF	BKG1	108.422	108.422
2025-26	BKN-V	G.UDAYAGIRI	BAKINGIA PRF	PRF	BKG1	193.65	193.65
2026-27	BKN-VI	G.UDAYAGIRI	BAKINGIA PRF	PRF	BKG1	207.65	207.65
2027-28	BKN-VII	G.UDAYAGIRI	BAKINGIA PRF	PRF	BKG2	219.71	219.71
2028-29	BKN-VIII	G.UDAYAGIRI	BAKINGIA PRF	PRF	BKG2	156.15	156.15
2029-30	BKN-IX	G.UDAYAGIRI	BAKINGIA PRF	PRF	BKG2	154.278	154.278
2030-31	BKN-X	G.UDAYAGIRI	BAKINGIA PRF	PRF	BKG2	253.65	253.65
			Total			**1716.93**	**1716.93**
KATINGIA TREATMENT SERIES-1							
2021-22	KTN1-I	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG1	165.17	165.17
2022-23	KTN1-II	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG1	138.212	138.212
2023-24	KTN1-III	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG1	260.83	260.83
2024-25	KTN1-IV	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG1	215.8	215.8
2025-26	KTN1-V	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG1	101.34	101.34
	KTN1-VI	G.UDAYAGIRI	GIDIPABALI RF	RF		120.05	120.05
2026-27	KTN1-VII	G.UDAYAGIRI	GIDIPABALI RF	RF		206.24	206.24
2027-28	KTN1-VIII	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG1	211.87	211.87
2028-29	KTN1-IX	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG1	281.05	281.05
2029-30	KTN1-IX	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG1	191.17	191.17
2030-31	KTN1-X	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG1	207.99	207.99
			Total			**2099.72**	**2099.72**
KATINGIA TREATMENT SERIES –(2)							
2021-22	KTN2-I	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG2	169.18	169.18
2022-23	KTN2-II	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG2	202.12	202.12
2023-24	KTN2-III	G.UDAYAGIRI	DAKPALLA RF	RF		265.89	265.89
2024-25	KTN2-V	G.UDAYAGIRI	PUKULINGIA RF	RF		149.47	149.47
2025-26	KTN2-VI	G.UDAYAGIRI	ROTINGIA RF	RF		116.31	116.31
2026-27	KTN2-VII	G.UDAYAGIRI	KURMINGIA RF	RF		119.99	119.99
	KTN2-VIII	G.UDAYAGIRI	SUJELI RF	RF		53.75	53.75

2027-28	KTN2-IX	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG2	281.75	281.75
2028-29	KTN2-IX	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG2	180.46	180.46
2029-30	KTN2-X	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG2	208.49	208.49
2030-31	KTN2-X	G.UDAYAGIRI	KATINGIA PRF	PRF	KTG2	275.1	275.1
			Total			**2022.51**	**2022.51**
PABURIA TREATMENT SERIES							
2021-22	PBR-I	G.UDAYAGIRI	PABURIA PRF	PRF	PBR1	214.76	214.76
2022-23	PBR-II	G.UDAYAGIRI	PABURIA PRF	PRF	PBR1	291.93	291.93
2023-24	PBR-III	G.UDAYAGIRI	PABURIA PRF	PRF	PBR1	176.7	176.7
2024-25	PBR-IV	G.UDAYAGIRI	GODINGIA B RF	RF		279.647	279.647
2025-26	PBR-V	G.UDAYAGIRI	GODINGIA B RF	RF		289.25	289.25
2026-27	PBR-VI	G.UDAYAGIRI	GODINGIA B RF	RF		165.17	165.17
2027-28	PBR-VII	G.UDAYAGIRI	PABURIA PRF	PRF	PBR2	123.04	123.04
2028-29	PBR-VIII	G.UDAYAGIRI	PABURIA PRF	PRF	PBR2	169.696	169.696
2029-30	PBR-IX	G.UDAYAGIRI	PABURIA PRF	PRF	PBR2	162.777	162.777
2030-31	PBR-X	G.UDAYAGIRI	PABURIA PRF	PRF	PBR1	191.242	191.242
			Total			**2064.212**	**2064.212**
PODANGI TREATMENT SERIES							
2021-22	PDN-I	G.UDAYAGIRI	PADANGI RF	RF		165.8	165.8
2022-23	PDN-II	G.UDAYAGIRI	PADANGI RF	RF		186.67	186.67
2023-24	PDN-III	G.UDAYAGIRI	PADANGI RF	RF		231.35	231.35
2024-25	PDN-IV	G.UDAYAGIRI	PADANGI RF	RF		152.43	152.43
2025-26	PDN-V	G.UDAYAGIRI	PADANGI RF	RF		157.29	157.29
2026-27	PDN-VI	G.UDAYAGIRI	PADANGI RF	RF		181.39	181.39
2027-28	PDN-VII	G.UDAYAGIRI	PADANGI RF	RF		174.06	174.06
2028-29	PDN-VIII	G.UDAYAGIRI	PADANGI RF	RF		187.12	187.12
2029-30	PDN-IX	G.UDAYAGIRI	PADANGI RF	RF		193.34	193.34
2030-31	PDN-X	G.UDAYAGIRI	PADANGI RF	RF		212.99	212.99
			Total			**1842.44**	**1842.44**
TALARIMAHA TREATMENT SERIES							
2021-22	TLM-I	G.UDAYAGIRI	TALARIMAHA PRF	PRF		173.15	173.15
2022-23	TLM-II	G.UDAYAGIRI	JOBEDI RF	RF		198.53	198.53

2023-24	TLM-III	G.UDAYAGIRI	BHANJAPADAR PRF	PRF		231.159	231.16
2024-25	TLM-IV	G.UDAYAGIRI	BHANJAPADAR PRF	PRF		314.23	314.23
2025-26	TLM-V	G.UDAYAGIRI	GOTINGIA RF	RF		81.88	81.88
2025-26	TLM-VI	G.UDAYAGIRI	BHANJAPADAR PRF	PRF		161.98	161.98
2026-27	TLM-VI	G.UDAYAGIRI	BALIAPATA RF	RF		202.17	202.17
			KALINGA SANDAL WOOD	RF		31.39	31.39
2027-28	TLM-VII	G.UDAYAGIRI	TALARIMAHA PRF	PRF		233.59	233.59
2028-29	TLM-VIII	G.UDAYAGIRI	TALARIMAHA PRF	PRF		187.06	187.06
2029-30	TLM-IX	G.UDAYAGIRI	TALARIMAHA PRF	PRF		217.89	217.89
2030-31	TLM-X	G.UDAYAGIRI	TALARIMAHA PRF	PRF		204.63	204.63
			Total			**2237.659**	**2237.659**
BURTANGA TREATMENT SERIES (1)							
2021-22	BUR1-I	TIKABALI	BURTANG SOUTH RF	RF	BURN1-S	222.11	222.11
2022-23	BUR1-II	TIKABALI	BURTANG SOUTH RF	RF	BURN1-S	143.64	143.64
2023-24	BUR1-III	TIKABALI	BURTANG SOUTH RF	RF	BURN2-S	162.43	162.43
2024-25	BUR1-IV	TIKABALI	BURTANG SOUTH RF	RF	BURN2-S	200.66	200.66
2025-26	BUR1-V	TIKABALI	BURTANG SOUTH RF	RF	BURN2-S	213.42	213.42
2026-27	BUR1-VI	TIKABALI	BURTANG SOUTH RF	RF	BURN2-S	230.45	230.45
2027-28	BUR1-VII	TIKABALI	BURTANG SOUTH RF	RF	BURN1-S	209.53	209.53
2028-29	BUR1-VIII	TIKABALI	BURTANG SOUTH RF	RF	BURN1-S	175.49	175.49
2029-30	BUR1-IX	TIKABALI	BURTANG SOUTH RF	RF	BURN1-S	122.96	122.96
2030-31	BUR1-X	TIKABALI	BURTANG SOUTH RF	RF	BURN1-S	177.41	177.41
			Total			**1858.10**	**1858.10**
BURTANGA TREATMENT SERIES –(2)							
2021-22	BUR2-I	TIKABALI	BURTANG SOUTH RF	RF	BURN3-S	239.39	239.39
2022-23	BUR2-II	TIKABALI	BURTANG SOUTH RF	RF	BURN3-S	273.48	273.48
2023-24	BUR2-III	TIKABALI	BURTANG SOUTH RF	RF	BURN4-S	232.43	232.43
2024-25	BUR2-IV	TIKABALI	BURTANG SOUTH RF	RF	BURN4-S	215.1	215.10
2025-26	BUR2-V	TIKABALI	BURTANG SOUTH RF	RF	BURN4-S	233.27	233.27
2026-27	BUR2-VI	TIKABALI	BURTANG SOUTH RF	RF	BURN4-S	183.1	183.10

2027-28	BUR2-VII	TIKABALI	BURTANG SOUTH RF	RF	BURN3-S	182.64	182.64
2028-29	BUR2-VIII	TIKABALI	BURTANG SOUTH RF	RF	BURN3-S	200.14	200.14
2029-30	BUR2-IX	TIKABALI	BURTANG SOUTH RF	RF	BURN3-S	163.85	163.85
2030-31	BUR2-X	TIKABALI	BURTANG SOUTH RF	RF	BURN3-S	140.18	140.18
			Total			**2063.58**	**2063.58**
BURTANGA TREATMENT SERIES –(3)							
2021-22	BUR3-I	TIKABALI	BURTANG SOUTH RF	RF	BURN6-S	220.93	220.93
2022-23	BUR3-II	TIKABALI	BURTANG SOUTH RF	RF	BURN6-S	184.75	184.75
2023-24	BUR3-III	TIKABALI	BURTANG SOUTH RF	PRF	BURN6-S	170.16	170.16
2024-25	BUR3-IV	TIKABALI	BARADIKIA PRF	PRF		56.09	184.74
		TIKABALI	NANDINI A PRF	PRF		81.71	
		TIKABALI	NANDINI B PRF	RF		46.94	
2025-26	BUR3-V	TIKABALI	GHUDUKAPADA R RF	PRF		199.81	199.81
2026-27	BUR3-VI	TIKABALI	MUNDULA PRF	PRF	MNDL1	146.93	146.93
2027-28	BUR3-VII	TIKABALI	MUNDULA PRF	PRF	MNDL2	128.43	128.43
2028-29	BUR3-VIII	TIKABALI	TADIPAJU PRF	PRF		195.02	195.02
2029-30	BUR3-IX	TIKABALI	TADIPAJU PRF	RF		294.18	294.18
2030-31	BUR3-X	TIKABALI	BURTANG SOUTH RF	RF	BURN6-S	243.69	243.69
			Total			**1968.64**	**1968.64**
CHAKAPAD TREATMENT SERIES							
2021-22	CPD-I	TIKABALI	CHAKAPADA RF	RF	CHKP13	276.68	276.68
2022-23	CPD-II	TIKABALI	CHAKAPADA RF	RF	CHKP13	264.73	264.73
2023-24	CPD-III	TIKABALI	CHAKAPADA RF	RF	CHKP12	272.8	272.8
2024-25	CPD-IV	TIKABALI	CHAKAPADA RF	RF	CHKP12	194.71	194.71
2025-26	CPD-V	TIKABALI	CHAKAPADA RF	RF	CHKP11	261.38	261.38
2026-27	CPD-VI	TIKABALI	CHAKAPADA RF	RF	CHKP11	206.51	206.51
2027-28	CPD-VII	TIKABALI	CHAKAPADA RF	RF	CHKP11	297.74	297.74
2028-29	CPD-VIII	TIKABALI	CHAKAPADA RF	RF	CHKP10	276.27	276.27
2029-30	CPD-IX	TIKABALI	CHAKAPADA RF	RF	CHKP10	100.07	245.64
		TIKABALI	CHAKAPADA RF	RF	CHKP10	145.57	
2030-31	CPD-X	TIKABALI	CHAKAPADA RF	RF	CHKP13	207.34	207.34
		TIKABALI	CHAKAPADA RF	RF	CHKP11	219.59	219.59
			Total			**2723.39**	**2723.39**
LAINPADA TREATMENT SERIES –(1)							
2021-22	LNP1-I	TIKABALI	LAINPADA RF	RF		140.221	140.22
2022-23	LNP1-II	TIKABALI	LAINPADA RF	RF		150.289	150.29
2023-24	LNP1-III	TIKABALI	LAINPADA RF	RF		140.54	140.54
2024-25	LNP1-IV	TIKABALI	LAINPADA RF	RF		152.67	152.67

2025-26	LNP1-V	TIKABALI	SANKARAKHOL RF	RF		229.86	229.86
2026-27	LNP1-VI	TIKABALI	SANKARAKHOL RF	RF		226.86	226.86
2027-28	LNP1-VII	TIKABALI	LAINPADA RF	RF		173.23	173.23
2028-29	LNP1-VIII	TIKABALI	LAINPADA RF	RF		181.63	181.63
2029-30	LNP1-IX	TIKABALI	LAINPADA RF	RF		203.14	203.14
2030-31	LNP1-X	TIKABALI	LAINPADA RF	RF		248.5	248.50
			Total			**1846.94**	**1846.94**
TUDUBALI TREATMENT SERIES							
2021-22	TDB-I	TIKABALI	TUDUBALI RF	RF		156.79	156.79
2022-23	TDB-II	TIKABALI	TUDUBALI RF	RF		171.966	171.966
2023-24	TDB-III	TIKABALI	TUDUBALI RF	RF		167.64	167.64
2024-25	TDB-IV	TIKABALI	TUDUBALI RF	RF		154.04	154.04
2025-26	TDB-V	TIKABALI	TUDUBALI RF	RF		106.18	106.18
2026-27	TDB-VI	TIKABALI	TUDUBALI RF	RF		87.28	87.28
2027-28	TDB-VII	TIKABALI	TUDUBALI RF	RF		159.64	159.64
2028-29	TDB-VIII	TIKABALI	TUDUBALI RF	RF		130.15	130.15
2029-30	TDB-IX	TIKABALI	TUDUBALI RF	RF		112.83	112.83
2030-31	TDB-X	TIKABALI	TUDUBALI RF	RF		133.39	133.39
			Total			**1379.906**	**1379.906**
LAINPADA TREATMENT SERIES-(2)							
2021-22	LNP2-I	TIKABALI	LAINPADA RF	RF		188.81	188.81
2022-23	LNP2-II	TIKABALI	LAINPADA RF	RF		236.07	236.07
2023-24	LNP2-III	TIKABALI	LAINPADA RF	RF		155.26	155.26
2024-25	LNP2-IV	TIKABALI	LAINPADA RF	RF		189.57	189.57
2025-26	LNP2-V	TIKABALI	LAINPADA RF	RF		165.25	165.25
2026-27	LNP2-VI	TIKABALI	LAINPADA RF	RF		128.55	128.55
2027-28	LNP2-VII	TIKABALI	RAGHAGUDA PRF	PRF		180.87	180.87
2028-29	LNP2-VIII	TIKABALI	LAINPADA RF	RF		162.39	162.39
2029-30	LNP2-IX	TIKABALI	LAINPADA RF	RF		185.53	185.53
2030-31	LNP2-X	TIKABALI	LAINPADA RF	RF		170.74	170.74
			Total			**1763.04**	**1763.04**
DONGA TREATMENT SERIES							
2021-22	DNG-I	SUDRUKUMPA	DONGA RF	RF	DONG8	107.34	285.18
	DNG-II	SUDRUKUMPA	DONGA RF	RF	DONG9	177.84	
2022-23	DNG-III	SUDRUKUMPA	DONGA RF	RF	DONG9	280.53	280.53
2023-24	DNG-IV	SUDRUKUMPA	DONGA RF	RF	DONG10	239.92	239.92
2024-25	DNG-V	SUDRUKUMPA	DONGA RF	RF	DONG10	218.88	218.88
2025-26		SUDRUKUMPA	DONGA RF	RF	DONG17	231.93	231.93
2026-27	DNG-VI	SUDRUKUMPA	DONGA RF	RF	DONG17	233.51	233.51
2027-28	DNG-VII	SUDRUKUMPA	DONGA RF	RF	DONG5	255.49	255.49
2028-29	DNG-VIII	SUDRUKUMPA	DONGA RF	RF	DONG6	194.65	194.65

2029-30	DNG-IX	SUDRUKUMPA	DONGA RF	RF	DONG6	238.39	238.39
2030-31	DNG-X	SUDRUKUMPA	DONGA RF	RF	DONG8	266.88	266.88
			Total			**2445.36**	**2445.36**
SUDURUKUMPA TREATMENT SERIES							
2021-22	SKP-I	SUDRUKUMPA	SUDURUKUMPA RF	RF	SUDK6	220.76	220.76
2022-23	SKP-II	SUDRUKUMPA	SUDURUKUMPA RF	RF	SUDK6	224.42	224.42
2023-24	SKP-III	SUDRUKUMPA	SUDURUKUMPA RF	RF	SUDK9	316.23	316.23
2024-25	SKP-IV	SUDRUKUMPA	SUDURUKUMPA RF	RF	SUDK9	198.89	198.89
2025-26	SKP-V	SUDRUKUMPA	DONGA RF	RF	DONG2	200.73	200.73
2026-27	SKP-VI	SUDRUKUMPA	DONGA RF	RF	DONG2	217.52	217.52
2027-28	SKP-VII	SUDRUKUMPA	SUDREJU RF	RF		194.16	194.16
2028-29	SKP-VIII	SUDRUKUMPA	SUDREJU RF	RF		243.39	243.39
2029-30	SKP-IX	SUDRUKUMPA	SUDURUKUMPA RF	RF	SUDK2	353.95	353.95
2030-31	SKP-IX	SUDRUKUMPA	SUDURUKUMPA RF	RF	SUDK2	399.22	399.22
			Total			**2569.27**	**2569.27**
GANJUGUDA (B) TREATMENT SERIES							
2021-22	GNGB-I	PHULBANI	KHAJURIPADA RF	RF	KHPD4	233.76	233.76
2022-23	GNGB-II	PHULBANI	KHAJURIPADA RF	RF	KHPD4	312.5	312.50
2023-24	GNGB-III	PHULBANI	KHAJURIPADA RF	RF	KHPD2	275.95	275.95
2024-25	GNGB-IV	PHULBANI	KHAJURIPADA RF	RF	KHPD2	260.31	260.31
2025-26	GNGB-V	PHULBANI	KHAJURIPADA RF	RF	KHPD1	247.04	247.04
2026-27	GNGB-VI	PHULBANI	KHAJURIPADA RF	RF	KHPD1	280.62	280.62
2027-28	GNGB-VII	PHULBANI	GANJUGUDA B PRF	PRF	GNGU-B2	272.24	272.24
2028-29	GNGB-VIII	PHULBANI	GANJUGUDA B PRF	PRF	GNGU-B2	204.65	204.65
2029-30	GNGB-IX	PHULBANI	GANJUGUDA B PRF	PRF	GNGU-B1	252.833	252.83
2030-31	GNGB-X	PHULBANI	GANJUGUDA B PRF	PRF	GNGU-B1	304.79	304.79
			Total			**2644.69**	**2644.69**
GUMAGARH TREATMENT SERIES							
2021-22	GMG-I	PHULBANI	GUMAGARH RF	RF	GUMG2	43.33	43.33
2021-22	GMG-II	PHULBANI	GUMAGARH RF	RF	GUMG3	260.18	260.18
2022-23	GMG-III	PHULBANI	GUMAGARH RF	RF	GUMG3	226.77	226.77
2023-24	GMG-IV	PHULBANI	GUMAGARH RF	RF	GUMG4	207.93	207.93
2024-25	GMG-V	PHULBANI	GUMAGARH RF	RF	GUMG4	294.61	294.61
2025-26	GMG-V	PHULBANI	GUMAGARH RF	RF	GUMG4	250.23	250.23

2026-27	GMG-VI	PHULBANI	GUMAGARH RF	RF	GUMG4	269.18	269.18
2027-28	GMG-VII	PHULBANI	GUMAGARH RF	RF	GUMG1	239.35	239.35
2028-29	GMG-VIII	PHULBANI	GUMAGARH RF	RF	GUMG1	276.62	276.62
2029-30	GMG-IX	PHULBANI	GUMAGARH RF	RF	GUMG1	235.86	235.86
2030-31	GMG-X	PHULBANI	GUMAGARH RF	RF	GUMG2	309.29	309.29
			Total			**2613.35**	**2613.35**
KALABAGH TREATMENT SERIES –(1)							
2021-22	KLBG1-I	PHULBANI	KALABAGH RF	RF	KLBG10	225.38	225.38
2022-23	KLBG1-II	PHULBANI	KALABAGH RF	RF	KLBG10	188.4	188.40
2023-24	KLBG1-III	PHULBANI	KALABAGH RF	RF	KLBG11	203.4	203.40
2024-25	KLBG1-IV	PHULBANI	KALABAGH RF	RF	KLBG11	245.29	245.29
2025-26	KLBG1-V	PHULBANI	KALABAGH RF	RF	KLBG12	169.85	169.85
2026-27	KLBG1-VI	PHULBANI	KALABAGH RF	RF	KLBG12	137.99	137.99
2027-28	KLBG1-VII	PHULBANI	KALABAGH RF	RF	KLBG9	181.4	181.40
2028-29	KLBG1-VIII	PHULBANI	KALABAGH RF	RF	KLBG9	120.39	120.39
2029-30	KLBG1-IX	PHULBANI	KALABAGH RF	RF	KLBG8	126.609	126.61
2030-31	KLBG1-X	PHULBANI	KALABAGH RF	RF	KLBG8	144	144.00
			Total			**1742.71**	**1742.71**
KALABAGHA TREATMENT SERIES –(2)							
2021-22	KLBG2-I	PHULBANI	KALABAGH RF	RF	KLBG7	174.37	174.37
2022-23	KLBG2-II	PHULBANI	KALABAGH RF	RF	KLBG3	119.98	300.47
	KLBG2-III					180.49	
2023-24	KLBG2-IV	PHULBANI	KALABAGH RF	RF	KLBG3	106.62	106.62
2024-25	KLBG2-V	PHULBANI	KALABAGH RF	RF	KLBG6	43.78	43.78
2025-26	KLBG2-VI	PHULBANI	KALABAGH RF	RF	KLBG6	199.22	199.22
2026-27		PHULBANI	KALABAGH RF	RF	KLBG6	173.88	173.88
2027-28	KLBG2-VIII	PHULBANI	KALABAG EXTN PRF	PRF	KLBG1	215.68	215.68
2028-29	KLBG2-VIII	PHULBANI	KALABAGH RF	RF	KLBG1	120.25	120.25
2029-30	KLBG2-IX	PHULBANI	KALABAGH RF	RF	KLBG2	170.5	170.50
2030-31	KLBG2-X	PHULBANI	KALABAGH RF	RF	KLBG2	178.03	178.03
			Total			**1682.80**	**1682.80**
KATRINGIA TREATMENT SERIES							
2021-22	KTR-I	PHULBANI	KATRINGIA PRF	PRF	KTNG2	254.1	254.10
2022-23	KTR-II	PHULBANI	KATRINGIA PRF	PRF	KTNG2	278.66	278.66
2023-24	KTR-III	PHULBANI	KATRINGIA PRF	PRF	KTNG2	293.35	293.35
2024-25	KTR-IV	PHULBANI	KATRINGIA PRF	PRF	KTNG2	219.34	219.34
2025-26	KTR-V	PHULBANI	KATRINGIA PRF	PRF	KTNG2	151	151.00
2026-27	KTR-VI	PHULBANI	KATRINGIA PRF	PRF	KTNG2	217.46	217.46
2027-28	KTR-VII	PHULBANI	KATRINGIA PRF	PRF	KTNG1	211.6	211.60
2028-29	KTR-VIII	PHULBANI	KATRINGIA PRF	PRF	KTNG1	218.61	218.61

2029-30	KTR-IX	PHULBANI	KATRINGIA PRF	PRF	KTNG1	302.33	302.33
2030-31	KTR-X	PHULBANI	KATRINGIA PRF	PRF	KTNG1	275.41	275.41
			Total			**2421.86**	**2421.86**
PALCHI TREATMENT SERIES							
2021-22	PALC-I	PHULBANI	PALCHI RF	RF	PALC2	168.09	168.09
2022-23	PALC-II	PHULBANI	PALCHI RF	RF	PALC2	91	91
	PALC-III				PALC3	52.19	52.19
2023-24	PALC-IV	PHULBANI	PALCHI RF	RF	PALC3	191.61	191.61
2024-25	PALC-V	PHULBANI	PALCHI RF	RF	PALC3	189.62	189.62
2025-26	PALC-VI	PHULBANI	PALCHI RF	RF	PALC4	178.38	178.38
2026-27		PHULBANI	PALCHI RF	RF	PALC4	230.49	230.49
2027-28	PALC-VII	PHULBANI	PALCHI RF	RF	PALC2	187.82	187.82
2028-29	PALC-VIII	PHULBANI	PALCHI RF	RF	PALC1	207.18	207.18
2029-30	PALC-IX	PHULBANI	PALCHI RF	RF	PALC1	202.24	202.24
2030-31	PALC-X	PHULBANI	PALCHI RF	RF	PALC2	190.28	190.28
						1888.9	**1888.9**
PHULBANI TREATMENT SERIES							
2021-22	PLB-I	PHULBANI	DARKI RF	RF		148.47	208.8
		PHULBANI	KALAMURI RF	RF		60.33	
2022-23	PLB-II	PHULBANI	PHULBANI PRF	RF		301.32	301.32
2023-24	PLB-III	PHULBANI	PHULBANI PRF	PRF		447.88	447.88
2024-25	PLB-IV	PHULBANI	DARKI RF	RF		222.1	222.1
2025-26	PLB-V	PHULBANI	GHUGHULASAHI RF	RF		116.76	116.76
2026-27	PLB-VI	PHULBANI	MUSKULI RF	RF		161.38	161.38
2027-28	PLB-VII	PHULBANI	PILASALUNKI WEST PRF	PRF		184.27	184.27
2028-29	PLB-VIII	PHULBANI	BURTANG NORTH RF	RF	BURN4-N	181.722	181.722
2029-30	PLB-IX	PHULBANI	BURTANG NORTH RF	RF	BURN4-N	230.292	230.292
2030-31	PLB-X	PHULBANI	PILASALUNKI EAST PRF	PRF		170.82	170.82
			Total			**2225.344**	**2225.344**
KARADA TREATMENT SERIES							
2021-22	KRD-I	RAIKIA	KARADA PRF	PRF	KRD1	298.54	298.54
2022-23	KRD-II	RAIKIA	KARADA PRF	PRF	KRD1	187.4	187.40
2023-24	KRD-III	RAIKIA	KARADA PRF	PRF	KRD1	219.48	219.48
2024-25	KRD-IV	RAIKIA	KARADA PRF	PRF	KRD1	290.2	290.20
2025-26	KRD-V	RAIKIA	KARADA PRF	PRF	KRD1	224.2	224.20
2026-27	KRD-VI	RAIKIA	KARADA PRF	PRF	KRD1	183.33	183.33
2027-28	KRD-VII	RAIKIA	KARADA PRF	PRF	KRD1	216.71	216.71
2028-29	KRD-VIII	RAIKIA	KARADA PRF	PRF	KRD1	253.25	253.25
2029-30	KRD-IX	RAIKIA	KARADA PRF	PRF	KRD1	190.75	190.75

2030-31	KRD-X	RAIKIA	KARADA PRF	PRF	KRD1	241.79	241.79
			Total			**2305.65**	**2305.65**
RAIKIA TREATMENT SERIES							
2021-22	RAK-I	RAIKIA	GANJUGUDA A PRF	PRF	GNGU-A2	120.157	120.157
2022-23	RAK-II	RAIKIA	GANJUGUDA A PRF	PRF	GNGU-A2	147.35	147.35
2023-24	RAK-III	RAIKIA	GANJUGUDA A PRF	PRF	GNGU-A1	80.84	80.84
2024-25	RAK-IV	RAIKIA	GANJUGUDA A PRF	PRF	GNGU-A2	101.8	101.8
2025-26	RAK-V	RAIKIA	GANJUGUDA A PRF	PRF	GNGU-A1	146.01	146.01
2026-27	RAK-VI	RAIKIA	MANIKESWAR PRF	PRF		112.00	112.00
2027-28	RAK-VII	RAIKIA	MANIKESWAR PRF	PRF		112.00	112.00
2028-29	RAK-VIII	RAIKIA	MANIKESWAR PRF	PRF		112.00	112.00
2029-30	RAK-IX	RAIKIA	MANIKESWAR PRF	PRF		110.00	110.00
2030-31	RAK-X	RAIKIA	MANIKESWAR PRF	PRF		111.52	111.52
			Total			**1153.68**	**1153.68**
SIKABADI TREATMENT SERIES							
2021-22	SKD-I	RAIKIA	SIKABADI PRF	PRF	SKBD1	185.26	185.26
2022-23	SKD-II	RAIKIA	SIKABADI PRF	PRF	SKBD1	176.01	176.01
2023-24	SKD-III	RAIKIA	KARADA PRF	RF	KRD4	219.68	219.68
2024-25	SKD-IV	RAIKIA	KARADA PRF	PRF	KRD4	265.38	265.38
2025-26	SKD-V	RAIKIA	KARADA PRF	PRF	KRD4	250.54	250.54
2026-27	SKD-VI	RAIKIA	KARADA PRF	PRF	KRD4	276.5	276.5
2027-28	SKD-VII	RAIKIA	SIKABADI PRF	PRF	SKBD1	261.802	261.802
2028-29	SKD-VIII	RAIKIA	SIKABADI PRF	PRF	SKBD1	201.77	201.77
2029-30	SKD-IX	RAIKIA	SIKABADI PRF	PRF	SKBD1	245.5	245.5
2030-31	SKD-X	RAIKIA	SIKABADI PRF	PRF	SKBD1	237.06	237.06
			Total			**2319.502**	**2319.502**
				Grand Total		**91946.79**	**91946.79**

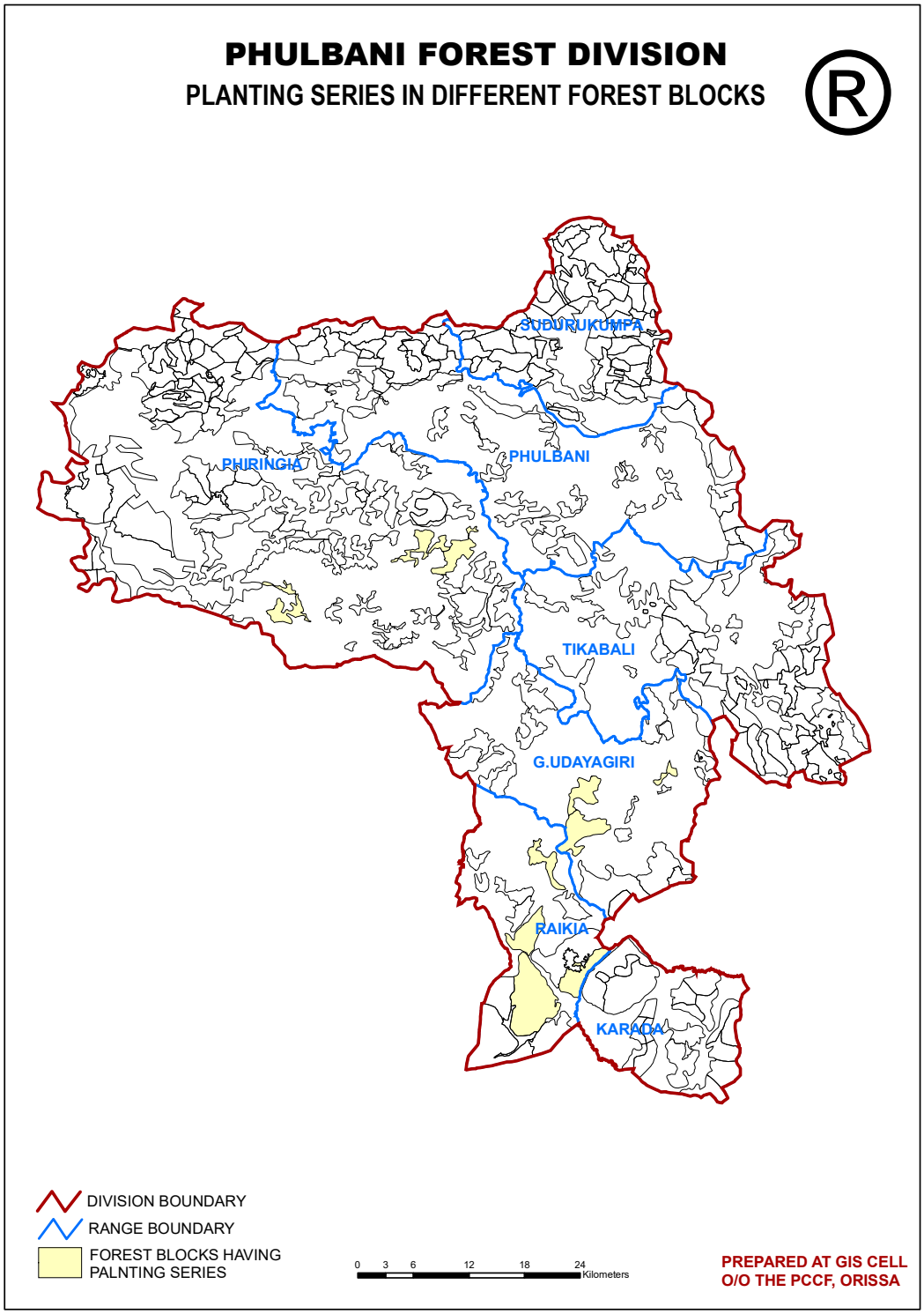
3.6.10 method of executing the felling

No felling in this Working Circle.

CHAPTER-4

THE PLANTATION WORKING CIRCLE

4.1



4.2 General Constitution of Working Circle:-

4.2.1. Continued exploitation of natural resources due to human and livestock demands, depletion of forest cover and loss of biodiversity, has resulted in serious land degradation in the Division. The non-arable waste lands of the Division usually suffer from one or more problems such as low nutrient status, eroded topsoil, difficult land surfaces like ravines, gullies, torrents, lack of soil moisture, development of soil toxicity or poor soil physical conditions. The problems may be inherent to the site but in a majority of the cases these have been formed due to persistent biotic disturbances (excessive grazing, biomass extraction and consequent absence of natural vegetation/regeneration).

4.2.2. This working circle includes all those blocks that have permanent blanks and barren land, which are devoid of root stock and natural regeneration. Also included under this Working Circle are the old existing plantations raised during and/or prior to the outgoing plan period.

4.2.3. Broadly three categories of lands are covered under this Working Circle as detailed below:

1. The first is that of blank areas which require artificial regeneration/plantation.
2. The second covers old plantation areas which need only protection and tending/thinning operations exclusively available pure teak plantations.
   Both the above categories constitute a total area of **3176.8** Ha.

Type of Forest	Area under Plantation in ha.	Area under Tending in ha.	Total area in ha.
RF	140	770	910
PRF	325	877	1202
VF	78	986.8	1064.8
Total	**543**	**2633.8**	**3176.8**

3. Miscellaneous plantations having adequate natural regeneration of Sal and its associates

4.3General Characteristics of vegetation:-

4.3.1. Opening of canopy followed by increased insulation of the soil surface has slowed downed the rate of organic matter build-up and increased dryness of the soil has resulted in failure of natural regeneration in many forest areas of the Division. Such areas undergo further damage due to annual lopping patterns, removal of woody biomass for firewood and trampling by free grazing animals that effectively and phenomenally destroy natural regeneration. Due to these uncontrolled factors majority of forest cover of the Division has retrogressed to early successional stages, light demanding species and even aged species dominate, while all aged populations becoming rare to observe. The resulting forest fragmentation is associated with plant and animal depletion, damage to the eco-system and loss of biodiversity. Firstly, this is due to reduction in the net area of natural habitat available and secondly, creation of forest patches that are at a distance from each other which prevents movement of plant propagules and animals through forest corridors.

4.3.2. In order to hasten vegetation recovery in such sites, it is often necessary to artificially introduce suitable tree and grass species that will allow natural recovery process to begin with. Forest plantations of indigenous or exotic species play a positive role towards eco-system rehabilitation by facilitating direct natural successional processes. Several studies have indicated that plantations adapted to harsh conditions of degraded sites, reverse the process of degradation processes by stabilizing soils, increasing organic matter, moderation of plantation and improvement of soil fertility and amelioration of problems of soils. Through their localized effects on microclimatic and biotic conditions, these plantations facilitate recruitment, survival and growth of native tree species in the under storey, thus acting as "**fosterecosystem**".

4.3.3. Management of plantations has become increasingly more intensive with the introduction of fast growing species, including genetically improved planting stock. The plantation programmes as of now not only aim at improving the forest cover but also to extend such resource base for meeting the requirement of the people as well as forest based industries.

4.3.4. Achievement of Block plantation during last working plan period 2007-08 to 2017-18 is 740 hect and bamboo plantation 315 hect. The details are reflected below in a tabular format:

Table No.- PWC-1 Achievement of Block Plantation in Phulbani Forest Division					
Year	**Scheme**	**Range**	**Site**	**Area (ha.)**	**Remarks**
2007-08	4406-SP-B.Economic Plntn.	G.Udayagiri	Ratingia RF	15	
			Padangi RF	15	
		Raikia	Dibari RF	20	
			Total	**50**	
2010-11	CAMPA-APO-2009-10	Phulbani	Dadaki	15	
			Jhampi	20	
			Panaspadar	15	
		Phiringia	Derakumpa	20	
			Sadingia	10	
		Sudrukumpa	Adimunda	20	
			Kurteli	20	
		Raikia	Lendrikia	10	
			Raikia	10	
			Budhiapanga	20	
		Tikabali	Ragaguda PRF	50	
			Tikabali RF	15	
			Takalamendi KF	5	
		Karada	Machhaghata	20	
			Total	**250**	
2011-12	13th FC Grant-SP				
	Inside WP Area	Phulbani	Balaskumpa RF	10	
		Phiringia	Bandhagada"A" PRF	20	
			Sadingia RF	20	
		G.Udayagiri	Padangi RF	10	
		Tikabali	Chakapad RF	20	
		Karada	Baraba RF	20	
			Total	**100**	
	Outside WP Area	Phulbani	R.Nuagaon	15	
		Phiringia	Sarukoi	15	
			Total	**30**	

2012-13	13th FC Grant-SP				
	Inside WP Area	Phiringia	Krandibali E RF	10	
		G.Udayagiri	Tudubali RF	10	
		Tikabali	Chakapad RF	20	
			Sankarakhole RF	10	
			Nandini A PRF	20	
		Raikia	Sikabadi PRF	20	
			Raikia RF	10	
Total				**100**	
	Outside WP Area	Phulbani	Garakumpa	17	
			R.Nuagaon	3	
		Phiringia	Katapanga	10	
		Tikabali	Brutanga	20	
2012-13	Outside WP Area	Karada	Nuagaon	10	
		Sudrukumpa	Chuchurudi	20	
			Total	**80**	
2013-14	13th FC –NP				
	Outside WP Area	Phulbani	Gedripaju	10	
		Phiringia	Saitingia	10	
		Tikabali	Rangamatia	10	
			Total	**30**	
2014-15	**13th FC Grant-NP**				
	Inside WP Area	Tikabali	Rasudi	20	
		Phiringia	Manipadar	15	
			Tanasu	15	
			Total	**50**	
	2406-SP-Economic Plntn.	Tikabali	Chakapad RF	20	
		Raikia	Sikabadi PRF (Malaguda)	10	
			Beredikia	10	
		Phiringia	Gerupada E RF	10	
			Total	**50**	
2015-16	EconmicPlntn		Laburi	50	

2015-16	CAMPA-2014-15	Phulbani	R.Nuagaon	25	
2015-16		Phiringia	Bandhagada	15	
2015-16		Tikabali	Chakapad RF	30	
2015-16		Raikia	Sikabadi RF	20	
			Total	**140**	
2016-17	UTP	Phulbani	Kutibari (Phulbani Municipality)	1.25	
2016-17	UTP	G.Udayagiri	G.Udayagiri NAC	1.25	
			Total	**2.5**	
2017-18	MGNREGS (AR)	Phiringia	Uparadamingia	6.25	
2017-18	MGNREGS (AR)	Phiringia	Seskajodi	5.625	
2017-18	MGNREGS (AR)	Phiringia	Santinagar	6.25	
2017-18	MGNREGS (AR)	Phiringia	Damaraju	6.25	
2017-18	MGNREGS (AR)	Sudurkumpa	Kuaghera	6.25	
2017-18	MGNREGS (AR)	Phiringia	Biluri	5.625	
2017-18	MGNREGS (AR)	Phiringia	Karnada	6.25	
2017-18	MGNREGS (AR)	Phiringia	Nuapadar	3.75	
2017-18	MGNREGS (AR)	Phiringia	Sakhipada	3.75	
2017-18	MGNREGS (AR)	Tikabali	Raipada	10	
2017-18	AJY	Phiringia	Jarapanga	10	
			Total	**70**	
2018-19	MGNREGS	Phiringia	Jagarpadar	6.25	
2018-19	MGNREGS	Phiringia	Shantinagar(A)	2.5	
2018-19	MGNREGS	Phiringia	Lambabadi	5	
2018-19	MGNREGS(NTFP)Mahul Plantation	Phulbani	Gudari	5	

2018-19	MGNREGS(NTFP)Mahul Plantation	Phiringia	Bhrungijodi	1	
2018-19	MGNREGS(NTFP)Mahul Plantation	Phiringia	Minia	1	
			Total	**20.75**	
2019-20	IGC-State Plan Bald Hill Plantation@1600 seedling/Ha	Phulbani	Bhaliapada RF	5	
2019-20	do	Phiringia	Kelapada A PRF	5	
2019-20	do	G.Udaygiri	Dhangadamah akF	3	
2019-20	do	G.Udaygiri	Banjamaha KF	2	
2019-20	do	Tikabali	Tikabali RF	5	
2019-20	MGNREGS-Bald Hill Plantation	Phulbani	Bhaliapada RF	5	
2019-20	do	Phiringia	Kelapada A PRF	10	
2019-20	do	G.Udaygiri	Dhangadamah a KF	3	
2019-20	do	G.Udaygiri	Banjamaha KF	4	
2019-20	do	Tikabali	Tikabali RF	10	
			Total	**52**	
2020-21	CAMPA-Bald hill pltn	Tikabali	Sunapanga	10	
2020-21	IGC	Raikia	Basantipali KF	10	
2020-21	MGNREGS-AR	Phulbani	Maniduba	3	
2020-21	MGNREGS-AR	Phulbani	Bhuktakanali	3	
2020-21	MGNREGS-AR	Phulbani	Gedripaju	4	
2020-21	MGNREGS-AR	Sudrukumpa	Bidihari	15	
2020-21	MGNREGS-AR	Tikabali	Sunapanga	10	

2020-21	MGNREGS-AR	Raikia	Kandabada	10	
2020-21	MGNREGS-AR	Raikia	Kantibana KF	15	
2020-21	MGNREGS-AR	G.Udayagiri	Retudi	5	
2020-21	MGNREGS-AR	G.Udayagiri	TalaBalumaha	5	
2020-21	MGNREGS-AR	Phiringia	Bakapali KF	10	
2020-21	MGNREGS-AR	Phiringia	Tetelpada KF	10	
2020-21	MGNREGS-AR	Tikabali	Basiamba KF	5	
2020-21	MGNREGS-AR	Tikabali	Panduli KF	4	
2020-21	MGNREGS-AR	Tikabali	Gumagarh KF	3	
2020-21	MGNREGS-AR	Tikabali	Andharakuti KF	3	
2020-21	MGNREGS-Econ.Pltn	Raikia	Lendrikia RF	10	
2020-21	MGNREGS-Econ.Pltn	Tikabali	Katimaha	5	
2020-21	MGNREGS-Econ.Pltn	Tikabali	Dasaguda KF	5	
2020-21	MGNREGS-Bald Hill Pltn	Tikabali	Sarunju KF	5	
2020-21	MGNREGS-Bald Hill Pltn	Raikia	Chunapali K.F	5	
2020-21	MGNREGS-Bald Hill Pltn	Phiringia	Kelapada A PRF	5	
			Total	**160**	

Table No. PWC-2 Achievement of Bamboo Plantation in Forest Division

Year	Scheme	Range	Site	Area (ha.)	Remarks
2008-09	NBM - CP	Tikabali	Tikabali RF	5	
		Phiringia	Gochhapada RF	10	
		Phulbani	Lamabadi KF	5	
			Total	**20**	
2011-12	2406-SP-OBDP	Phulbani	Khajuripada RF	10	
		Phiringia	Krandibali E RF	10	
			Sarakoi KF	5	
		Raikia	Karada PRF	5	
			Total	**30**	

2012-13	2406-SP-OBDP	Phulbani	Kalabagh RF	5	
		Phiringia	Baghanadi RF	5	
		G.Udayagiri	Pukulingia RF	5	
		Sudrkumpa	Danga RF	5	
		Tikabali	Sankarakhole RF	5	
		Raikia	Karada PRF	5	
			Total	**30**	
2012-13	NBM	Phulbani	Kalabagh RF	5	
		Phiringia	Gochapada RF	5	
		Raikia	Sikabadi PRF	5	
		Sudrkumpa	Danga RF	5	
		Tikabali	Sankarakhole RF	5	
		Karada	Machhaghat RF	25	
			Total	**50**	
2013-14	2406-SP-OBDP	Phulbani	Kalabagh RF	5	
		Phiringia	Balandapada PRF	5	
		Raikia	Sikabadi PRF	5	
		Tikabali	Kadapadar	5	
		Sudrkumpa	Danga RF	5	
		G.Udayagiri	Pukulingia RF	5	
			Total	**30**	
2013-14	NBM	Phulbani	Ganjuguda RF	5	
		Raikia	Sikabadi PRF	5	
		Sudrkumpa	Danga RF	5	
		Karada	Machhaghat RF	5	
			Total	**20**	
2014-15	2406-SP-OBDP	Phulbani	Gumagada RF	5	
		Phiringia	Balandapada PRF	5	
		G.Udayagiri	Bakingia PRF	5	
		Karada	Machhaghat RF	5	
		Tikabali	Lambrakhol	5	
		Raikia	Dakarabadi	5	
			Total	**30**	
2014-15	NBM	Phulbani	Kalabagh RF	40	
			Ganjuguda RF	40	
		Phiringia	Balandapada PRF	25	
			Total	105	
2015-16	OBDP-SP	Phiringia	Krandibali E RF	30	
2015-16	NBM-Forest Area	Phiringia	Krandibali E RF	20	
2015-16	NBM-Non Forest Area			15	
			Total	**65**	
2016-17	NBM	Phulbani	Kalabagh RF	30	
2016-17	NBM	Phiringia	Balandapada PRF	30	
2016-17	NBM	Tikabali	Sankarakhol	10	
2016-17	OBDP-MGNREGS	Phulbani	Khajuripada RF	15	

2016-17	OBDP-MGNREGS	Phiringia	Balandapada PRF	15	
2016-17	OBDP-MGNREGS	Phiringia	Brudiguda	0.57	
2016-17	OBDP-MGNREGS	Phiringia	Tetelpada	3.96	
2016-17	OBDP-MGNREGS	Phiringia	Derakumpa	1.265	
2016-17	OBDP-MGNREGS	Phiringia	Pipalmala	0.225	
2016-17	OBDP-MGNREGS	Phiringia	Kambapada	2.275	
2016-17	OBDP-MGNREGS	Phiringia	Mallickpada	1.815	
2016-17	OBDP-MGNREGS	Phiringia	Dangedikia	1.689	
2016-17	OBDP-MGNREGS	Phiringia	Damisahi	2.415	
2016-17	OBDP-MGNREGS	Phiringia	Dagarpadar	2.095	
2016-17	OBDP-MGNREGS	Phulbani	Pandrimendi	3.2	
2016-17	OBDP-MGNREGS	Phulbani	Rubipidia	4.8	
2016-17	OBDP-MGNREGS	Phulbani	Khaligudri	3.8	
2016-17	OBDP-MGNREGS	Phulbani	Landrupada	8	
			Total	**136.109**	
2017-18	NIL				
2018-19	NIL				
2019-20	CAMPA	Phulbani	Ganjuguda PRF	25	
2019-20	do	Phiringia	Krandibali East RF (Galesuga)	25	
2019-20	do	Tikabali	Tudubali RF	20	
			Total	**70**	
2020-21	CAMPA	Phiringia	Majhipada	20	
2020-21	MGNREGS	Phulbani	Rakadipadar	10	
2020-21	MGNREGS	Tikabali	Patharkata	10	
			Total	**50**	

4.4 Area allotment and planting series

The total area allotted to this Working Circle is 3176.8 ha. It comprises of only the plantable area. The block wise and range wise distribution of the area are reflected in following Table.

Table No.-PWC-3 Plantation Working Circle

Year	Range	Planting Series	Coupe No.	Forest Block	Status	Extent	Area in Ha.
2021-22	Raikia	Raikia	I	Raikia	RF	Part	10
2022-23			II				10
2023-24			III				10
2024-25			IV				10
2025-26			V				10
2026-27			VI	Lendrikia			10
2027-28			VII				10
2028-29			VIII				10
2029-30			IX				10
2030-31			X				10
						TOTAL	**100**
2021-22	Raikia	Karada	I	Sikabadi C/2	PRF	Part	13
2022-23			II	Sikabadi C/2			13
2023-24			III	Sikabadi C/2			13
2024-25			IV	Sikabadi C/2			13
2025-26			V	Sikabadi C/2		Bal	13
2026-27			VI	Karada C/3		Part	20
2027-28			VII	Karada C/3			20
2028-29			VIII	Karada C/3			20
2029-30			IX	Karada C/3			20
2030-31			X	Karada C/3			20
						TOTAL	**165**
2021-22	G.Udayagiri	G.Udaygiri	I	Pukulingia	RF	Part	10
2022-23			II	Pukulingia	RF		10
2023-24			III	Bakingia	PRF		20
2024-25			IV	Bakingia	PRF		20
2025-26			V	Bakingia	PRF		20
2026-27			VI	Bakingia	PRF		10
2027-28			VII	Bakingia	PRF		10
2028-29			VIII	Godagadu	VF		7
2029-30			IX	Katalnaju	VF		24
2030-31			X	Lingagada	VF		5
						TOTAL	**136**

2021-22	Phiringia	Bandha-gada	I	Bandhagada 'A' C/1	PRF	Part	20
2022-23			II	Bandhagada 'A' C/1			20
2023-24			III	Bandhagada 'A' C/2			20
2024-25			IV	Bandhagada 'A' C/2			20
2025-26			V	Nuapadar	RF		20
				Sunakhadu	VF		5
2026-27			VI	Rabingia			5
				Dangerikia			5
2027-28			VII	Jaylamba			5
2028-29			VIII	Dumuriguda			5
2029-30			IX	Rabingia			7
				Rabingia			5
2030-31			X	Saitingia			5
TOTAL							**142**
GRAND TOTAL							**543**

Table No.- PWC-4 Plantation Working Circle(Tending series)

Year	Range	Tending Series	Coupe No.	Forest Block	Status	Extent	Area in Ha.
1	2	3	4	5	6	7	8
2021-22	Phiringia	Phiringia	I	Baghanadi	RF	5	43
				Bandhagada "A"	PRF	25	
				Kumuriguda	VF	5	
				Dumuriguda	VF	5	
				Sudhasahi	VF	3	
2022-23			II	Bandhagada "A"	PRF	25	40
				Sunakhadu	VF	5	
				Rabingia	VF	5	
				Dangerikia	VF	5	
2023-24			III	Bandhagada "A"	PRF	25	38.5
				Jayalamba	VF	5	
				Gurupada	VF	5	
				Sakhipada	VF	3.5	
2024-25			IV	Bandhagada "A"	PRF	25	40
				Kilakuti	VF	5	
				Tandrigan	VF	5	
				Masripada	VF	5	
2025-26			V	Bandhagada "A"	PRF	10	45
				Balandapada "S	PRF	20	

				Nuapadar	VF	5	
				Nahangam	VF	5	
				Budhakamba	VF	5	
2026-27			VI	Balandapada "N"	PRF	55	77
				Gopipadar	VF	5	
				Dumuriguda	VF	17	
2027-28			VII	Gochhapada	RF	30	70
				Kiamunda	PRF	20	
				Badadangia	VF	20	
2028-29			VIII	Krandibali East	RF	50	68
				Saitinga	VF	10	
				Rabingia	VF	8	
2029-30			IX	Mallickpada	PRF	10	48
				Sadingia	RF	30	
				Badadangia	VF	8	
2030-31			X	Nuapadar	RF	60	70
				Rabingia	VF	5	
				Saitingia	VF	5	
					TOTAL	**539.5**	**539.5**
2021-22	Raikia	Karada	I	Lendrkia	RF	10	91
				Dibari	RF	47	
				Karada	PRF	29	
				Chunapali	VF	5	
2022-23			II	Raikia	RF	80	92
				Beredakia&Raikia	VF	12	
2023-24			III	Ganjuguda "A"	PRF	85	93
				BasantiNagar	VF	8	
2024-25			IV	Ganjuguda "A"	PRF	85	90
				Masedikia	VF	5	
2025-26			V	Ganjuguda "A"	PRF	42	79
				Sikabadi	PRF	25	
				Musumaha	VF	12	
2026-27			VI	Sikabadi	PRF	80	85
				Pajimaha	VF	5	
2027-28			VII	Sikabadi	PRF	80	93
				Mlahupanga	VF	13	
2028-29	Karada		VIII	Badagada	PRF	36	86
				Machhaghat	RF	35	
				Ranaba	RF	15	
2029-30			IX	Baraba	RF	60	60
2030-31			X	Nandabali	PRF	80	80
					TOTAL	**849**	**849**
2021-22	Sudrukumpa	Phulbani	I	Ranipathar	RF	40	40
2022-23			II	Ranipathar	RF	20	68
				Sudreju	RF	8	
				Sudrukumpa	RF	40	

2023-24	Phulbani		III	Takapakhal	VF	7.0	44
				Ranjuakumpa	VF	10.0	
				Bunduli	VF	7.0	
				Palpasahi	VF	10.0	
				Baida	VF	10.0	
2024-25			IV	Gudari	VF	10.0	81
				Baida	VF	15.0	
				Karadakumpa	VF	20.0	
				Khaumunda	VF	16.0	
				Karadakumpa	VF	20.0	
2025-26			V	Marisapada	VF	8.0	41.4
				Sudhasahi	VF	10.0	
				Kudapada	VF	8.4	
				Mulagudari	VF	10.0	
				Gudribaju	VF	5.0	
2026-27			VI	Jarginaju	VF	5.0	47.4
				Bradinaju	VF	5.0	
				Gudribaju	VF	20.0	
				R.Nuagam (Khajuripada)	VF	12.5	
				Dumurigudda	VF	4.9	
2027-28			VII	R.Nuagam	VF	5.0	28
				Dangulu (Kirabira)	VF	5.0	
				Rasimendi	VF	7.0	
				Manipadar	VF	5.0	
				Gerakumpa	VF	6.0	
2028-29			VIII	Dakapal (Jargiguda)	VF	10.0	45
				Tibirikuti	VF	10.0	
				Terapakhal	VF	5.0	
				Pakanagam	VF	20.0	
2029-30			IX	Terapakhal	VF	20.0	45
				Dadpaju	VF	10.0	
				Dangulu	VF	15.0	
2030-31			X	Suduli	VF	25.0	70
				Bedanpaju	VF	25.0	
				Jalangpadar	VF	20.0	
					TOTAL	**509.8**	**509.8**
2021-22	Tikabali	Tikabali	I	Chakapad	RF	55	152
				Kochilagada "A"	VF	5	
				Kandabada	VF	5	
				Kochilagada "B"	VF	7	
				Tiparigaon	VF	5	
				Tiparigaon(Adibasi Sahi)	VF	5	

				Nandini A PRF	PRF	70	
2022-23			II	Kandabada	VF	8	88
				Muningia	VF	15	
				Kamrikia	VF	5	
				Bordikia	VF	5	
				Chakapad	RF	55	
2023-24			III	Chatijhar	VF	5	84
				Chatijhar	VF	10	
				Lujuramunda (Mundasahi)	VF	5	
				Mallikpada	VF	5	
				Mallikpada	VF	4	
				Chakapad	RF	55	
2024-25			IV	Lujuramunda	VF	10	111
				Lujuramunda (Gumagada)	VF	6	
				Padhanpada	VF	10	
				Raikhol	VF	15	
				Tiparigaon	VF	15	
				Chakapad	RF	55	
2025-26			V	Sankarakhole	RF	10	125
				Ragaguda	PRF	50	
				Dutukagaon	VF	10	
				Padhanpada	VF	10	
				Mundasahi (Gumagada)	VF	15	
				Mallickpada	VF	30	
2026-27	G.Udayagiri		VI	Padangi	RF	10	45
				Kaminaju	VF	5	
				Jarginaju	VF	20	
				Kapanaju	VF	5	
				Katalnaju	VF	5	
2027-28			VII	Puduguda	VF	5	25
				Jadangbali	VF	5	
				Bakikamba	VF	5	
				Dubenaju	VF	5	
				Jarginaju "B"	VF	5	
2028-29			VIII	Katalnanju	VF	6	34
				Katimendi	VF	10	
				Chumpali	VF	5	
				Patulisahi	VF	13	
2029-30			IX	Loharnaju	VF	5	38
				Telingia	VF	5	
				Kiramaha	VF	5	
				Godagadu	VF	18	
				Gatamaha	VF	5	
2030-31			X	Kiramaha	VF	10	33.8

				Sujeli(Kurmingia)	VF	8	
				Lingagada	VF	10	
				Godabisa	VF	5.8	
					TOTAL	**735.8**	735.8
GRAND TOTAL						**2633.8**	**2633.8**

4.5 Special objectives of management

The special objectives of the management of this Working Circle are within the scope of general objectives of the management for the entire division. They are reflected below:

1. Regeneration and eco-development of degraded forests and adjoining areas on watershed basis.
2. Augmentation of availability of fuelwood, fodder and grasses from the regenerated areas.
3. To restock the barren and permanent blanks, besides enclosed areas by raising plantation of suitable species through artificial regeneration.
4. To maintain existing old plantations by appropriate tending operations.
5. To harvest mature plantations to meet the requirement of both the industry and the local people and followedby necessary replanting as per the silvicultural requirements.
6. To concentrate more on such choice of species which have proved successful for their locality.
7. To implement measures to conserve soil and moisture thereby enhancing the land productivity.
8. Enhancing people's participation in planning and regeneration efforts to ensure sustainability and equitable distribution of forest products from the regenerated lands and to promote partnership concept in the management and administration of forests and common property resources.
9. Promote agro-forestry and development of common property resources.
10. Promotion of fuel saving devices to encourage efficient use of fuelwood and to reduce the drudgery of rural/tribal women involved in collection of wood as also to improve environment.
11. To encourage and improve the plantation of NTFP species like bamboo, cane and medicinal plants.

12. To develop water resources through plantation and water harvesting programme.
13. Development and extension of improved technologies such as clonal propagation and use of root trainers for raising seedlings, mycorrhizal inoculation etc.
14. Rehabilitation of special problem lands like saline/alkaline soil, ravines, etc.
15. Employment generation for the disadvantages sections of society, particularly women, scheduled castes/scheduled tribes and landless rural labourers, inhabiting the forests and adjoining areas.

4.6. Analysis of the crop:-

4.6.1. The areas included in this circle are mostly blank patches with no appreciable forest crop. Since these areas are mostly devoid of vegetation cover, the detailed analysis and valuation of the crop have not been undertaken. The existing plantations show mixture of species like Teak, Bamboo, Gambhar, Piasal, Sisso, Tamarind and other fruit bearing and fuel wood species. However, pure teak plantations are raised in blocks like Ranipathar, Baraba, Chakapad, Burtang (S) and Gochhapada.

4.6.2. Analysing the species planted in those areas, it is observed that fast growing and fuelwood species are given less importance. The above plantations are thinly populated and the main cause for it is relentless biotic interference. These plantations are also neglected to a great extent after the maintenance work period of 3 years is over. The plantations raised through the Social Forestry Project in village forests have been harvested and coppice growth is noticed at few places. Hence, all the plantations enumerated above require complete protection measures coupled with tending operations to boost their growth.

4.7Sivicultural system

The silvicultural system to be adopted for raising plantation is filling up of existing gaps by artificial regeneration with appropriate site specific species. Effort should be made to use propagules of superior genetic stock and only quality planting

material should be used in all plantations. Proper post planting care with the involvement of local villagers in JFM mode should be taken for the success of plantation programme. For existing plantations, tending operations should be taken up which should comprise of both gap plantation as well thinning operations coupled with strict protection from biotic interference. Appropriate soil and moisture conservation measures should also be undertaken at appropriate sites to check accelerated soil erosion, particularly on steep and precipitous slopes.

4.7.1 Choice of Species:

4.7.1.1 Before selecting species for afforestation and defining their composition per hectare, careful consideration should be given to various aspects of ecosystem management. The emphasis should be focused on the fact that afforestation programme, should not in any way afterwards, disturb or change the existing composition of forests but to protect, maintain and restore the biodiversity of the areas along with the other objectives of afforestation. Due consideration should be given to the productivity, minor forest produce and wildlife utility aspects, if any, of the afforestation programme. The efforts should be made to keep the species and their composition more or less same as they exist in the forests. The names of species selected for afforestation and pertaining to Phulbani Forest Division should be in accordance with circular no. 1102 dated 04.10.2018 of the PCCF & Hoff, Odisha, Bhubaneswar **(Annexure-XV)**are reflected below in **Table No.PWC-4**.

Table No.: PWC 5 Ideal Afforestation Model

Sl. No.	Functional Categories of the Species	Percentage	Name of Species	No. of plants per Ha.	Spacing to be adopted
A	B	C	D	E	F
1	Economic planting series and general other	86%	*Tectona grandis*	1250	2.5mx2.5m
			Terminalia tomentisa	50	-do-
			Lagerstroemia parviflora	100	-do-
			Ougeinia oojeinensis	100	-do-
			Adina cordifolia	50	-do-
			Anogeissus latifolia	100	-do-
			Albizzia lebbeck	50	-do-
			Dalbergia sissoo	50	-do-
			Gmelina arborea	75	-do-
			Pterocarpus marsupium	50	-do-
			Lannea grandis	50	-do-
			Diospyros melanoxylon	75	-do-
2	NTFP productionand	12%	*Sterculi aurens*	25	4 x 4
			Terminali aarjuna	25	4 x 4

	wild life utility		*Semicarpus anacardium*	50	4 x 4
			Emblica officinalis	75	4 x 4
			Cassia fistula	25	4 x 4
			Bauhinia racemosa	25	4 x 4
			Bridelia retusa	75	4 x 4
3	Fruit trees		*Mangifera indica*	25	10 x 10
			Artocarpus heterophyllus	25	10 x 10
			Madhuca indica	25	10 x 10
			Syzygium cumini	25	10 x 10
			Ficus bengalensis	5	10 x 10
			Tamarindus indica/Buchanania lanzan	20	10 x 10
			Total	**2575**	

4.7.1.2 The above table clearly reflects an ideal Afforestation model based on for restoration of biodiversity of the locality. Since correct choice of site-specific species has a great bearing on the success and establishment of a plantation, certain indices which shall also be taken into account are the site requirement of the species with regard to soil depth, plantation, slope and erosion, soil texture, soil moisture besides local and commercial demand for that species.

4.8. Constitution of Plantation Series:

In view of different requirements for various areas within the circle, separate series are required to be constituted and dealt with, for example Planting Series for plantable area and Tending Series for miscellaneous plantations respectively.

The plantable area of 543 Hectares under this Working Circle has been divided into 04(Four) Planting Series (PS). While constituting such series, care has been taken to restrict the series, as far as possible, within the Range jurisdiction to which the forest block belongs. This has been done mainly for administrative convenience and better implementation of the prescriptions.

4.9.Plantation Cycle:

The planting cycle of 10 (ten) years should be adopted.

4.10. Method of executing of planting operation

For all plantation activities, in addition to the following stated guidelines, the guidelines prescribed in the Plantation Manual 1977 and other executive instructions

issued from time to time should be meticulously followed. It is needless to emphasize that success of the plantation depends largely on good planting stock and timely planting operations in the field. The planting areas selected in this working circle are heavily infested by weed growth. Special cost norm has to be provided to remove the weeds to make the area plantable. However, a tentative work schedule with different operations is indicated below:

4.10.1 Demarcation of Annual Plantation coupes:

a. Each planting series has been divided into 10 (ten) annual coupes. The said sequence of planting series is shown in management maps and in **Table No**: **PWC-3**. If plantation operations could not be taken up in a particular year because of lack of funds, or other factors, those forest blocks will be taken for plantation in subsequent years, in addition to that particular year's area. If more funds are available or an emergency situation warrants, the areas due for plantation in future can also be included. However, all these deviations should be subjected to the formal approval of the competent authority and duly reflected in respective compartment history files as well.

b. The annual plantation areas should be demarcated in the winter season (October to December) of the year preceding the year of plantation. The areas prescribed for the plantations should be shown in the management maps. In these areas small stone cairns of half meter height will be erected with lime wash at visible distance or the coal tar ring should be painted at breast height of trees standing on the borders of the areas of plantation. The survey of plantation area should be carried out by **GPS System** along with delineation of 4 hectares plots. In addition to this, GPS reading of erected pillars should be taken and duly superimposed on the management map or relevant topo-sheet.

c. The plantation areas should be indicated by signboards at corners or at point of intersection with roads, inspection paths and boundary lines of reserved forests. The signboards should contain the name of the plantation site, area, year of planting and compartment number and other details. Year of planting is very essential, otherwise after 5-6 years it is very difficult to know the year and the area.

4.10.2 Seed Collection:

4.10.2.1 Adequate quantity of seeds of the species intended for plantation should be collected well in advance. When seeds are to be collected, it should be seen that they are being collected from sound, healthy and matured trees and that too when seeds are fully ripe. Seed collection should be done during proper season and good and healthy seeds are to be sorted out for plantation purposes.

4.10.2.2 Seed of most forestry species can be stored in dry state for a number of years, but with passing years its viability decreases. During storage, fungi cause heavy losses to seeds either by complete decay of seeds or affecting their viability, thereby reducing germination percent. Seeds can be best stored at low moisture content (8-10%) and low temperature. For example, *Dendrocalamusstrictus* seeds can be stored with the application of silica gel or anhydrous calcium chloridein desiccators or at 3^0C to 5^0C ambient temperature after reducing seed moisture content to 8%.

4.10.3 Nursery Technique:

4.10.3.1 With the need to promote afforestation through people's participation, production and distribution of good planting materials is a necessary pre-requisite. Plantations established through superior quality saplings have distinct advantages of better survival and growth. Hence, the primary step in promoting forestry, particularly on non-forest lands, is to facilitate the establishment of decentralized plant nurseries in rural areas.

4.10.3.2 Subsequently, in early 1980s, involvement of the common public is planting trees on non-forest and private lands was felt necessary to meet the growing demand for essential commodities such as fodder, fuel and timber, while conserving the environment and natural forests. Accordingly, the demand for saplings increased significantly and various methods had to be adopted to cope with the requirements.

4.10.3.3 The Forest department has been maintaining nurseries in different locations, depending on the requirements for seedlings. These nurseries were categorized as:

4.10.4 Mega Nursery:-

One Mega nursery is located at Division headquarters with sufficient quantity and quality seedlings to meet the demand of all ranges at the time of need.

4.10.5 Permanent nurseries:

About 1-2 nurseries located in central locations in each Range, with permanent establishment for seed storage and watering facilities. These nurseries maintain saplings up to 2-3 years to produce tall and healthy saplings. Apart from meeting Department's requirement, seedlings from these nurseries are also made available to outside agencies.

4.10.6 Semi-permanent nurseries:

Established near plantation blocks to raise seedlings of 1-2 years for meeting the requirements of specific planting programmes.

4.10.7Temporary nurseries:

Established near plantation sites to raise seedling of 6 months for meeting the requirements of nearby planting sites.

4.11 Plantation plan and estimate:

A site map on 1:25000 scale topo sheet or in an appropriately large scale showing the details of area, direction of slope, nature of erosion, biotic interference, site specific species, aspiration of the people and other factors shall be prepared. Species suitable for the site shall be identified in accordance with the objectives of management. A treatment map shall be prepared along with a statement showing estimates of financial requirement and calendar of operations. This job shall be done by an officer not below the rank of a Forest Ranger and checked by an Assistant Conservator of Forests and approved by the DFO. This work shall be completed by the end of the October of the year preceding the year of plantation. Each plantation site shall be taken care for three to five years, including the main year of operation. The treatment plan and estimates shall be as per the approved cost norms and the instructions of the authorities in vogue. Abstract of approved estimates of all plantations in the divisions will be sent to the Conservator of Forests for information and record.

4.11.1 Demarcation:

The plantation site will be properly surveyed and demarcated by December, plantation journal and other records as envisaged in the Orissa Plantation manual shall be maintained timely and meticulously. The plantation site shall be cleared of undesired weeds, and shall be burnt. No trees or poles will be clear felled. These operations shall be completed by December- January of the year zero.

4.11.2 Staking, Pitting and Planting:

4.11.2.1 After the completion of site preparation by the end of January, operations like alignment, stacking and pitting shall be done. Alignment, stacking and pitting should be taken up at appropriate spacing. The standard size of pit 30cm X 30cm X 30 cm shall be dug in the entire area. Stacking and pitting shall be completed by March-April. However, in case of stump planting, crow bar holes shall be done just at the time of planting itself. The site preparation including pitting should in all cases be over by April so as to provide intervening time for weathering of the opened up soil. However, planting shall commence immediately on the onset of monsoon. At the time of planting, insecticide and fertilizer shall be applied as a basal doze depending on the requirement. Planting will be done departmentally and plantation journal shall be maintained as per the Orissa Plantation Manual.

4.11.2.2 Planting shall be taken up immediately after the onset of monsoon and completed by third week of June. The number of plants per hectare should be decided by the DFO depending on the site and the species to be planted. Required dosage of insecticides and fertilizers shall be applied during the planting process.

Table No.: PWC-6 Tentative Schedule of Planting Operations

Sl.No.	Item of Work	Tentative time of execution
1	Alignment and stacking	By end of May.
2	Stump planting	Within 15th June.
3	Transplanting of seedlings	By end of June.
4	Casualty replacement	Within end of July (it should be accompanied by first weeding)
5	Manuring	By end of August (-do) by second weeding.
6	First weeding	Within end of July.
7	Second weeding	Within end of August.
8	Third weeding	Within end of October.
9	Casualty replacement in the following year.	Within end of July.

10	First weeding	Within end of July (operation like creeper and climber removal are done with the first weeding).
11	Second weeding	Within end of October.
12	Cleaning	This is to be carried out in 5 year. The operation includes reduction of multiple shoots pruning and climber cutting.
13	Thinning	Mechanical thinning to be carried out in 5^{th} year and ordinary 'D' grade thinning are to be carried out in 10^{th} and 20^{th} year.

4.12. Post Planting Operations:

Post Planting Operations shall include casualty replacement; weeding, soil working and other operations to be carried out as per calendar of operations. The planting and post-planting operations shall be carried out as per the norm approved by the Government from time to time and in accordance with the prescriptions given in the Orissa Plantation Manual. The plantations shall be fully protected from all sorts of biotic interference. Local villager should be involved in the protection of the plantations. Formation of VSS as per JFM resolution should be explored. Further, the tending operations in these plantations shall be carried out as per the prescriptions given for the tending series.

4.12.1 Treatments and maintenance of Existing Plantations:

4.12.2 The existing plantations have been taken to constitute the Tending Series (TS). However, growth in these plantations is not uniform. In some cases, plantations have been adversely affected by biotic interference where as in a few cases; the plantations have been protected. Moreover, the exact age of these plantations is also not made available nor any authenticated records to this effect are provided. In most of the cases the compartment numbers are not mentioned in which plantations are raised and in the absence of this information it is difficult to trace out the years of formation of the plantations in the field. Further, these plantations have yet not reached the harvesting stage. Hence, uniform treatment for all the plantations is not possible.

4.12.3 The Divisional Forest Officer shall be at liberty to demarcate annual coupes in a given tending series according to administrative convenience and requirements of the plantations. These annual areas in the present case of treatment should be demarcated in the manner as prescribed above for the planting coupes. The Range

Officer shall prepare the site-specific treatment plan of the said plantation sites, supervised by ACF and shall be duly approved by the DFO. This shall be done in the year preceding the year of tending operations.

4.12.2 Operations in Tending Series:

4.12.2.1 Growth in the miscellaneous plantations tends to become bushy and branchy for want of pruning and thinning. This is more prevalent in case of miscellaneous plantations with species like Acacia; Chakunda; Siris; Gambhar; Amla etc. which are in regular need of weeding; pruning and climber cutting. These operations are beneficial in the early years of the formation of the plantations followed with thinning in the later years.

4.12.2.2 The tending operations which shall be carried out in the miscellaneous plantation tending series are listed out below:

- Weeding and regular pruning shall be done till the 8th year of plantation.
- All climbers shall be cut.
- All dead trees shall be removed departmentally.
- Thinning shall be done in the congested crop on the lines of 'A' grade & 'B' grade thinning only.
- Gap plantation shall be done where ever required.

4.12.3Control:

The Nursery Journal, the Plantation Journal and other records shall be maintained separately for each plantation in accordance with the provisions of 'The Orissa Forest Plantation Manual, 1977' indicating the physical and financial achievements. Necessary entries with regard to plantation activities undertaken shall be entered in the compartment histories. All the plantations done shall invariably be shown on the topo maps of 1: 25,000. Records of tending operation carried out shall be maintained in an appropriate register at the Divisional and Range level.

4.13. Watershed approach in rainfed afforestation:

In the Division most of the afforestation programmes are rainfed. In order to make the successful afforestation in degraded forest it is important to treat the area on the basis of watershed unit. Instead of carrying out afforestation of isolated patches, it is suggested to treat whole watershed depending of the type of the area,

soil status, slope and water retention capacity. During the rainy season the vegetation suffers from water deficit situation at upper part and due to prolonged wet condition on lower parts of the topo sequence at a time. Suitable conservation and storage structures, at appropriate locations in micro-watershed, lead to recharge of ground water and increase of water table. Activities of RWC and Plantation(overlapping) WC should be taken up in an micro watershed together to have maximum benefit to the eco system.

4.14. Strategy to tackle firewood problem(Fuel wood plantation):

4.14.1 Fuelwood shortage problem cannot be looked upon in isolation. It has to be linked with the overall energy programme. Departments and organizations dealing with other energy sources need to link their programmes with concerned departments and providing alternate sources of energy and ensuring environmental conservation. Programmes like installing biogas plants and supplying improved wood burning chulhas are the major concerns of the Forest Department. It is this Department which needs to be involved in these programmes and also link programmes of providing alternate sources of energy with forest conservation and environmental protection.

4.14.2 Some policy and technical issues pertaining to forest management in general and fuel wood supply in particular are given below:

A. Policy Aspects:

1. Rational conservation of the existing resources.
2. Creation of additional resources.
3. Creation of village level organization and financial support to them.
4. Conception and implementation of well thought energy policy.
5. Proper land use policy and planning.
6. In the tradition of fuel wood consumption, introduction of the alternate sources of energy.
7. Easy access to the available resources to all the levels of rural society.
8. Analysis and review of legal situation.
9. Strengthening of forest administration.

B. Technical Aspects:

1. Accurate estimation of energy requirement of different social strata.

2. Real assessment of the available resources.
3. Management of existing forest for meeting social needs ensuring ecological safeguards.
4. Availability of areas for raising plantation crops and their potential to yield fuel, fodder and small timber and their soil and moisture studies.
5. Review of silvicultural and management practices.
6. Choice of indigenous and exotic species for the sites and study of their growth rates and yield estimates.
7. Research on high yielding varieties and full tree utilization.
8. Identification and multiplication of efficient solar energy harvest species.
9. Development of economically practical agro-forestry systems.
10. Improvement in energy conversion techniques.
11. Study and prescription of distribution systems.
12. Search for efficient and easily accessible alternate sources of energy.
13. Development of processed bio-fuels.
14. Establishment of competent and efficient research system.
15. Development of models for the integrated development of villages in and around forests on the concept of biotic factor treatment.
16. The people's participation in the entire programme, especially in production, protection and management.

4.14.3 Understanding the man and forest interaction is also necessary for planning the forest resource management. *Forests precede civilization and civilization precedes desertification*. Improper allocation of resources gives birth to economic stratification in which the privileged segments command authority over resource use and unprivileged segments are compelled to resort to indiscriminate use of forests. As far as firewood distribution is concerned, may be in the hills or plains, production from forests is translocated to the rich urban societies. Even alternate sources of energy remain confined to the privileged people due to their higher economic status and limited supply of sources. Poverty also helps in human proliferation which leads to still more poverty. With increased poverty, dependence on forests increases and irrational exploitation starts. Unless a rational distribution of privileges and easy access to resources are achieved, any effort put in to solve firewood crisis will not bear any fruitful results.

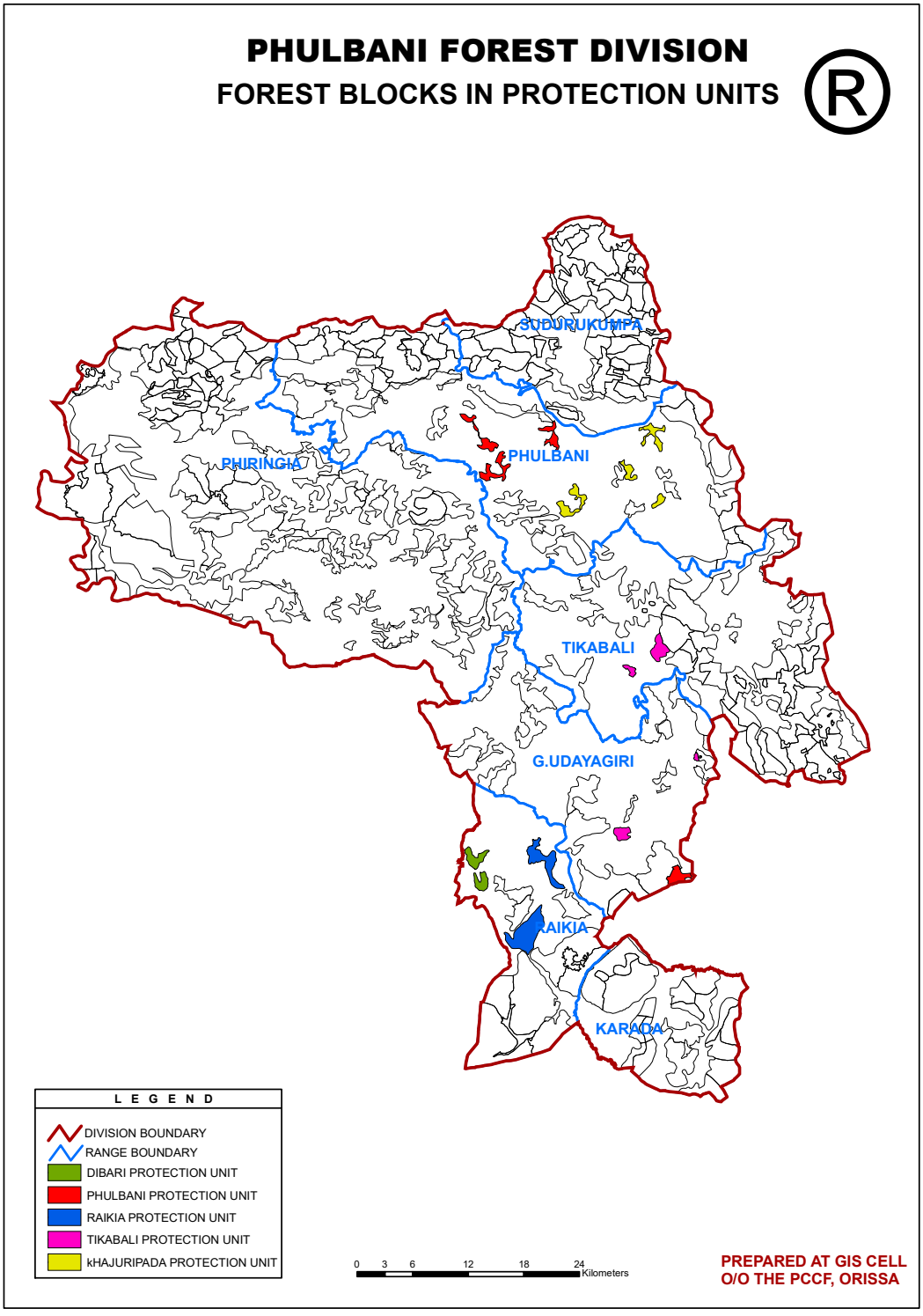
4.15 Interim Revision:

No major change in the prescription is anticipated. However, prescriptions may be reviewed after 5 years jointly by the Regional Chief Conservator of Forests, Berhampur Circle and the Conservator, Working Plans. Any deviation suggested shall be subjected to the sanction of the competent authority.

CHAPTER-5

THE FOREST PROTECTION WORKING CIRCLE

5.1



5.2General Constitution of Working Circle:-

5.2.1. The National Forest Policy (1988) preamble states the following factors as responsible for depletion of forests:

1. Ever-increasing demand for fuel wood, fodder and timber.
2. Inadequacy of protection measures.
3. Diversion of forest land for non-forest purposes.
4. Tendency to look upon forests as revenue earning resource.

5.2.2. The National Forest Policy was adopted to have a new strategy for forest conservation which includes:

a. Preservation
b. Maintenance
c. Sustainable utilization
d. Restoration
e. Enhancement of natural environment

5.2.3. Thus the conservation of the forests remains the dominant spirit of the policy which does not prohibit sustainable use of forest resources. It does call for preservation of forest areas rich in bio-diversity. The environmental stability which is required to be ensured would only flow from ensuring resources conservation.

The objectives of the policy can be broadly grouped into three main themes:

1. Conservation of forest resources.
2. Meeting demands of local communities for fuel wood, fodder, small timber and of essential needs of the nation; and
3. Development of the resources by afforestation, improvement of productivity and efficient utilization of forest produce and promotion of timber substitution.

5.2.4. Conservation requires more efficient protection and sound and intensive forest management. Effective protection needs motivated personnel with necessary legal power, mobility and communication network. This has to be complemented by improved management, especially sustainable supply of fuel wood, fodder and small timber to the stakeholder that would keep them from unregulated exploitation of forests. For this to happen, co-operation of the local people will have to be elicited.Thus a combination of efficient policing, management and extension services are required. The traditional protection measures which were meant to operate in

isolation in low population density of both human being and livestock scenario have nearly collapsed.

5.2.5. This overlapping working circle covers all those forest blocks which need special protection measures from biotic interferences, besides the blocks and compartments existing in ecologically fragile areas. Due to intense biotic pressure from human and cattle, large number of forest blocks of the division is under various stages of degradation. Unless steps are taken to prevent fires, illicit felling, encroachment, poaching, shifting cultivation the process of degradation can not be reversed. Further there is also need to visualize that forest on steep slopes which are quite prevalent in Phulbani areas and ecologically fragile areas are not disturbed and are completely protected from any sort of biotic interference. The conservation of forest requires checking further degradation as well as increased production to meet the demands of the local community.

5.3History of Forest Protection in Orissa:

The history of forest protection dates back to the early part of twentieth century in Orissa. The first instance of forest protection by communities was recorded in Lapanga in Sambalpur district as far back as 1936. The districts where forest protection has made substantial headway are: Nayagarh, Mayurbhanj, Keonjhar, Deogarh, Dhenkanal, Sambalpur, Bolangir and Kandhamal. There are about 8000 villages protecting and managing forests for their livelihood security and environmental protection. The village communities, in the form of primary groups like youth clubs, village forest protection committees, started protecting nearby forest areas for different reasons with local schoolteachers, foresters and influential leaders emerging as key motivators in the process. The diverse motivations for protection varied from acute scarcity of fuel wood, fodder and small timber to creating their own forests. In other places, villagers protected forests as an economic asset. In some tribal dominated parts of undivided Koraput district, protection was initiated to protect the cultural heritage associated with forests. If the motivation in Nayagarh was an agrarian need for building carts and implements, it was the scarcity of small timber, firewood and poles for house building in Bolangir. Motivated by such diverse reasons, communities started protecting nearby forests without bothering much about the legal status of the forests. The indigenous management practices adopted by the villagers were location and situation-specific and

always endeavoured to strike a balance between conservation and the livelihood needs of the villagers.

5.3.1 The 1970s saw sporadic conservation initiatives in various parts of the state. In Nayagarh, then part of Puri district, primary school teachers initiated environmental education in schools, which soon spread to villages culminating in the launching of an effort to protect a big hillock by a cluster of 5-6 villages. Elsewhere in the state, a few energetic and enthusiastic local forest officers took it upon themselves to initiate the forest fringe villages into protecting their nearby forests. In Bolangir, where forests were often the reason as well as the victim of ordinary village conflicts, forest officials and local leaders tried to unite people in the name of forests. Soon, they were joined in their efforts by school teachers. In Nayagarh, a Divisional Forest Officer (DFO) joined hands with primary school teachers to initiate protection of existing forests and plantation in bald patches. The localized protection initiatives subsequently came together to spread and strengthen the protection activities. These sporadic protection initiatives, which started in the 70s, took the shape of a movement and spread to other districts like Dhenkanal, Phulbani, Sambalpur and Keonjhar in the 80s.

5.3.2 Like motivations, the methods employed to carry out protection too varied widely. The traditional method of protection has been by the physical presence of villagers in and around the forest with sticks in hand, which is known as ***Thengapali*** (rotation of stick). *Thengapali* is a form of forest protection where village communities are directly involved in forest protection. It is an ancient form of forest protection in which two sticks are left at the doorstep of two adjacent households in the village every evening. The persons belonging to the two households are responsible for patrolling the forest the following day/night. There are, however, other less direct methods of protection too. In some places, the people have appointed paid watchmen to guard the forests. In others, the whole village keeps a vigilant eye on the forests without physically entering them. Some communities also use religion as a means of forest protection. They play on the religious fears of the people that cutting trees would bring misery to them to reduce depletion and ensure protection.

5.3.3 There are instances in Orissa of protection initiated by one family being emulated first by the whole village and then by a cluster of villages. This cluster approach to protection, a noteworthy feature of forest protection in Orissa, had its roots in Nayagarh. This approach enables protection of a hillock from all sides leaving

hardly any change for outsiders to enter and cause any damage to the forest. Besides, it does not provide any room for selective protection and plundering.

5.3.4 The institutions carrying out protection vary from one-man institution to traditional village bodies, village forest protection committees, youth clubs and women's groups. There are more than a hundred all-woman forest protection committees in Orissa. Those different groups protecting forests are now sought to be brought together in formal Joint Forest Management Committee as per JFM Resolution of the Government.

5.4General Characteristics of vegetation:-

5.4.1. Forest degradation has numerous agents and causes, many of which reinforce the process. In Phulbani Forest Division, human activities contributing to the degradation of natural forest vegetation, involve five primary processes:

1. Removal of woody species at rates exceeding their renewability.
2. Excessive grazing by livestock of grass and other herbaceous matter.
3. Increased incidence of fire.
4. Humus, top soil loss and soil compaction.
5. A gradual decrease in water retention and recharge capacity; and
6. Pernicious age old practice of shifting cultivation and encroachment.

5.4.2. Degradation often occurs gradually due to pressure of biotic disturbances which slowly depletes vegetation, suppresses natural regeneration and induces sheet and gully erosion of top soil. The following table indicates the gradual process of vegetative changes which commonly take place in the Division.

Table No.: PWC-1 Common stages of forest degradation

	FULL CANOPY	OPENFOREST	DEGRADED FOREST	SCRUBLAND	DENUDED LAND	BARRENLAND
Forest composition	Multitier high density	Majority first story removed, under storey primary and secondary species	Secondary species, vigorous coppice growth	Good coppice growth, moderate soil erosion	Scattered coppicing, grass and scrubs, heavy soil erosion	Devoid of vegetation, severe soil erosion, and water runoff
Human activity causing degradation	LOW Minimal interference	HIGH Selective commercial	HIGH Grazing, small-scale fuelwood cutting	MODERATE Grazing, subsistence fuelwood cutting	LOW Grazing, root digging for	MINIMAL

					subsistence fuelwood	
Management options (institutional)	Custodial protection Community – managed buffer zone in high pressure areas	Technical exploitation Forest Department supervised extraction	JOINT MANAGEMENT High priority area for community-FD partnerships	JOINT MANAGEMENT High priority area for community-FD partnerships	Joint management Medium priority	Strict protection Low priority
Silvicultural activities	Limited extractions of non-timber forest products on sustainable basis	Regulated extraction of timber to minimize ecosystem damage	Coppice regeneration: Stool cleaning, multiple shoot cutting, enrichment planning in gaps (trees and grasses), organized non-timber forest product collection.		Plantation establishment, soil and water conservation	Soil and water conservation, vegetative contour planting, grass and shrub establishment
Source: Handbook of Forest Protection by A.K. Banerjee.						

5.4.3. Degradation of forests often begins with the selective felling of larger trees, causing openings in the crown cover. Timber extraction results in damage to smaller trees, saplings, shrubs and herbs, as well as causing soil erosion and compaction. Further, felling of trees can cause larger losses of crown cover, opening up more spaces for livestock grazing. In turn, grazing frequently causes further soil erosion and compaction, suppressing natural regeneration through less of soil fertility and both seed and seedling destruction. Progressive losses of plant diversity and gross productivity are often coupled with the invasion of exotic, non-palatable, obnoxious seeds like Lantana camera and Eupatorium odoratum. The acute scarcity of fuel wood has resulted in uprooting of stumps and roots thereby disrupting soils and accelerating erosion. The ecological impacts of different anthropogenic interventions are also depicted in the above Table No. 7.1.

5.4.4 Ultimately, the complex multi-tired, multi-species forest structure is transformed to a depleted, highly vulnerable biological system, with little or no vegetative cover except for some scattered, thorny and obnoxious, non-palatable species.

5.4.5. Majority of forest blocks included in this working circle are the ones which have been badly affected due to regular removal of biomass and some blocks are included

which have valuable high forests, that are now becoming targets of timber smugglers in an organized way. Both these type of blocks need intensive protection measures so that pressure of biomass removal is reduced substantially so that silvicultural operation prescribed in the main working circle will yield the desired result. The type and classification of forests included in this circle has already been dealt in Chapter-2. The main species in these forests are Sal and its associates like Piasal, Sisso, Asan, Dhaura, Kurum, Kasi, Kangada, Rai, Bandhan etc.

5.5Felling Series, Cutting sections and JFM areas:-

Not applicable to this working circle

5.6 Blocks, Compartments and JFM area (marked on GIS bases Maps)

The total area allotted to this Working Circle is **4680.13**Ha. A statement reflecting the allocation of blocks and compartments together with areas is given in Table

Table No: PWC-2		**Details of Different Protection Units and their Constitution**				
Unit Name	**Range Name**	**Name of the Forest Block**	**Block Status**	**Extent/ Comptt.**	**Block Area included in Ha.**	**Unit Area in Ha.**
1	**2**	**3**	**4**	**5**	**6**	**7**
1. Khajuripada	Phulbani	1. Balaskumpa	RF	Full	337.682	
		2. Bhaliapada	RF	Full	244.69	
		3. Dutimendi	RF	Full	154.84	
		4. Pandrisuga	RF	Full	95.82	
Total					**833.032**	**833.032**
2. Phulbani	Phulbani	1. Dakpalla 'A'	RF	Full	275.14	
		2. Dakpalla 'B'	RF	Full	318.15	
		3. Khaumunda	RF	Full	213.84	
Total					**807.13**	**807.13**
3. Phiringia	Phiringia	1. Gerupada 'E'	RF	Full	236.19	
		2. Gerupada 'W'	RF	Full	199.47	
		3. Kelapada 'A'	PRF	Full	125.81	
		4. Kelapada 'B'	PRF	Full	224.66	
		5. Kelapada 'C'	PRF	Full	68.66	
Total					**854.79**	**854.79**
4. Tikabali	Tikabali	1. Tikabali	RF	Full	84.25	
		2. Beheragaon	PRF	Full	299.172	
	G. Udayagiri	1. Kalinga Sandal wood	RF	Full	16.33	
		2. Kanabagedi	RF	Full	192.53	
Total					**592.282**	**592.282**

5. Dibari	Raikia	1. Dibari	RF	Full	156.78	
		2. Kilundi	RF	Full	270.407	
Total					**427.187**	**427.187**
6. Raikia	Raikia	1. Lendrikia	RF	Part	640.31	
		2. Raikia	RF	Part	525.4	
Total					**1165.71**	**1165.71**
Grand Total of 6 numbers protection units						

5.7 Special objectives of management

The special objectives of Management set for this Working Circle are within the general objectives of management. These are as follows:

1. To protect these forests from fire and grazing and also to provide strict vigil against illicit felling, encroachment, poaching and shifting cultivation.
2. To increase the biodiversity in the forest crop by encouraging natural regeneration.
3. To arrest further degradation and enhance the natural regeneration by adopting strong protection measures to minimize biotic interference.
4. To keep delicate and eco-fragile areas ecologically intact by maintaining adequate vegetative cover.
5. To rehabilitate and restock the degraded forests for environmental stability in the locality.
6. To improve the site quality through soil and moisture conservation measures.
7. To improve/restore the micro-climate and micro-edaphic conditions.
8. To provide protection to the degraded forests with active participation of villagers of the adjoining villages through JFM.
9. To tend and improve the existing growing stock through suitable silvicultural measures in order to get better growth.
10. To meet the needs of local people with regard to firewood and small timber to the extent enjoyed depending on the productivity, to ensure peoples participation in protection of forests.

5.7.1 Analysis and valuation:-

The growing stock and stem/canopy density map of all the forest blocks basing on the inputs supplied by field enumeration has been submitted by NRSA, Hyderabad. It is expected that with proper protection and stoppage of illegal removal of biomass

from these degraded forest blocks, these blocks will steadily regain its original state. Protection of high forest blocks will ensure that these blocks do not get degraded. Protection from grazing and fire will ensure that the regeneration status in all the forests of this Division will improve substantially. All these observations advocate strongly in favour of protection of these forests.

5.7.2Sivicultural system

Traditional forest management practices are being modified to reflect the needs and aspirations of the poor tribals living in and around the forest area of the Division. The exploding human population, extension of agricultural lands, practice of shifting cultivation and so on and so forth represents the changes referred. The biotic pressure resulting from these has led to indiscriminate destruction of the forests. The shrinkage in forest cover and increasing demand for forest products lead to inevitable conflicts and tension. In such an evolving environment it is evident that in place of traditional approach, something more dynamic, more wholesome which ensures peoples' participation is the need of the hour to restore and sustain forest health. In this Overlapping Working Circle the silvicultural system to be followed will be as prescribed in the primary circle to which individual block or compartment is allotted.

5.7.3Treatment:

For achieving the special objectives of this circle, the following operations/treatment are prescribed:

1. The area should be rigidly protected from illegal biomass removal so as to keep it under nature's own care and nursing.
2. Areas of forest blocks on steep precipitous slopes and eco-fragile areas would be specially protected to ensure there is no loss of vegetation or soil cover.
3. Steps will be taken to prevent fire and grazing in the forests.
4. Boundary, compartment and blocks should be maintained.
5. Forest road network should be maintained.
6. Communication network-VHF sets should be used effectively to check smuggling of forest produce.
7. Special anti-smuggling squads and fire fighting squads should be created out of V.S.S. members for each protection unit and in those areas where stands of important species diversion are available.

8. Provision for employment during lean period (November to March)

5.7.4 Rotation period

Since special protection would extend over the entire working circle, it is desirable to create different "protection units" for this purpose. This will assist in taking up operations like maintenance of boundary to prevent encroachments, road repairs to ensure regular patrolling in vulnerable forest areas, anti-smuggling squads operations to check all illegal activities in a planned and systematic manner and will help in tackling protection 'hotspots'. Accordingly, after detail field verification, the working circle area has been divided into 6 protection units as per the block and area wise details furnished at Table no: PWC-2

The protection cycle of 5 years is prescribed so that areas will be treated twice during the plan period.

5.8 Harvestable diameters

Not applicable to this working circle.

5.9. Reducing factors and reduced areas

Not applicable to this working circle

5.10. Felling cycle

Not applicable to this working circle

5.11 Division into periods and allotment to periodic blocks (PB)

Not applicable to this working circle

5.12 Calculation of the yield

Not applicable to this working circle

5.13 Table of felling

Not applicable to this working circle

5.14 Method of executing the felling:

Methodology and Execution of operation:

5.14.1 Division into Annual Protection Areas:

1. In order to execute the protection measures, each protection units has been divided into 5 (five) annual coupes to facilitate systematic operations. The annual

coupe shall be attended to as per the sequence prescribed in the plan. **Table no. PWC-2** gives the annual coupes (protection unit wise) with its number and the year of treatment along with the name of the forest block, its compartment number and area included in the coupe.

2. The annual coupes of all the units have also been depicted in the Management Map.

Table No: PWC-3 Details of Different Protection Units and their Constitution

Year	Range	Protection Unit	Coupe No.	Forest Block	Status	Extent	Area in Ha.
1	2	3	4	5	6	7	8
2021-22	Phulbani	Khajuripada	I	Balaskumpa	RF	Part-167.50	167.50
2022-23			II			Part-170.182	170.182
2023-24			III	Bhaliapada		Full	244.69
2024-25			IV	Dutimendi			154.84
2025-26			V	Pandrisuga			95.82
2026-27			I	Balaskumpa		Part-167.50	167.50
2027-28			II			Part-170.182	170.182
2028-29			III	Bhaliapada		Full	244.69
2029-30			IV	Dutimendi			154.84
2030-31			V	Pandrisuga			95.82
							833.03
2021-22	Phulbani	Phulbani	I	Dakpalla 'A'	RF	Part-182.65	182.65
2022-23			II	Dakpalla 'A' Dakpalla 'B'		Part-92.5 Part-82.5	175
2023-24			III	Dakpalla 'B'		Part-168.17	168.17
2024-25			IV	Dakpalla 'B' Khaumunda		Bal-67.48 Part-85.0	152.48
2025-26			V	Khaumunda		Bal-128.84	128.84
2026-27			I	Dakapalla 'A'		Part-182.65	182.65
2027-28			II	Dakpalla 'A' Dakpalla 'B'		Part-92.5 Part-82.5	175
2028-29			III	Dakpalla 'B'		Part-168.17	168.17
2029-30			IV	Dakpalla 'B' Khaumunda		Bal-67.48 Part-85	152.48
2030-31			V	Khaumunda		Bal-	128.84

						128.84	
							807.14
2021-22	Phiringia	Phiringia	I	Gerupada (E)	RF	Part-148.69	148.69
2022-23			II	Gerupada (E) Gerupada (W)		Bal-87.5 Part-119.47	206.97
2023-24			III	Gerupada (W) Kelapada 'A'	RF PRF	Bal-80 Part-47.5	127.5
2024-25			IV	Kelapada 'A' Kelapada 'B'	PRF PRF	Bal-78.31 Part-92.51	170.82
2025-26			V	Kelapada 'B' Kelapada 'C'		bal-132.15 Full-68.66	200.81
2026-27			I	Gerupada (E)	RF	Part-148.69	148.69
2027-28			II	Gerupada (E) Gerupada (W)		Bal-87.5 Part-119.47	206.97
2028-29			III	Gerupada (W) Kelapada 'A'	RF PRF	Bal-80 Part-47.5	127.5
2029-30			IV	Kelapada 'A' Kelapada 'B'	PRF PRF	Bal-78.31 Part-92.51	170.82
2030-31			V	Kelapada 'B' Kelapada 'C'		bal-132.15 Full-68.66	200.81
							854.79
2021-22	Tikabali	Tikabali	I	Tikabali RF Beheragaon	RF PRF	Full-84.25 Part-45	129.25
2022-23			II	Beheragaon	PRF	Part-137.5	137.5
2023-24			III	Beheragaon		Bal-116.672	116.672
2024-25			IV	Kalinga S.W Kanbagedi	RF RF	full-16.33 Part-72.5	88.83
2025-26			V	Kanbagedi	RF	bal-120.03	120.03
2026-27			I	Tikabali RF Beheragaon	RF PRF	Full-84.25 Part-45	129.25
2027-28			II	Beheragaon	PRF	Part-137.5	137.5

2028-29			III	Beheragaon		Bal-116.672	116.672
2029-30			IV	Kalinga S.W Kanbagedi	RF RF	full-16.33 Part-72.5	88.83
2030-31			V	Kanbagedi	RF	bal-120.03	120.03
							592.282
2021-22	Raikia	Dibari	I	Dibari	RF	Part-92.5	92.5
2022-23			II			Bal-64.28	64.28
2023-24			III	Kilundi		Part-72.5	72.5
2024-25			IV			Part-95.24	95.24
2025-26			V			Bal-102.667	102.667
2026-27			I	Dibari		Part-92.5	92.5
2027-28			II			Bal-111.28	111.28
2028-29			III	Kilundi		Part-72.5	72.5
2029-30			IV			Part-95.24	95.24
2030-31			V			Bal-102.667	102.667
							427.187
2021-22	Raikia	Raikia	I	Lendrikia	RF	part-232.2	232.2
2022-23			II			Part-297.5	297.5
2023-24			III			Bal-110.61	110.61
2024-25			IV	Raikia		Part-260	260
2025-26			V			bal-265.4	265.4
2026-27			I	Lendrikia		part-232.2	232.2
2027-28			II			Part-297.5	297.5
2028-29			III			Bal-110.61	110.61
2029-30			IV	Raikia		Part-260	260
2030-31			V			bal-265.4	265.4
							1165.71
GRAND TOTAL							**4680.14**

5.14.2 Demarcation of Annual Coupes and preparation of Annual Plan of Action:

1. The annual coupes shall be demarcated in the preceding season of treatment. In case a coupe overlaps two or more compartments, each compartment shall

be treated as a separate treatment area; this will even ensure proper maintenance of compartment histories. Signboards, showing the name of the forest block, Working Circle, Compartment no., area and year shall be displayed on prominent and easily identifiable trees.

2. The DFO shall ensure preparation of an annual action plan with a calendar of operations before execution of works. The guiding factors for incorporation of different components shall be as per the activities stipulated in the above paragraph.

5.14.3 Forest Protection Measures:

1. All the forests of this Working Circle shall be strictly protected against illicit felling, forest fires and all sorts of biotic interferences. Anti-smuggling squads at vulnerable points in every protection unit should be created by deployment of manpower from other less important areas besides engagement of protection watchers. The information network should be made effective and properly directed to conduct raids at susceptible places of hoarding of timber and other forest produce. The DFO should evolve the modalities for its effective working. The detailed list of smuggling prone areas are reflected below:

Table No.: PWC-4 Illicit felling and smuggling prone area of the Division.

Sl. No.	Range	Name of R.F./P.R.F.	GIS Area in Ha.	Comptt. No.	Total GIS Area in Ha.	Vegetation type	Method of smuggling
1	2	3	4	5	6	7	8
1	Phulbani	Balaskumpa RF	342.86	--	342.86	Misc. coppice bushy vegetation with sal.	Head load, dragging method by local people.
2	-do-	Bhaliapada RF	250.60	--	250.60	-do-	-do-
3	-do-	Dutimendi RF	154.84	--	154.84	Sal mixed misc. vegetation with coppice shoots.	Head load, dragging method by carts etc.
4	-do-	Pandrisuga RF	95.82	--	95.82	-do-	-do-
5	-do-	Dakpalla 'A' RF	275.15	--	275.15	Sal mixed misc. bushy vegetation with coppice growth and sal shoots.	Head load, bhar load, dragging method by carts etc.
6	-do-	Dakapalla 'B' RF	318.15	--	318.15	Sal mixed misc. coppice	Head load, bhar load,

						saplings and bushes with few poles crops.	etc.
7	-do-	Khaumunda RF	213.84	--	213.84	Misc. coppice growth with lower hills sal poles.	Head load &bhar load with dragging method.
8	Phiringia	Gerupada (E) RF	236.19	--	236.19	Sal mixed misc. growth with sapling &pole crops and at some patches having coppice growth.	-do-
9	-do-	Gerupada (W) RF	199.47	--	199.47	-do-	-do-
10	-do-	Kelapada 'A' PRF	125.81	--	125.81	Sal mixed misc. coppice & poles with sapling growth.	-do-
11	-do-	Kelapada 'B' PRF	224.66	--	224.66	-do-	-do-
12	-do-	Kelapada 'C' PRF	68.66	--	68.66	-do-	-do-
13	Tikabali	Tikabali RF	84.25	--	84.25	-do-	-do-
14	-do-	Beheragan PRF	305.35	--	305.35	-do-	-do-
15	G. Udaygiri	Kalinga sandal wood	31.39	--	31.39	-do-	-do-
16	-do-	Kanabagedi	192.53	--	192.53	-do-	-do-
17	Raikia	Dibari RF	203.78	--	203.78	Sal mixed misc. coppice veg. with sal saplings at some patches & bushy misc. growth.	Head load, bhar load etc.
18	-do-	Kilundi RF	270.407	--	270.407	-do-	-do-
19	-do-	Lendrikia RF	741.192	--	741.192	-do-	-do-
20	-do-	Raikia RF	657.345	--	657.345	-do-	-do-
Source: Field study							

The following forest blocks are very much prone to illicit felling and smuggling of timber and other forest produce in a pre-planned and organized way for which stringent protection measures may be ensured to curb further depletion of forests.

Table No.: PWC-5		
Sl. No.	**Name of the RF/PRF**	**Compartment subjected to illicit felling/smuggling of timber**
1	Chakapad RF	C/6,8
2	Ranaba RF,	C/2,5
3	Machhaghat RF	C/1,3
4	Donga RF	C/15,16,17
5	Khajuripada RF	C/3,4
6	Burtang (S) RF	C/6,7
7	Tadipaju PRF	(nearer to Burtang village along the Tikabali-Chakapad road)
Source: Field observation		

2. No grazing and illegal removal of forest produce shall be allowed from the protection coupes.

3. The concerned Range Officer/DFO shall periodically monitor the performance of each Beat Forest Guard and Section Forester. The DFO shall review the performance of each Range/Section/ Beat at least once in six months with regard to the protection efforts, monitor illicit felling and take required remedial measures as are considered necessary and feasible. For better co-ordination, the communication network including VHF network shall be strengthened and made effective.

4. The field forest staff shall also take steps to control encroachments in the forests and take steps to evict encroachers in the treatment area of the annual coupe. Resurvey, demarcation and construction/repair of boundary pillars according to provisions of O.F.D. Code, 2020 is absolutely necessary to be taken up in the annual coupe. The cases of encroachment shall be firmly dealt with. The prosecution cases filed in the court should be pursued vigorously.

5. The success of protection efforts should be monitored with regard to the number and nature of forest offence cases, encroachers evicted, timber and vehicle seized and the manner in which the booked offence cases are investigated and contested in the appropriate courts of law.

6. The DFO and his subordinate officers shall constantly pursue the offence cases in competent courts of law so as to ensure greater rate of conviction. These

measures will have long lasting effects on the overall protection in the entire Division.

7. A Functional Divisional mobile squad with vehicle, mobile, VHF system with hand sets, required staff and arms will be constituted. The Divisional mobile will be deployed by the DFO for regular patrolling and supporting filed staff in emergencies.

8. There shall be regular monthly review by the DFO of the forest offence cases in every Protection Unit at the Divisional level besides detailed review in the field during his routine inspections. The outcome of such reviews shall invariably find place even in his monthly tour diaries.

9. The forest cases detected shall not as a matter of routine be compounded. Proper investigation shall be done to convert the UD cases to PR cases so that the accused are brought to the books. Further, the PR cases shall be submitted in time duly following the procedure stipulated in the Orissa Forest Offence (Detection, Enquiry & Disposal) Rules'1980. The PR cases filed in the court shall be regularly pursued through the Public Prosecutor/Assistant Public Prosecutors. Moreover, the technical issues and bottlenecks may be brought for discussion/redressal in the Senior Officers' Meeting at the District level.

5.14.4 Shifting Cultivation Scenario and strategies to check depletion of forest cover:

5.14.4.1 Shifting cultivation evolved in the socio-economic environment of ancient India, characterized by surplus land, and scarcity of labour and capital resources. The age-old practice has become unviable, leading to the degradation of forests and tribal economy, due mainly to the changes in socio-economic and agro-ecological parameters which sustained it. Land-based technologies such as labour-intensive agro-forestry systems, providing basic needs and employment, may be implemented by using surplus labour and wastelands in order to control shifting cultivation.

5.14.4.2 Any rational strategy for the control of shifting cultivation must account for the above discussed socio-economic and ecological aspects. The employment and income generation measures based on land resources should be at the centre of any future strategy. Therefore, equitable distribution of wastelands, lying unused, among tribals may be a step in the right direction. But Government intervention is required for

reclamation and development of wastelands before handing over these lands to resource poor tribals. In the process of reclamation, preferably through agro forestry practices, tribals will get gainful employment for their sustenance. Agri-silviculture and agro-silvopastoral systems may be adopted depending upon locations and requirements. The annual yield from the agriculture crop, coupled with wage earning, means that a sustainable income can be maintained while waiting for the longer gestation enterprise.

5.14.4.3A holistic and participatory approach of integrated development, encompassing Government interventions at almost all the levels of vicious circle, needs to be adopted. Such interventions may include labour-intensive agro-forestry practices (with indigenous species), soil conservation measures including mulching, credit and subsidy, development of marketing facilities, nutritional improvement, population control measures, and ownership of land and trees. A separate working circle may be included in the Working plans for the control of shifting cultivation inside reserved and protected forests, preferably on the watershed or catchment basis in the next plan. The development of minor forest produces should form an integral part of tribal development strategy mainly due to their great potential in providing employment: Kendu Leaf (*Diospyrosmelanoxylon*) offer work opportunities during the month of March to May, Sal seeds collection during May and June, plantation activities during July to October and timber harvesting operations during October to May. Mahua (*Madhucaindica*) flowers collection provide good income opportunities.

5.14.4.4 Agro-forestry systems, offered as alternatives to shifting cultivation, should not only be sustainable, equitable, silviculturally sound and economically viable but also socially adoptable. The adoptability of agro-forestry models requires constant dialogue with tribals for soliciting their approval. The Government Will for weaning away tribals from the unsustainable land-use of shifting cultivation, by harmonizing avenues of income with the right land-use practices, has been recently stated in the Forestry Policy. The traditional practice of maintaining groves of Jackfruit , Mango (*Mangifera indica*) and other suitable fruit bearing species, which is popular in the North and South Orissa, may be used in evolving location specific agro-forestry systems.

5.14.5. Role of Agro-forestry:

5.14.5.1 The major objective of agro-forestry which is pertinent to the Phulbani Forest Division is to optimize production and economic returns per unit area, while respecting

the principle of sustainable development. In order to attain this objective, certain agro-forestry models have been evolved and standardized, combining optimum land-use system with tree-agriculture-livestock production system to give maximum economic returns, simultaneously or sequentially. However, the models have to be designed in such a manner so as to make them technologically feasible, ecologically sustainable, economically viable, and socially acceptable.

5.14.5.2 Design is a strategic tool for popularizing a particular agro-forestry model. The creative potential of scientists shall concentrate upon the value engineering, methods of design optimization, ergonomic considerations, synergic combinations of tree-crop interactions, designs innovation, and development of models, based upon needs, site capacity, economic returns, and above all, the environmental services. The model designs and preferences may be need (Product) specific, economic value specific, site specific, cultural value specific, technology specific and combination specific.

5.14.5.3 Practically most of the adopted agro-forestry land use systems require neither most costly external inputs nor complex technology. The traditional hill agriculture including horticulture, forestry and livestock together meet the demands of the local people, food, fodder, fuel, fertilizer, fibre, timber, medicinal and commodity crops, and also giving some economic return. The indigenous trees are given to increase the over all Productivity on long term basis.

5.14.5.4 Agro-forestry can play an important role in the production and conservation of medicinal plants. The medicinal plants can be integrated into different agro-forestry systems by using the espacement in between the trees for growing medicinal plants. In this way we can ease the pressure on natural resources; make available fresh, genuine and quality raw material for manufacturing high quality drugs and also conserving biological and genetic diversity besides providing employment opportunities to local/tribal people and alternate source of income to farmers.

5.14.6 Fuel wood Strategy:

5.14.6.1 The rural household sector pertaining to Phulbani Forest Division depends heavily on biomass source of fuel energy to meet cooking energy needs. Of all, this sector accounts for bulk of total fuel energy consumption with which a large segment of population is associated. Admittedly, the traditional source of cooking energy in

Orissa is firewood. It is widely used in cooking, water heating, body warming etc. in rural areas, and in particular, by poor people. As a result, the scarcity of fuel wood has not only resulted in a price hike, but also has led to the use of animal dung, agricultural waste, which has indeed other alternative uses. Further, the growing demand for fuel wood in recent years has also aggravated the cooking energy problem in Orissa. In particular, owing to rapid denudation of forest cover and irregular as well as erratic supply of non-commercial energy in recent years, a chain of reactions have automatically set in. Of all, the continuing depletion forests cover has emerged as a serious threat to future energy situation in the Division.

5.14.6.2 In reality, most of the fuel energy used by rural households does not enter into organized market network. This poses therefore, a constraint relating to collection of data to ascertain pattern of supply and demand for consumption of energy in rural areas. The consumption pattern of fuel energy in the household sector is influenced by a set of factors like price, household income, rate of urbanization, besides the extent of introduction/application of efficient cooking methods and gadgets etc. therefore, an alternative pattern of energy consumption is expected to exhibit important changes in socio-economic structure, and the emergence of an energy culture among the urban and rural elites. This stimulates the demand for cooking gas, electricity for cooking as well as illumination. In view of a set of peculiarities of needs in the consumption sector and changing environment, a wide range of inter-regional, inter-sectoral variations in regard to fuel wood requirement are evidently noticed. Besides, the social customs, traditions and culture of the people also play a significant role in determining the consumption pattern of fuel energy, and these also undergo changes over time.

5.14.6.3 The foregoing analysis made it distinctly clear that the fuel energy consumption pattern, and so also the energy problem are area/region-specific and time-specific. The nature of problem varies from place to place (even in the same place) depending primarily on its availability and affordability of consumers (access to types of fuel) respectively. The problem arises not only owing to time-specific element in it, but also relating to its availability. Since, we notice marked variations in intra-regional and inter-regional situations a uniform energy plan strategy does not seem to be at all relevant. Instead, a decentralized micro approach (keeping in view the specific resource-base of the area, and specific needs of the people) should be the basic thrust of energy plan and strategy.

Table No.- PWC-6List of Forest Roads of Phulbani Forest Division					
Sl. No	**Name of the Forest road**	**Name of the Range**	**Length in K.M.**	**Remarks**	**Remarks**
1.	Panisal-Samapaju	Sudurukumpa	16.0	3 km Black topped	Forest Diversion is to be submiited by E.E.RD.
2.	Ranipathar-Bhaliapada	Sudurukumpa	16.0	7 km Converted to jungle due to non-use.	
3.	Kutibari – Banardei	Sudurukumpa	19.0	7 km Converted to jungle due to non-use.	
4.	Rengali – Banardei	Sudurukumpa	16.00	Converted to jungle due to non-use.	
5.	Tikiripada – Samapaju	Sudurukumpa	3.0	Converted to jungle due to non-use.	
6.	Sikadi – Dalapada	Phulbani	5.0		
7.	Datapaju – Panasapadar	Phulbani	8.0		
8.	Tikiripada – Panasapadar	Phulbani	16.00	Converted to jungle	
9.	Katringia – Katramala	Phulbani	17.0	3 km Black topped	Forest Diversion is to be submiited by E.E.RD.
10.	Palchi – Kalabagh	Phulbani	3.00		
11.	Gochapada – Murja	Phiringia	3.0		
12.	Balandapada – Narayanprasad	Phiringia	10.0	10 km black topped	
13.	Pasara – Mundagaon	Tikabali	10.0	10km Black topped	
14.	Kupati – Chahali	Tikabali	9.0		
15.	Chahali – Rupagaon	Tikabali	9.0	9 km Black topped	
16.	Rupagaon – Budakakhele	Tikabali	6.0		
17.	Gosama – Andrigada	Tikabali	8.5		
18.	Kupati – Gosama	Tikabali	5.5	Converted to jungle due to non-used	
19.	Nediguda – Andrigada	Tikabali	4.5	Converted to jungle due to non-	

				used	
20.	Burbinaju – Katadi	G.Udaygiri	6.5	6.5 km black topped	
21.	Approach Road to Forest to Forest Colony	G.Udaygiri	1.5	1.5 black topped	
22.	Karada – Baraba	Karada	12.0	12 km blacktopped	
23.	Karada – Pokasunga	Karada	10.2	10.2 km Black Topped	
24.	Malapanka – Baraba	Karada	3.0	3km Black Topped	
25.	Baraba – Mundapathar	Karada	3.0	Converted to jungle due to non use.	
26.	Sahajakol – Ranaba	Karada	10.0	10km Black topped	
27.	Sahajakhola – Hatimunda	Karada	3.0	Converted to jungle due to non use.	
28.	Ranaba - Baraba	Karada	8.3	3.3 km Black topped	
Total			**242.00 Kms**.		

Abstract:

i.	Length of Forest Road with Black topped condition –	81.5 km
ii.	Length of Forest Road converted to Jungle due to non-use.-	65.0 km
iii.	Proposal for Blacktopping to be submitted by E.E, RD	27.00 km
iv.	Length of Forest Road made C.C.	05.00 km
v.	Length of Forest Road to be repaired	63.5 km
	Total	242.00 km

5.14.7. Soil and Moisture Conservation Measures:

5.14.7.1 Although stopping degradation and initiating natural regeneration through community protection is the first step in restoring the productivity of forest ecosystems, natural systems can be manipulated positively to accelerate recovery and enhance the flow of desirable products. Human interventions, however, need to be directed by specific management objectives.

5.14.7.2 Soil and water conservation measures such as contour trenching, vegetative bunding, and small check-dams can enhance soil moisture and the accumulation of

topsoil, accelerating rehabilitation of the micro-environment. Such conservation measures are helpful in improving germination and growth rates of seedlings. Enrichment planting of desirable local and exotic tree species in degraded forest gaps can generate additional forest products and improve forest density and composition. Cleaning degraded forest lands of dead brush, cleaning stumps, and cutting excessive coppice shoot growth can also facilitate regeneration and promote healthy growth. More extensive enrichment planting is suitable for locations with no coppice or low coppice potential and with moderate levels of soil degradation.

5.14.8.Forest Road Network:

1. The existing forest as roads of Phulbani Forest Division which has already been reflected in Ch-III, Part-I are not properly maintained due to paucity of funds. These forest roads are major communication networks for transportation of forest produce, for supervision of forestry operations and to check smuggling, illicit felling and poaching. Forest fringe dwellers also use these forest roads. Therefore these roads require to be properly maintained. The footpaths and stoney patches on perennial streams need to be properly protected by patrolling in short intervals.

2. These forest roads/tracks should be maintained by providing drains on either side. The side drains should be periodically cleared to allow surface runoff smoothly. Cross-drains across the roads should be provided in hill slopes. Existing causeways and temporary bridges should be improved. Light morrum topping of road should be done periodically so as to prevent soil loss and erosion because of surface runoff and constant use. Roads should be repaired generally during November and December.

3. Attempt should be made to black top/make all weather roads connecting vulnerable forest blocks so that the intensity of patrolling can be maintained during the rainy season.

4. The concerned Range officer shall prepare a plan and estimate for annual repair/special repair after physical verification of forest roads and obtain the approval of the competent authority prior to execution of the work. In case of new construction, detailed investigation shall be undertaken before execution of any such project.

5.14 .9.Forest Fire Protection:

1. The forest blocks coming under Protection Working Circle should be protected from fire. The Orissa Forest Fire Protection Rule, 1980 and provisions of Orissa Forest Department Code should be strictly reinforced in the field to preserve the precious micro-flora and fauna from further deterioration.
2. The extent of fire and fire prone areas of the Division in respective blocks has been in explained in following table. However, protection against fire requires concerted effort of the field staff and the forest fringe dwellers during the period January to May.

Sl. No.	Zone	Range	Forest Block	Beat
1	Very Severe	Phulbani	Kalabagh RF	Kalabagh
2			Katringia RF, Mallickpada PRF	Katringia
3		Sudrukumpa	Sudrukumpa RF, Ranipathar RF	Sudrukumpa
4			Donga RF, Sudrukumpa RF	Tikiripada
5			Ranipathar RF	Ranipathar(S)
6		Phiringia	Balandapada (N) PRF	Balandapada
			Balandapada (S) PRF	
7			Krandibali(W) RF, Krandibali (E) RF	Krandibali
8			Baghanadi RF, Krandibali (W) RF, Gocchapada RF	Gocchapada
9			Kiamunda RF, Ladapadar RF Balanadapada (S) PRF, Sadingia RF Damingia PRF	Sadingia
10			Damingia PRF, Damingia Extn PRF, Nuapadar RF, Gerupada(W)RF	Rabingia
Sl. No.	**Zone**	**Range**	**Forest Block**	**Beat**
1	Severe	Phulbani	Khajuripada RF, Bhaliapada RF	Bhaliapada
2		Sudrukumpa	Ranipathar RF, Donga RF	Ranipathar(N)
3		Phiringia	Baghanadi RF, Balandapada (N) PRF	Loising
4			Gochhapada RF Mallickpada PRF	Mallickpada
5			Gochhapada RF Krandibali (E) RF	Musulipanga

6			Kiamunda PRF, Krandibali(W) RF, Balandapada (S) PRF,	Pindangi
7			Baghanadi RF,	Pakadi
			Balandapada (N) PRF	
			Balanadapada (S) PRF	
8		Tikabali	Burtang RF, Nandini A PRF	Pasara
9			Linepada RF, Gutingi A RF, Ragaguda RF, Linepada RF	Sankarakhol
Sl No.	**Zone**	**Range**	**Forest Block**	**Beat**
1	Medium	Phulbani	Palchi RF	Katramal
2			Kalabagh RF	Dadaki
3			Khajuripada RF, Ganjuguda (B) PRF	Khajuripada
4		Sudrukumpa	Donga RF	Banaradei
5			Donga RF, Ranipathar RF	Kirima
6			Donga RF	Kurumuni
7		Tikabali	Ragaguda RF, Burtang RF, Archangi RF	Bardakhol
8			Chakapda RF	Gasamaha
9			Mundula RF, Chakapada RF	Ghatiguda
10		G.Udayagiri	Dakapalla RF, Katingia PRF Gidipabali RF	Lingagarh
11			Bhanjapadar RF, Talarimaha PRF	Talarimaha
12		Raikia	Karada PRF	Dakarabadi
13			Karada PRF	Karada
14		Karada	Badegada PRF, Baraba RF, Ranaba RF	Badagarh
15			Nandabali PRF	Dangesi
Sl. No.	**Zone**	**Range**	**Forest Block**	**Beat**
1	Light	Phulbani	Burtang (N) RF	Dalapada
2		Sudrukumpa	Sudrukumpa RF Village Forest	Bhetkhol
3			Donga RF	Duguda

4			Donga RF	Kutibari
5			Donga RF	Sikadi
6		Phiringia	Bandhagada A PRF	Bandhagarh
7		Tikabali	Chakapada RF	Chahali
8			Nandabali PRF, Burtang (S) RF	Chakapada
9			Chakapada RF	Kupati
10		G.Udayagiri	Talarimaha PRF, Baliapata RF	Kalinga
11		Raikia	Sikabadi PRF	malaguda
12			Manikeswar PRF	Raikia
13		Karada	Baraba RF, Ranaba RF	Baraba
14			Macchaghat RF, Badegada PRF	Gandharbhuin
15			Ranaba RF	Ghatikhariguda
16			Nandabali PRF	Kanadi
17			Nandabali PRF	Pokosunga
18			Ranaba RF	Ranaba
Sl. No.	**Zone**	**Range**	**Forest Block**	**Beat**
1	Insignificant	Phulbani	Phulbani PRF	Panaspadar
2			Dakapalla B RF	Phulbani
4			Katringia PRF	Dubagarh
5			Dutimendi RF	Dutipada
6			Gumagada RF	Gumagarh
7			Phulbani PRF	Tudipaju
8		Phiringia	Gochhapada RF Badagada PRF	Phiringia
9			Kelapada RF	Kelapada
10			Bandhagada A PRF	Pabingia
11		Tikabali	Tikabali RF , Tadipaju PRF Beheragaon PRF	Burtang
12			Chakapada RF	Nediguda
13			Linepada RF	Tikabali
14		G.udayagiri	Village Forest	G.udayagiri
15			Gutingia B RF	Gutingia
16			Pukulingia RF	Kurumingia
17			Padangi RF , Paburia PRF	Paburia
18			Paburia PRF	Tudubali
19		Raikia	Karada PRF	Kendukhari
20		Karada	Machhaghat RF	Dimiripalli

3. Fire continues to be the major threat to forest regeneration and establishment. Fire Watcher system needs to be strengthened in the identified vulnerable areas. Depending upon requirement and availability of funds fire watchers will be provided to every Protection unit.
4. The VSS should be involved in containing forest fires. Incidence of annual fire should be entered in the compartment history. Fire prone areas should be identified and precautionary measures taken in time. Every year fire maps need to be prepared block wise. Fire protection incentive schemes may be developed.
5. Annual fire line clearance of 1 to 2-chain width in fire sensitive areas, coupled with controlled burning shall be done under the personal supervision of the Forester/Range Officer. Moreover, old fire lines, forest roads, boundary lines, village ring shall be kept clean by taking up control burning in 1-chain strip on both sides of it.
6. Modern fire fighting methods should be adopted to prevent ground fire and crown fire.
7. Awareness on the damage caused by fire to be created amongst the people with provision of incentives so that the V.S.S. members will be encouraged to carry out the work in a devoted manner.

5.14.10.Communication System and Mobility:

1. The VHF system in vulnerable pockets of the Division needs to be strengthened. Fixed sets, mobile sets and hand set should be made available. Each Protection should be provided at least one fixed set and one hand set.

2. Since fast communication is vital for transmitting information and also for deployment as well as re-enforcement in an emergency case, there shall be VHF system with fixed stations at the Divisional office and all the Range HQs and in every Protection Unit. Besides, all the four wheel vehicles shall also be installed with mobile VHF sets.

3. Attempt shall be made to provide every Protection unit with a jeep/van.

4. Record in registers of communication through VHF and on daily patrolling done by the staff in Protection and mobile units should be properly maintained.

5. A four wheeled driven vehicle to each range should be provided to carry out gang patrolling with staffs in suspected places and routes so as to check smuggling of forest produce to a great extent.

5.15:SubsidarySilvicalture Operation

Not applicable to this working circle.

5.16:Regeneration

Not applicable to this working circle

5.17.Associated Regulations and measures:

5.17.1 Grazing Control: The annual protection areas shall remain closed for grazing for at least next five years. Grazing may be controlled in forests outside the protection series areas. Steps shall also be taken, in consultation with local people, to develop fodder resources for the use of affected local people who will be encouraged to cut grasses/collect fodder for stall-feeding of their cattle/livestock. However, the Orissa Forest (Grazing of Cattle) Rules, 1980 shall be followed meticulously.

5.17.2 People Participation: With continuing deforestation affirming the failure of conventional forest management systems, only a new paradigm for managing India's natural forests will ensure their healthy and productive existence into the twenty-first century. No longer can management objectives for forest lands rest on commercial extraction of a limited range of timber and pulpwood products to supply industrial demands. Neither can we realistically expect that establishing fast-growing tree plantations will halt or replace degrading natural forests. New priorities and objectives must supersede commercial interests, despite their historically powerful lobby. By empowering communities to establish access controls, the nation's threatened natural forests can be rehabilitated. Many communities will assume management responsibilities if forest productivity is targeted towards meeting local community needs, both economic and environmental. Given the diversity of local needs among forest-dependent users, specific 'micromanagement' by multiple objectives will be required. This will require community-based diagnostic studies and micro-planning that assesses local needs, user groups, the productive capacity of the resource base, mapping of forest boundaries, and management interventions to enhance the desired

range of biomass product flows. Through development of a co-operative partnership between forest departments and community user groups, joint forest management strategies can facilitate natural regeneration and improve management of natural forest lands. As biomass-dependent communities organize themselves around the protection and management of degraded forest lands, impressive gains in revegetation will be visible in many locations.

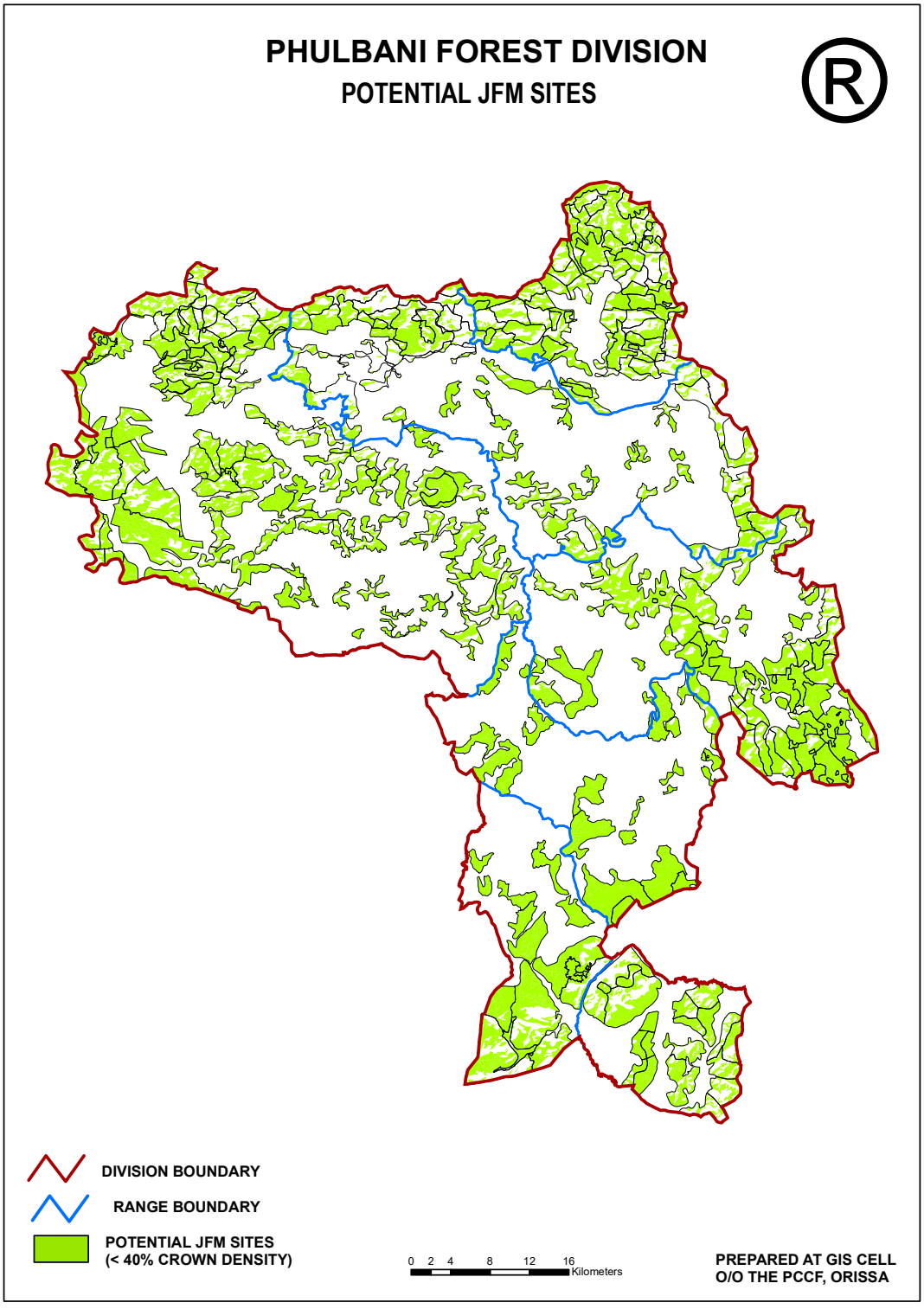
5.17.3 Rights and Concessions: Rightsand concessions under this Working Circle shall be regulated in accordance with the provisions of the Orissa Forest Act, 1972; Rules made there under besides the Government policies in force.

5.17.4 Control: All the entries regarding further encroachments, encroachment evictions, consolidation, illicit felling, poaching etc. needs to be entered in the compartment histories. All the works undertaken must be entered in the compartment histories. The checking of compartment histories should form a part of the office inspections by the Conservator and the DFO.

CHAPTER-6

THE JFM (OVERLAPPING)WORKING CIRCLE

6.1



6.2 General Constitution of Working Circle:-

This overlapping working circle overlaps with mainly the Rehabilitation Working Circle. All the forest blocks which have been allotted to the VanaSamarkashaynaSamities for protection and management as per the JFM resolution of the State have been included in this working circle. Further all the notified Village forests have also been brought under this working circle. The forest under this overlapping circle will be managed through site specific microplans prepared by the village committees which will be in consonance with the prescriptions of the main Working circle to which the forest block has been allotted. The need should be empowering the V.S.S. and making them accountable. Given proper forest management environment, it would be possible "to have the cake and eat it too". This is what Forest Management in the 21st century and new millennium will strive for.

6.2.1 The National Forest Policy of 1988 was hailed by all organizations working with people as it provided for people's involvement in forest management. In keeping with this policy, the Government of India in the Ministry of Environment and Forests issued guidelines on 1st June 1990 for involving village communities and NGOs in the protection, regeneration and development of degraded forests. This new approach is known as participatory forest management or Joint Forest Management (JFM).

6.2.2 Under the new concept, people dependent on forests are to be consulted and their views taken as the basis to plan the management of forests, keeping the silvicultural practices and sustainability as the guiding principle. The execution of forest management plan is to be done through village committee maintaining complete transparency in all transactions. The Forest Department through D.F.O. Phulbani is to provide necessary funds for various activities in the forest to the village committee as also essential technical guidance. Species selection for planting is made only as per people's preferences. The people are entitled to take the usufruct free of cost. They are also entitled to a share in timber and other major forest produce when harvested as per the JFM plan.

6.2.3. Amongst contemporary forest management strategies, JFM is both a positive and bold initiative. This programme, besides holding promise to enhance sustainability and productivity of the forest ecosystem could, to an extent, lead to fulfillment of the following long term social objectives:

1. Enabling and empowering local communities (women and men) in sharing the management of the forest, thus enhancing their sense of ownership and commitment to the forest. This will also help the communities to gain more in confidence and self esteem.
2. Building of communities' institutions for enhancing grass root level management capabilities for local resource management.
3. Relieving pressure of the Forest Department personnel from day to day management / repetitive protection duties so that their time could be utilized in other aspects of forest management which otherwise get neglected.
4. Bringing in more transparency in working of the Forest Department.

6.2.4. It has to be understood that the poor people living on the fringes of forests that eke-out their livelihood by felling forest trees or by cultivating forest lands do so because no alternative source of income is available to them. Therefore, degradation of forests through illicit felling, smuggling of forest produce and encroachment of forest lands for cultivation cannot be stopped until and unless alternative source of livelihood is provided to these people who are solely dependent on forests. Even the marginal farmer's income from rainfed agriculture is getting reduced because of degradation of forests, which causes floods, droughts, lowering of water table, soil erosion etc., resulting in loss of fertility and in the event making them dependent on forests even more. It is a vicious circle which has to be broken.

6.3 History of JFM in Orissa

Having realized that the forests can not be protected or managed properly without active involvement of the local communities, the State Government of Orissa has taken the following steps:

6.3.1 The Orissa Village Forest Rules, 1985 prescribes that there shall be a Management Plan for the management of every village forest (Rule II). It shall be the duty of all persons belonging to the community or communities for whose benefit the village forest is constituted to afford protection and ensure preservation of the plantations therein and in the event of any injury to such plantations from whatever cause, as soon as possible, report to the nearest local Forest Officer or Police Officer (Rule 6). The above Rules also prescribed that the beneficiaries shall, on payment (as per rate prescribed in Schedule of Rate for Forest Produce in Orissa Rules, 1977) be

entitled to the forest produce from the village forest for their bonafide consumption, but not for sale or barter.

6.3.2 Government Resolution dt.1/8/1988:

The next important step to involve the people in forest protection was through Government Resolution No. 10F (Pron.)-47/88/17240/FFAH dt.1/8/1988 of the Government of Orissa, FFAH Department. As per this Resolution, the villagers were assigned a specific role in the protection of Reserve Forests adjoining their villages. It was stipulated that the villagers will, in return, be granted, under section 24 of the Orissa Forest Act, 1972, certain concessions in the matter of meeting their bonafide requirement of firewood and small timber. The concerned DFO shall assign the peripheral R.F. areas to the adjoining villages according to the compartment line/natural boundary and shall constitute a Forest Protection Committee for each of the assigned village. The villagers, shall through the Forest Protection Committees, furnish an undertaking to the concerned DFO for proper upkeep and maintenance of the assigned R.F. areas. The assigned village shall be responsible for fire protection, prevention of felling, theft and smuggling of forest produce and encroachments in the assigned R.F. areas. For performance of the above duties, the villagers shall be entitled to obtain their bonafide requirement of small timber and firewood for household consumption only and not for sale or barter.

6.3.3 Government Resolution dt.13/10/1988:

The Resolution dated 1st August, 1988 was amended vide Resolution No. 10F (Pron.)-47/88/23638/FFAH dt.13/10/1988. This Resolution prescribed that the village level Forest Protection Committee (FPC) should be constituted in consultation with the local villagers. The non-official members of the village level FPC may be selected by convening a meeting of the concerned villagers. However, the Sarpanch of the concerned Gram Panchayat and the Forester shall be the chairman and convener of the committee respectively.

6.3.4 Government Resolution dt.11/12/1990:

The Resolutions of August, 1988 and October 1988 were subsequently superceded by Resolution No.10F (Pron.)-4/90/29825/FFAH dt.11/12/1990 of Government of Orissa, FF & AH Department. As per this resolution, the **"protected forests"** were also included for assignment to adjoining villages. The FPC shall as far as possible, include women and persons belonging to the SC, ST and landless

categories. The villagers shall, through the FPC, furnish an undertaking to the concerned DFO for proper upkeep and maintenance of the assigned R.F. and P.F. areas. The assigned villages shall be responsible for fire fighting and prevention of illicit felling, theft of forest produce and encroachment in the assigned R.F. and P.F. areas. For performance of the above duties, the villagers shall be entitled to obtain their bonafide requirement of small timber and firewood for household consumption only and not for sale or barter.

6.3.5 Government Resolution dt.3/7/1993:

To make the involvement more effective and transparent, the Government of Orissa in F&E Department, issued resolution No.10F (Pron.) 20/93-16700/F&E dt.3/7/1993. This resolution dealt in an exhaustive manner the involvement of the local communities in protection of adjoining forests, formation of **Vana Samrakshana Samitis (V.S.S)** and their executive committees. It also outlined the duties and responsibilities of the V.S.S. and Executive Committees, role of Forest department & Gram panchayat, preparation of JFM plan, usufructuary benefits for the V.S.S., provision of Memorandum of Understanding (MoU) etc. It provided for constitution of a State level Steering Committee chaired by the State Forest Minister to monitor and guide the implementation of the scheme/resolution.

6.3.6 Government Resolution dt.30/9/1996:

6.3.6.1 The resolution No. 22180/F&E dt.30/9/96 envisages the following pertinent points:

- Conferred specific rights in favour of the village communities in respect of various forest products.
- Prescribed that the management of the peripheral forests has to be village based.
- All kinds of forests including degraded forests will be protected with the co-operation of concerned villagers, in lieu of which the villagers will be entitled to take various forest products to meet their bonafide requirements.
- The villagers of any particular village can exercise their collective right over the forest situated within the boundaries of the village or the area notified as Village forest for the said village.
- Forest department staff not to allow other villagers to collect firewood and other forest produces from such forest.

6.3.6.2 The scope of collective right is to be conferred on the village communities. Village community actively involved in protection of plantations and forests within village boundary or adjacent area for a number of years will be conferred the responsibility for control, management and protection of the forest in question. For forests located outside the village boundary, which part will come under the control of which village community, will be decided taking into account the situation and other aspects of surrounding villages.

6.3.6.3 For this purpose the boundaries of such forest area is to be demarcated on the ground in a formal manner by the DFO, Sub-collector and Tahasildar through joint verification and the said forest is to be declared as "Village Forest" for that particular village. A management scheme for the V.F is to be prepared by the village community which needs approval by the DFO. The village community in its own authority may allow resident families to collect wood, bamboo, etc. from the V.F free of cost. The village community has full right to collection, storage, processing of the products from the said V.F. Any such produce should be disposed off only to the lessee, agents, authorized Government officials at a price fixed for the same.

6.3.7 Government of India guideline dt.21/2/2000:

The Government of India guideline vide No.22/8/2000- JFM (FPO) GoI, MOEF; Forest Protection Division gave new dimensions to the JFM concept on the following aspects:

- **(i)** Legal back-up to the JFM committees under the societies Registration Act, 1860.
- **(ii)** Participation of women in the JFM programme.
- **(iii)** Extension of JFM to good forest areas.
- **(iv)** Preparation of Micro plan for JFM areas.
- **(v)** Conflict resolution.
- **(vi)** Recognition of self-initiated groups.
- **(vii)** Contribution of regeneration of resources.
- **(viii)** Monitoring and Evaluation.

6.3.8 GOVT. RESOLUTION 9TH SEPTEMBER 2011

6.3.8.1 This resolution dealt, in a fairly exhaustive manner, the involvement of all local communities in protection of adjoining forests, formation of Van SamrakshyanaSamiti (V.S.S.), duties and responsibilities of the V.S.S. and their

Executive Committees and the role of Forest Department and Gram Panchayats, preparation of Joint Forest Management plans, usufruct benefits for the V.S.S. and provisions of MoU etc. Since these Resolutions in the past did not cover the Mangrove Wetlands and the Protected Areas (PA) of the State, i.e. National parks and Sanctuaries, and participatory modes of management are needed there too, the 2008 Resolution was issued to extend the participatory approach to all types of forests. Eco-development was adopted as a strategy in order to improve the livelihood of local people and thereby secure their support for conservation.

6.2.8.2 Participatory Forest Management in JFM mode is an evolving concept encompassing ecological socio-cultural and economic dimensions. People have played an important role in protection and regeneration of forests all over the state of Orissa. Villagers have either formed V.S.Ss as per JFM Resolution or Community Forest Management Groups outside the existing JFM framework. It is desirable that associations of people, whether formed under Government resolutions, or by peoples' own initiative, with the forest conservation as the principal and core objective, are allowed to function smoothly.

6.2.8.3 Panchayat Extension to Scheduled Area (PESA) Act, 1996, which is applicable to scheduled areas, lays down as follows: "Every Gram Sabha shall be competent to safeguard and preserve the traditions and customs of the people, their cultural identity, community resources and the customary mode of dispute resolution; Every Gram Sabha shall approve the plans, programmes and projects for social and economic development before such plans, programmes and projects are taken up for implementation by the Panchayat at the village level and be responsible for the identification or selection of persons as beneficiaries under the poverty alleviation and other programmes." This Act vests the ownership of Minor Forest Produce (MFP) on Gram Panchayats in Scheduled areas. The decision of Government of Orissa to do away with the monopolies in collection and trading in 69 items of MFP is in consonance with the spirit of PESA Act.

6.2.8.4 The community forest resource has been defined under the Scheduled Tribes andOther Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (popularly

known as Forest Rights Act). As per the said Act, community forest resource means customary common forest land within the traditional and customary boundary of the village and seasonal use of the landscape in case of pastoral communities etc. The Minor forest produce has been defined under the Forest Rights Act which includes all non-timber forest produce of plant origin such as bamboo, brushwood, stumps, cane,

tassar, cocoons honey, wax, lac, tendu or kenduleaf, medicinal plants and herbs, roots, tubers and the like. It may be mentioned here that in case of Kendu Leaf, the current policy of Government is to discharge certain responsibilities with a view to protecting the livelihood of forest dependent communities while providing management inputs to facilitate a scale of operation required for adequate value realization and sustainable management process.

6.3.8.5 Under the Forest Rights Act, the Gram Sabha is to initiate the process of determining the individual and community forest right. Therefore the enactment of FRA provides an opportunity not only to strengthen the existing Participatory Forest conservation and management initiatives but to promote such initiatives in the areas which are devoid of such institutional arrangements. With the changing scenario of Forest Management, increasing awareness among people and experiences gained from the past management practices; it is now felt necessary that the resolution on Joint Forest Management, 2008 is revised.

6.4JFM Status in Phulbani:

As per the resolution V.S.S. have already been formed with allotment of degraded forest area for protection and management by the community. In Phulbani Forest Division 759 numbers of V.S.S. have been constituted and 58274.47 ha of forest land have been allotted to the V.S.S.

The JFM (Overlapping) Working Circle includes the Working Plan area that is already under the protection of the V.S.S. constituted as per the joint forest management resolution of the State. The total area allotted to this Working Circle is 58274.47 ha. This is an Overlapping Working Circle which mainly overlaps the Rehabilitation Working Circle. The important forest blocks included in this Working Circle are:

1. Donga RF.
2. Kalamuri RF
3. Sudrukumpa RF
4. Ranaba RF
5. Baraba RF
6. Sikabadi PRF
7. Gochhapada RF
8. Nuapadar RF
9. Gerupada RF
10. Chakapad RF
11. Padangi RF
12. Burtang (S) RF
13. Kerandibali RF
14. Khaumunda RF
15. Dakapalla RF
16. Gumagarh RF
17. Machhaghat RF
18. Karada RF
19. Bandhagarh 'B' RF
20. Baghanadi RF
21. Bandhagarh 'A' PRF
22. Lendrikia RF
23. Tudubali RF
24. Tikabali RF
25. Palchi RF

All Village forests included in this Working Plan are also placed in this Working Circle. The VSS which were constituted to manage these forests as per Village Forest Rules, 1985 will continue to manage and protect these forests of the Division. They will also implement the prescriptions of this Working Circle. The prescriptions of this working circle are extended to other areas where VSS are formed during the course of implementation of this Working Plan. All new areas allotted to V.S.S. are become part of this Working Circle.

6.5General Characteristics of vegetation:-

6.5.1. Different types of forests ranging from mixed deciduous to dry deciduous scrub forest are present in this Working Circle. Due to relentless biotic interference most of these forests have become degraded. The forces driving deforestation in the Division are complex in nature. There is an urgent need to understand the relationship between resource degradation and social unrest which threaten both the environment as well as the District's social and economic stability. Although some forest blocks do disappear abruptly through clear-felling or devastating fires; most forest ecosystem instead suffer a process of degradation. This occurs through a series of human interventions that result from a lack of management controls. Multiple actors are involved in disturbing the same tract of forest at different point of time. Attempted solutions to the problems of deforestation are often misguided and ineffective. Very few patches namely Gumagarh R.F., Dakapalla R.F., Kalamuri R.F., Bandhagarh R.F., Lendrikia R.F., Bandhagarh 'A' P.R.F., Ghugulasahi R.F., which are now under V.S.S. have started showing signs ofrejuvenation.

6.5.2. The detailed description of the vegetation in these forests has been covered in Chapter-II (A) Part-I. The important species present are Shorea robusta, Anogeissus latifolia, Terminalia tomentosa, Oblgeinia oojeinensis, Syzygium cumini, Emblica officinalis, Haldina cordifolia, Aegle marmelos, Albizzia procera, Schleichera oelosa, Holarrhenaanti dysentrica, Nyctanthus arbor-tristis, Bauhinia vahlii, Asperagus recemosus, Dendrocalamus strictas etc.

6.6Felling Series, Cutting sections and JFM areas:-

Not applicable to this working circle

6.7 Blocks, Compartments and JFM area (marked on GIS bases Maps)

There are altogether 759 numbers of V.S.S. which has been formed in the Division, thereby covering a total area of **58274.47**ha. The community protected areas

are distributed in all the Ranges coming under the jurisdiction of Phulbani Forest Division. The detailed list of V.S.S. is listed **as Annexure-XIII**.

Table No: 5.1: EXTENT OF FOREST AREA UNDER JFM

Total No. of VSS	Extent of Forest Area				Total Area in Ha.
	RF (ha.)	PRF Area	VF Area	Rev. Forest Area	
1	2	3	4	5	6
759	18266.4	6501.853	1064.83	30536.77	56369.853

6.8 Special objectives of management

6.8.1 The special objectives are enumerated below:-

1. To involve communities in forest and natural resources management and soliciting their active participation.
2. To bring the people and Forest department as equal partners in management practices.
3. To restock barren and blank areas through artificial regeneration or Assisted or Aided Natural Regeneration (ANR).
4. To enrich available growing stock by appropriate and site specific silvicultural practices.
5. To increase the productivity of the soil through suitable soil and moisture conservation measures.
6. To encourage people for rational utilization of their own community resources for the development of the community in a sustained manner.
7. To involve, guide and facilitate people in judicious and scientific NTFP collection, storage, value addition and trade.
8. To create multiple income generating activities in villages protecting the forests.
9. To study the scope of enhancing the network of VSS protection areas.

6.8.2 To achieve the above objective, the criteria to be applied should include the following changes:

1. From "change the nature" to "follow the nature"
2. From "commercial management" to "eco-system management"

3. From "classification of forests and trees based on their timber value" to "classification based on their ecology".
4. From "exotics" to "indigenous" species.
5. From "single product timber system" to one in which multi-products will meet the subsistence and welfare needs of the people.
6. From "clear felling" to selective/group selection.
7. From "de-empowering" people to empowering people.
8. From "excluding people" to "including people and making them partners in planning, implementation and profit".
9. From "policing" to "persuasive co-operation".
10. From "authoritarian administration" to "sharing authority".
11. From "government control" to "community control" of common property resources.
12. From "timber research" to "all product research".

6.8.3 Analysis and valuation:-The forest blocks allotted to this Working Circle are Village Forests or degraded R.Fs, proposed R.Fs, D.P.Fs, and K.Fs. etc. All these blocks have potential for rapid improvement since they have rooted waste, coppice shoots and pole crops. Degradation of these forests has taken place due to continuous biotic interference, fire, unregulated grazing etc. It is expected that with the formation of VSS and allotment of these degraded forests to the villagers most of the biotic pressure will be reduced thereby allowing for rejuvenation of the crop.

As per JFM resolution of the State, micro plans are prepared for the area allotted to the V.S.S. The V.S.S. micro plans should be site specific treatment plan and normally follow the prescriptions outlined in the Rehabilitation Working Circle and JFM Working Circle.

6.9.Sivicultural system

Not applicable to this Working Circle

6.10 Rotation period

Not applicable to this Working Circle

6.11 Harvestable diameters

Not applicable to this Working Circle

6.12 Reducing factors and reduced areas

Not applicable to this Working Circle

6.13 Felling cycle

Not applicable to this Working Circle

6.14 Division into periods and allotment to periodic blocks (PB)

Not applicable to this Division.

6.15 Calculation of the yield

Not applicable to this Working Circle

6.16 Table of felling

Not applicable to this Working Circle

6.17Method of executing the felling/ Implementation of JFM

6.17.1 The following steps should be scrupulously followed in the implementation of a JFM project;

1. Formal agreement of the Villagers to protect surrounding forest areas (achieved through motivation provided by forest department/local NGOs/informed villagers themselves/informal meeting etc.)
2. Formation of VSS and General Body with due representation from the villagers and forest department, as per the existing guidelines.
3. Registration of the VSS with the competent authority, as per the guidelines on the subject issued by the State Government.
4. Initial Survey and demarcation of the areas to be protected by the villagers-jointly carried out by the villagers/VSS /forest department.
5. Resolution of conflicts about the selected areas, if any, vis-à-vis other adjoining villages and finalizing the areas to be protected. Recognition of the forest area allotted by the Panchayat and all neighbouring villages.
6. Formalise the selected areas by demarcating with pillars, etc.
7. Assignment of the finalized area to the VSS by the forest department for protection, rehabilitation and management.
8. Finalisation of the protection mechanism, rules for penalties to be paid by the offenders, establishment of village fund, benefit sharing mechanisms, calendar

of VSS/General Body meetings, quorum laid down for the meetings including the number of women representatives mandatorily required to be present, by the VSS in consultation with the villagers and forest department.

9. Participatory Rural Appraisal (PRA) by the forest department/NGOs to prepare micro-plans for the development planned inside and outside the selected area, in consultation with villagers and NGOs. The micro-plans specify the development methodology proposed (e.g. the plantations) proposed to be taken up, choice of species, water management, treatment required (viz.soils), other developmental needs of the village (e.g. P.H.C, School, bore well, water pumps etc).

10. Secure funding from the government: for the forestry related activities identified in the microplans, from concerned line departments. The forest department liaisons with the other development agencies in the district for the latter.

11. Commence implementation.

12. Training of VSS members in convening meetings, recording of minutes, account keeping, etc. and training of front line field staff of forest department, particularly in communication skills.

13. Monitoring of the functioning of the VSS by the forest department, and the extent of effective community participation in protection, rehabilitation and management of the forest areas assigned to VFC, through minutes of the VFC meetings.

14. Review of progress and results by independent agencies such as NGOs, etc.

Training of JFM to be imparted by Regional Centres and training packages would need to address the forest department and villagers.

6.17.2 Capacity building for JFM:

Different training programs has been organized in Phulbani Forest Division during the previous plan period under Odisha Forestry Sector Development Project. Different stakeholders like VSS Members, Foresters, Forestguards& NGO Team have been trained to strengthen the JFM activities through community mobilization, forest protection and other ancillary activites. The detail capacity building programs are furnished as **Annexure-XXII**.

6.17.3Senior Officials (like DFOs.):

Attitudinal aspects, success stories from other states, communication skills.

6.17.4Range Officers and below:

This group is usually excluded from JFM oriented training programmes, but needs to be trained since it is this group that interacts directly with the villagers in planning and implementation of the projects. Such groups could be trained on the techniques of conducting PRAs, development of micro-plans, how to motivate and involve the village communities, conflict resolution aspects, monitoring of JFM projects. Development of success indicators for a given project is another important topic for training of the group.

6.17.5Villagers:

The areas to be selected for protection, factors to be considered for developing micro-plans and their proper implementation, success indicators and how to monitor them, book-keeping and maintenance of records. The objective should be that finally monitoring is done by VFCs/village communities themselves.

6.17.6 Role of NGOs:

They should help the government implementing agencies in facilitating motivation of village communities, carrying out PRAs. and preparation of micro-plans. The Regional Centres could involve the local and other prominent NGOs in imparting the training modules proposed above.

6.17.7 Use of participatory rural appraisal in microplanning:

Participatory Rural Appraisal (PRA) is a process to establish a relationship between two groups,viz; Government and the People. It may be between any agency or an NGO and the people of a particular area. The idea is to bring people together on a common platform and make them share information on a particular subject (forestry, agriculture etc.). In this process the Government or the outside agency has to restrict itself to the role of a facilitator)

PRA is a process which may begin with a few interactions or meetings between the two groups and gradually it should lead to a set of actions by the people which may be structured and spread over a few years with catalytic support from the Government / out side agency. Such a set of actions may be called a Micro plan or a community action plan as the case may be. For an effective implementation of the said plan, constant interactions between the two groups are necessary. PRA is

therefore a process, which calls for regular interactions between the two groups for its success.

6.18The methodology to be adopted:

6.18.1 There are a few exercises, which are usually carried out under PRA. Broadly, it may begin with the visit of a few officers and staffs of the Forest Department in our case, to a village. It would be better if prior to this visit the Forester/Forest Guard of that area meets those villagers and informs them that a group of officers and staff would be going to that village. It would be still better if a convenient time for the villagers is enquired into and accordingly time and venue fixed. It is important to find out their convenience and adjust our visit to suit them. We have to remember that the JFM resolution of 1993 describes the Government and people as "equal partners". Hence finding out their convenience and adjusting to it would be a step in the right direction.

6.18.2 After having fixed the time it is important to stick to our time and not to keep the people waiting. An open space under a tree or a school building of that village would be an ideal meeting place. The villagers may provide chairs for the officers to sit, but it is important to sit down with the people on the ground and conduct the meeting on mats or "*durries*" may be called for.

6.18.3 The first thing to do is to introduce ourselves clearly and loudly so that all the people can hear us and while introducing ourselves it would be good to make it clear to them that our purpose is to find out from them how they have been managing their forests and to learn from them as to how it should be managed in the best way. Then the people should be asked to introduce themselves.

6.18.4 After the introduction is over, it would be good to start the discussion by complementing the people for some appreciating thing noticed about their village. It may be the clean road of their village or neatly kept houses. This helps to set a positive frame of mind for the exercise to start with. There are some exercises like:

1. Preparation of a village map by the people.
2. Preparation of a seasonal calendar listing out activities for different months of the year.
3. Historical transect-giving the condition of the crops, the rainfall pattern, the population, the forest cover etc. over a period of time say 15 year ago, 10 year

ago, 5 year ago, and the present condition in order to have an idea of the changes over time.

6.18.4 Some more exercises like ranking of activities and survey of forest tree species near the village may be done by different groups for different purposes. For our purpose it would be sufficient to do the first three activities, namely preparation of a village map, seasonal calendar and historical transect. Sometime the people may ask us the purpose of doing these exercises. In some villages, they may even ask what programme the Government is going to bring about for their village. It is important to emphasize that our purpose is mainly to understand how the people are managing their forest resource all these years. The visit of officers of any Government Department naturally raises the hopes of the people. They may even start giving their problems and seek help. It is therefore important to keep repeating that ours is an academic exercise to involve them and learn from their success in forest protection/Management.

6.18.5A general question may be asked in order to prepare the people for the exercises and that question may be framed like this: Is it better to try and solve our problems by our own collective efforts or should not keep waiting for the Government or an NGO or any outside agency to come and solve our problem? The response may not be readily forthcoming. So, we may wait for them to think and then give their answer. It would also be necessary to repeat this question at least three times so that they are able to hear it properly and then give their answer after some thought. We may also write it out on a board. Patience is necessary throughout this exercise. Patience along with parse variance would be needed abundantly. More often than not, the majority opinion would be that we should try and solve our problems by ourselves; once we get this reply from the majority of the people we may thank them for their positive approach to their problems. In case we have a situation in which the majority of the people say that they have to depend upon Government or any outside agency to solve their problems then we may have to say that we have no other option but to leave that village and proceed to any other village nearby. Normally such a situation may not arise.

6.18.6 Once we have the people with us that they would like to solve their problems by their own collective action we may thank them and appreciate their positive approach and then request them to divide themselves into three groups. Care may be needed to ensure that in each group man, women and children are represented. There should be a couple of officers and staff to attend to each group. One group

should be asked to draw a map of their village showing their houses, the approach road, their agricultural fields, their school building, if any etc. It may be noted that the map need not be to the scale. The purpose is not to prepare a map for use by a tourist or for our department work. The idea is only to bring them together and make them work together. It would take some requesting and coaxing to get them to do this work, unless some one volunteers to do it from the group. A student may come forward and who-ever starts to do the drawing should be encouraged. Soon we would find that the group starts working with each one giving some suggestion and trying to point out some corrections in the map.

6.18.7 Simultaneously the second group should be asked to take up the historical transect. Here also the idea is to make them work together and represent the condition over a period of time which may be divided into five year periods of the situation 15 year ago, 10 years ago, 5 year ago and the present. The data to be given may cover the following:

1. Rainfall, area under agriculture and the different crops raised, population, forest cover etc. If some elderly people are available in the group they may be asked to narrate the situation 20 years ago or 25 years ago. Pictures may be drawn to represent the data items like rainfall, agricultural corps, population etc. The officers and the staff should avoid drawing, but should keep on encouraging and calling upon the people to do the drawing or the writing as the case may be. It is important to play our role as a facilitator right from the beginning.

6.18.8 The Third group should be asked to prepare to seasonal calendar. Some procedure should be adopted of making the people come up with their information which should also be recorded by one of them. Questions may be asked like in the month of January what agricultural activity is done? Do you sow seeds or do you plough the land? As the answers start coming we may get one of them to start recording it in the form of a diagram preferably a circle divided into 12 quadrants. Each quadrant would represent a month and the activities or the crops may be represented in the form of pictures.

6.18.9 The exercises of getting the three groups working may take quite some time. There should be no hurry at all on our part. The three groups may complete their work after more than an hour. All along they should be asked questions and made to think and come up with their answers. Once they complete their exercise, one or two

from each group should be asked to come and present their findings. As they make their presentations, others from other groups may give- some further informations or corrections, which should all be welcomed with thanks. At the end of the presentations the leader of the team from our side should thank them for their effort to generate such a lot of informations. They have to be told that we are grateful for their collective participation. The exercise of preparing the village map, the historical transect and the seasonal calendar would also help us to identify the promising one among them who could be taken as members of the Executive Committee of the V.S.S.

6.18.10 This first exercise should be followed by several other visits in order to form the V.S.S. and then to prepare the micro plan. At all stages we should look for their suggestions and ideas and avoid projecting our own ideas. If we start giving our ideas then they may take it as such without owning it and that would not last. They may come back to us later saying that it did not work. But if they come up with an idea & we give them the support/facilitate it, the chances of success become much greater.

6.19.<u>Microplanning:</u>

Any forestry programme with people's participation as an integral component is to be based on the needs and resources at the local level. To meet these needs, a micro-plan should be in operation. This micro plan should include:

1. Village would be the unit for microplanning.
2. Be prepared with active participation of people.
3. Target existing stake holders/common interest group.
4. Aim to link local resources to local needs and programme objectives.
5. Be a simple document which the villagers can understand.
6. Require not more than 20-25 man-days to prepare.
7. Not to be a miniature version of the project proposal.

Plan preparation should normally processed through Participatory/Rapid Rural appraisal.

Microplans are to be prepared based on PRA/RRA. This would include.

<u>6.19.1 Feedback from the people:</u>

Meetings with common interest groups or the whole village collectively must be done right at the beginning. The objectives of the Scheme must be made clear to the people before eliciting their opinion as to their needs and expectations.

6.19.2 Collection of relevant Baseline data for the micro plani.e. both for theEntry point activities and rehabilitation plan. These data will cover:

a. Physical and financial resources of the area.

b. Extent and type of existing land degradation.

c. Human and cattle populations with relevant details.

d. Socio-economic profile.

e. Specific information relating to the forest area/extraction there from etc.

6.19.3 Based on these information technical plans are to be prepared so that they:

a. Are area-specific.
b. Specify the activities with timeframes.
c. Specify duties and obligations of participants.
d. Specify rights and benefits to participants.
e. Specify type and manner of record management.
f. A suitable Treatment Sketch maps for each area should be mandatory.

6.19.4 Discussion and finalization of Microplans:

The plans prepared should be presented to the concerned villagers/interest groups. These plans should be discussed openly and advice of all interested parties heard and debated. The plans should incorporate changes, if any and finalised with the approval of the village community.

6.20Guidelines for Entry Point Activities for JFM:

6.20.1 Whereas involvement of local communities in forestry programmes is a desirable objective, it is often difficult to achieve because of the following reasons:

(a) Forest activities have long gestation periods and are, therefore, accorded low priority by the local community.
(b) Forestry programmes are considered to be 'government' programmes; where implementation and protection is seen as the responsibility of the forest department.
(c) Most of the forestry/plantation programmes entail 'closure' of the area, which increases hardship to the local people.
(d) Co-operation of almost all stakeholders is necessary for successful protection of plantations.

6.20.2 Entry point and other relevant promotional activities may help overcome these hurdles. The objectives of these activities should be:

(a) To mobilize all stakeholders/the community.

(b) To compensate the community for the loss due to 'closure' (in particular those enjoying traditions rights to forest produce).

6.20.3 The community should collectively identify entry point activities Entry Point activities should include creation of community assets to be maintained by them for example.

- Water harvesting structures like check dams for irrigation, drinking water requirements and amelioration of soil moisture regime.
- Digging of wells for supply of drinking water.
- Creation of roads and culverts.
- Construction of sheds for school and community use assets.
- Installation of energy saving and energy alternative devices.
- Rule electrification through the use of solar power.

6.20.4 The above is an illustrative list, and other activities as may be necessary as per the local conditions and requirements may also be taken up commensurate with the approved microplan.

6.20.5 The main objective of the entry point and other promotional activities is to elicit the willing participation of the communities in JFM. The former would be useful in breaking the ice and to win the trust and confidence of the people. They should normally cease or taper off with formation of the Village Development Fund (VDF), since the fund provides a more formal, larger and endurable financial basis for mitigating and maintaining developmental activities as may be decided by the community as a whole.

6.21Grazing Control:

Natural resources like forests, water and land under the impact of ever-increasing population explosion are depleting at an alarming rate. Almost all fundamental needs in a rural household are biomass based. Several of these, viz., firewood, timber, medicinal plants, crop wastes, cow dung, leaf litter and others are collected freely from immediate surroundings. As most of the people are unable to get these basic requirements, they resort to illicit felling and overgrazing in forests. In the process of free gathering of firewood and fodder, uncontrolled grazing and recurring fires, some drastic ecological changes surface, thereby causing considerable damage to the forest vegetation and the soil. The ill effects of these pressures give rise to many irreversible ecological crises and consequently shattered economic sustainability.

In order to improve the biomass vis-à-vis controlled grazing in the study area, following steps need to be taken to tackle the problem of excessive grazing:

1. Involving the local people in the planning processes of forest management;
2. Regulated grazing encompassing a certain forest area for grazing and refraining grazing in strictly prohibited areas;
3. Improvement of forage resources and animal breeds;
4. Management and utilization of native fodder trees.

6.22Strategy for participation of women in JFM:

Women can play a dominant role in the implementation of JFM strategies because of their intimate association with forests. They depend on forests for various livelihood security services. They must get equal representation in the VSS/VFPC. They should have a choice in the decision making viz. in the selection of species and other silvicultural measures for upgrading the degraded forest's vegetal cover and biodiversity. Various women groups/SHQ groups can be constituted to establish alternate income generating activities to ameliorate the living conditions of poor and destitute women dependent entirely on forest for their sustenance.

6.23Human Resources Development from JFM perspective:

Success of JFM depends on good relationship between the Forest Department and local communities so that they can work together in unison to meet common objectives. This in turn requires new skills of analysis and understanding, with more emphasis on listening and learning than traditional roles. Since JFM is a new process calling for the attitudinal and behavioral changes in the staff, training should be imparted to all categories of staff in PRA and extension skills. Such an approach has given a new and demanding role to field staffs, especially the Forest Guard and Forester, who will become facilitators and advisers rather than regulators. VSS/VFPC members should be given training in institutional building book keeping skills, common property management, SHG group concept, conflict resolution etc. Exposure trips to successful areas should also be arranged to have shared vision amongst the members of the organization and members of the community.

The local NGOs should be involved in motivating the rural people towards the development of JFM, protection and management of forests. They should organize training of V.S.S./VFPC level so as to create awareness among people, particularly

women and poor marginalized groups about JFM concept and participatory management.

Skill training in traditional and non-traditional articles coupled with Vermiculture, Bee keeping and Honey processing, NTFP processing, income-generating activities, supply of smokeless chullah, grafting techniques, raising of plantation and nursery etc. should be imparted to rural poor and tribal living in and around the JFM areas for their economic upliftment.

6.24Conflict management in JFM:

The following conflicts remain to be negotiated by natural resource managers/Foresters:

1. Issues of short term livelihood needs and long term ecological conservation.
2. Increasing biotic interference and limited carrying capacity of forest area.
3. Resource ownership and programme ownership.
4. Controls on exploitation and harvesting and increasing the scope of sharing.
5. Extent of management by the people.
6. Socio-cultural background and collective management ensuring equity and no gender biases.
7. Poor or limited market infrastructure and emphasis on NTFP's marketing.
8. Economic, political and social plurality and task singularities as collective resource sharing, recycling the benefits and participatory decision making.
9. Strong authority of Forest Department and sharing of authority, responsibility, control, facilitating empowerment.
10. Demand between forestry and non-forestry uses of land in R.F. areas.

To overcome above challenges, the negotiation skills of the foresters can play a positive role in shaping the institutionalization of JFM on the Division. The real challenge lies in the pace of transformation of organizational mandate into institutionalized process of participatory management. The present day ecological conflicts have their roots in economic compulsions, sociological stresses, technological intensification, changing consumption pattern, scarce land availability and contending resource users.

6.25Research needs in JFM:

Research is needed in a number of important policy related areas that will effectively help in monitoring the success/failure and thus need remedial action. There are:

1. Identifying factors facilitating/retarding people's participation in different geographical areas and socio-cultural contexts.
2. Properly understanding the socio-anthropological dimensions and historical genesis of conflicts in man-forest interface and also rationalization of man-forest interactions in the context of changing socio-economic needs of society.
3. Addressing gender issues through forestry programmes.
4. Systematic programmes for genetic improvement and silvicultural management of tree and non-tree species which are of direct importance to local communities.

6.26Sustainability in JFM:

Stated briefly, the concept of JFM rests on three pillars, for example:

6.26.1 Ecological Sustainability:

i. Appropriate resource assessment and enhancement.
ii. In situ/Ex-situ conservation and propagation.
iii. Non-destructive harvest.
iv. Integrated eco-system approach.

6.26.2 Economic sustainability:

i. Rural income generation.
ii. Food security.
iii. Health cover.
iv. Institutional support.
v. Processing, grading and value addition.
vi. Marketing.

6.26.3 Socio-cultural sustainability:

i. Capacity building of people at all levels.
ii. Liberal use of social capital.
iii. Incorporation of traditional knowledge base in forest management.
iv. Representation of people from different communities.
v. Priority given to people dependent entirely on forest resources.
vi. Respect to value based systems.

vii. Consideration for social norms and traditions of various groups.

6.26.4 An organized judicious way of thinking is required for a balanced resource management. Taking people away from disorganized to organized thinking, from unidirectional to multidirectional approach, from conflicts and mistrusts to complementary actions, from compartmentalisation to integrated approach is a difficult task, but not impossible. The successful implementation of JFM would be an attempt in that direction. The concept has over the years evolved from participatory management to joint management, but the reflection of the philosophy is expressed more explicitly by the term collective management, which goes much beyond the simple control and sharing of resources. For successful implementation apart from political and administrative commitment and training of participants, the issues requiring attention are sustainability, equity, legal status, marketing, product sharing, cohesive participation by villagers, gender issues and conflict resolutions.

6.26.5 While solving these issues, the views of different groups should be articulated in an integrated and purposeful manner so that the real issues in sustainability of the resources are not lost sight of. In this task, the staffs of the Division have to shoulder a great burden of objectivity and fair play. They have to come out with visions, ideas and pragmatic philosophy and provide leadership forge consensus with other groups. The NGOs and other activists will have to come out of their cocooned networking exercises and work at the grass root level to understand the situation specific to each location so that a real JFM programme is launched.

6.27Control:

All the areas assigned to the VSS should be marked on the toposheets of 1:25000 with appropriate treatment map and plan. The works taken up in the VSS areas should be entered in the compartment histories. The checking of compartment histories should form a part of the office inspections by the conservator and the DFO.

6.28Rights and concessions:

Rights and concessions in this Working Circle shall be regulated in accordance with the provisions of the relevant gazette notifications of the respective forest blocks and Government of Orissa policy with regard to JFM. The existing rights and concessions are elaborated in Part-I of this Plan.

6.29Interim Revision:

No major changes in the prescriptions of this Working Circle are anticipated. However, it may be reviewed if necessary, after five years jointly by the Conservator of Forests (T) and Conservator of Forests (WP). Any deviations than the normal prescriptions suggested shall be subjected to approval and sanction of competent authority.

6.30Subsidiary silvicultural operations cleaning and thinning

Not applicable to this Working Circle

6.31 Regeneration

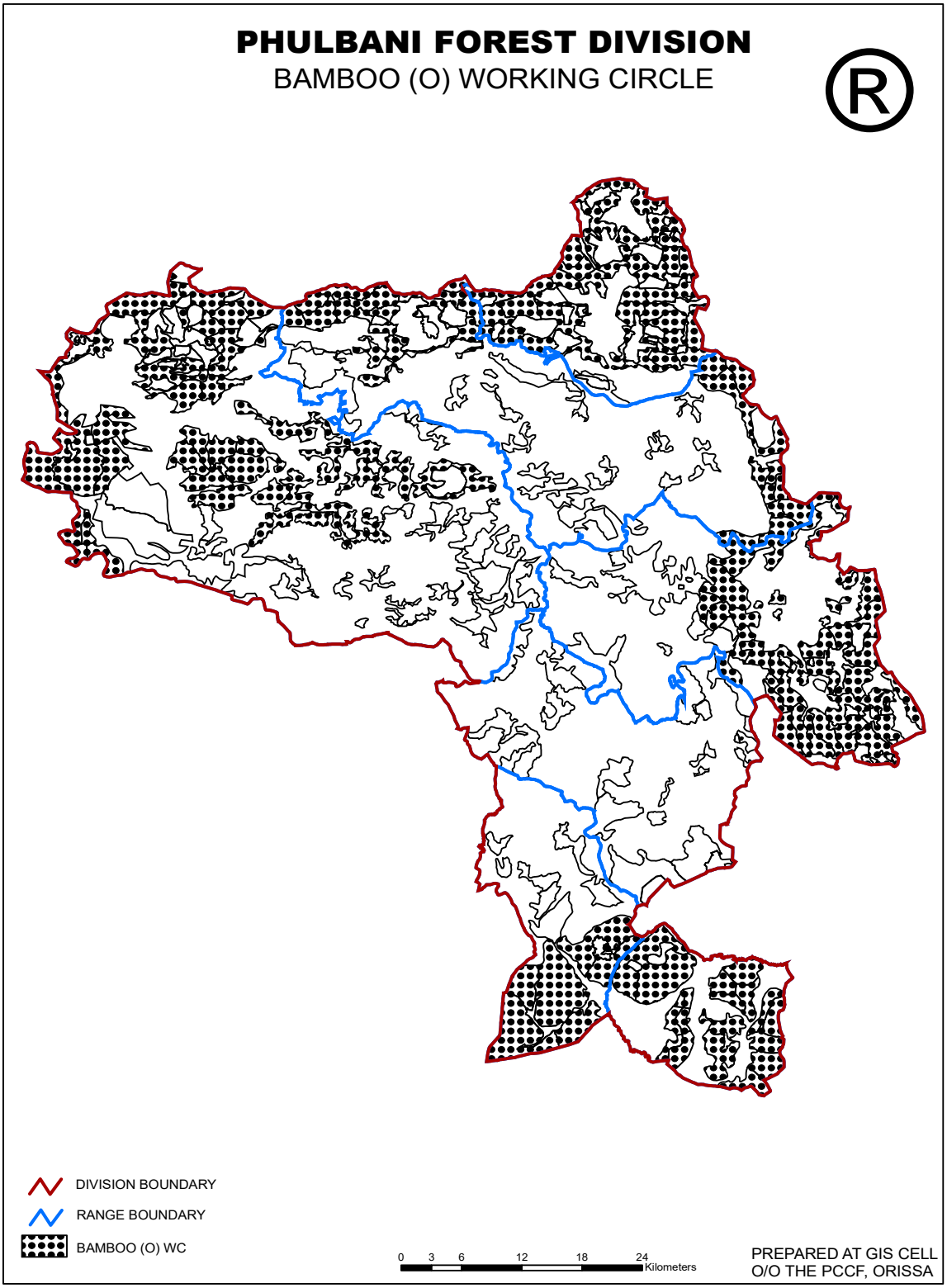
Not applicable to this Working Circle

6.32 Associated regulations and measures

Not applicable to this Working Circle

CHAPTER-7

7.1 BAMBOO (OVERLAPPING) WORKING CIRCLE



7.2 General Constitution of Working Circle:-

7.2.1. Bamboo, "the poor man's timber", is one of the most important forestry species distributed throughout the Division and has major contribution to rural economy. Most Forest areas of the Division provide a variety of products, such as timber, firewood, animal products, medicinal plants and several other tangible and intangible benefits. Among the non-wood forest products, bamboo assumes great significance in the context of high emphasis on the use of cost effective and locally available materials for construction of houses. Bamboo, one of the traditional and cheap construction materials, has been used by various sections of society for building homes since times immemorial. Bamboo is still a highly useful and preferred construction material became of its fast growth rate, short rotation harvesting, ease in transportation, working with simple tools and above all, high mechanical strength comparable with wood. Several other applications of bamboo have been reported, of which major ones include use as building material, agricultural implements, furniture, musical instruments, food items, handicrafts, raw materials for large bamboo based industries like paper and pulp and packaging.

7.2.2. This Working Circle covers all the bamboo bearing areas of this Division. Different bamboo bearing forest blocks with its condition of vegetation of bamboo availability is listed below in table no.BWC-1.This Working Circle generally overlaps areas of Selection Working Circle and Rehabilitation Working Circle. In fact, most of the areas included in this Working Circle are part of the outgoing plan and scheme. The detailed list of availability of bamboo in different forest blocks as found during field survey is shown in the table No. 5.1. This Bamboo Working Circle overlaps all Bamboo bearing areas of other Working Circles, except areas under protection working circle. In this Division, Bamboo occurs in all most all the Forests Blocks except a few blocks. The forest blocks which are suitable for commercial exploitation of bamboo are Burtang (W), Khajuripada, Kalabagh, Palchi, Ranipathar, Donga, Sudurukumpa, Baghnadi, Gochhapada, Kerandibali (E) & (W) Blocks, Archangi 'A' & 'B' blocks, Burtang 'S', Chakapad, Baraba, Machhaghat, Ranaba RF blocks including the PRFs blocks, like Ganjuguda 'A' block, Kiamunda, Balandapada 'N' & 'S' blocks, Budukakhole, Mundula, Karada, Sikabadi&Nandabali blocks. From the blocks, it is observed during field enumeration that good quality of Salia Bamboo clumps are seen in Archangi 'A' & 'B' blocks, Chakapad, Burtang 'S', Ranipathar, Donga RF blocks and in PRF blocks namely Sikabadi,

Badegarh, Nandabali blocks. The total area allotted to this Overlapping Working Circle is **99937.682**Ha.

Table No.:BWC.1 Block wise availability of Bamboo in Phulbani Forest Division.			
Sl. No.	**Name of Forest Block**	**Area in Ha.**	**Availability of Bamboo**
1	**2**	**3**	**4**
A. PhulbaniRange			
1	Balaskumpa RF	337.682	Yes, degraded
2	Bhaliapada RF	244.69	Yes, sporadically and degraded
3	Burtang North RF	1776.604	Yes, commercial exploitation can be done.
4	Dakapalla 'A' RF	275.14	Yes, degraded and damaged condition
5	Dakapalla 'B' RF	318.15	No.
6	Dutimendi RF	154.84	Yes, damaged
7	Ghugulasahi RF	116.76	Yes, degraded and damaged clump
8	Gumagarh RF	2613.35	Yes, degraded
9	Kalabagh RF	5000.13	Yes, commercial exploitation can be done.
10	Kalamuri RF	60.33	Available sporadically in damaged condition.
11	Khajuripada RF	2637.71	Yes, commercial exploitable can be done.
12	Khaumunda RF	213.84	Yes, degraded & damaged.
13	Muskuli RF	161.38	Yes, damaged condition.
14	Palchi RF	1888.9	Yes, commercial exploitation can be done.
15	Pandrisuga RF	95.82	Yes, degraded & damaged.
16	Darki RF	370.57	Yes, degraded, not commercially available.
B. SudurukumpaRange			
17	Donga RF	6868.8	Yes, commercial exploitation can be done.
18	Ranipathar RF	5134.467	Yes, commercial exploitation can be done.
19	Sudreju RF	445.55	Yes, degraded.
20	Sudurukumpa RF	4740.11	Yes, commercial exploitation can be done.
C. PhiringiaRange			
21	Baghanadi RF	9651.71	Yes, commercial exploitation can be done.
22	Bandhagarh 'B' RF	265.50	No.
23	Dahisara RF	214.78	Yes, degraded, not commercially available.
24	Gerupada 'E' RF	236.19	Yes, degraded, not commercially available.
25	Gerupada (W) RF	199.47	Yes, degraded, not commercially available.
26	Gochhapada RF	5013.36	Yes, comm. exploitation can be done.
27	Kerandibali 'E' RF	3335.241	Yes, comm. exploitation can be done.
28	Kerandibali 'W' RF	4957.53	Yes, comm. exploitation can be done?
29	Ladapadar RF	1517.67	Yes, degraded 4 & 5 comptt. (1,2,3comptt.)
30	Nuapadar RF	705.72	No
31	Sadingia RF	767.20	Yes, degraded, commercially not available.
D. TikabaliRange			
32	Archangi 'A' RF	225.84	Yes, commercial exploitation can be done.

33	Archangi 'B' RF	210.39	Yes, commercial exploitation can be done.
34	Burtanga 'S' RF	5167.59	Yes, commercial exploitation can be done.
35	Chakapad RF	12634.342	Yes, commercial exploitation can be done.
36	Ghudukapadar RF	199.81	Yes, degraded & damaged condition.
37	Linepada RF	2972.39	Yes, damaged clumps.
38	Shankarakhole RF	466.72	Yes, damaged clump.
39	Tikabali RF	84.25	No.
E. G.Udayagiri Range			
40	Dakapalla RF	265.89	Yes, degraded.
41	Gedipabali RF	326.29	Yes, degraded.
42	Godingia 'A' RF	719.79	Yes, degraded & damaged.
43	Godingia 'B' RF	734.067	Yes, degraded & damaged.
44	Pukulingia RF	169.47	Yes, degraded & damaged.
45	Sujeli RF	53.75	Yes, degraded & damaged.
46	Rotingia RF	116.31	Yes, degraded & damaged.
47	Kalinga I (Jobedi) RF	198.53	Yes, degraded & damaged.
48	Kalinga II Godingia RF	81.89	Yes, degraded & damaged.
49	Kalinga III Kurumungia RF	119.99	Yes, degraded & damaged.
50	Kalinga IV (Sandal Wood) RF	16.33	No.
51	Kanabagedi RF	192.53	Yes, degraded & damaged
52	Padangi RF	1842.44	Yes, degraded.
53	Tudubali RF	1379.906	Yes, degraded.
54	Baliapata RF	197.98	Yes, degraded.
F. RaikiaRange			
55	Dibari RF	203.78	Yes, damaged & degraded
56	Kilundi RF	270.407	Yes, damaged & degraded.
57	Lendrikia RF	700.31	Yes, damaged & degraded.
58	Raikia	655.4	Yes, damaged condition.
G. KaradaRange			
59	Baraba RF	1746.02	Yes, commercial exploitation can be done.
60	Machhaghat RF	1909.21	Yes, commercial exploitation can be done.
61	Ranaba RF	2861.429	Yes, commercial exploitation can be done.
P.R.F.			
I. PhulbaniRange			
1	Phulbani PRF	749.21	Yes, degraded.
2	Gonjuguda 'B' PRF	1034.52	Yes, commercial exploitation can be done.
3	Pilasalunki 'E' PRF	170.82	Yes, damaged condition.
4	Pilasalunki 'W' PRF	184.27	Yes, damaged condition.
5	Kalabagh PRF	215.68	Yes, degraded.
II. PhiringiaRange			
6	Bandhagada 'A' PRF	3588.414	Yes, degraded.
7	Kelapada 'A' PRF	125.81	Yes, degraded.
8	Kelapada 'B' PRF	224.66	Yes, degraded.
9	Kelapada 'C' PRF	68.66	Yes, degraded.
10	Katringia PRF	2421.86	Yes, degraded.
11	Mallickpada PRF	660.16	Yes, degraded.
12	Kiamunda PRF	4710.726	Yes, commercial exploitation can be done.
13	Damingia PRF	1127.445	Yes, degraded.
14	Damingia Ext. PRF	605.22	Yes, degraded.
15	Balandapada 'N' PRF	1273.495	Yes, commercial exploitation can be done.

16	Balandapada 'S' PRF	5714.04	Yes, commercial exploitation can be done.
III. TikabaliRange			
17	Beheragan PRF	299.172	Yes, degraded.
18	Budukakhole PRF	59.73	Yes, commercial exploitation can be done.
19	Baradikia PRF	56.09	Yes, commercial exploitation can be done.
20	Nandini 'A' PRF	151.71	Yes, commercial exploitation can be done.
21	Nandini 'B' PRF	46.94	Yes, commercial exploitation can be done.
22	Tadipaju PRF	489.20	Yes, degraded.
23	Ragaguda PRF	230.87	Yes, degraded.
24	Mundula PRF	275.36	Yes, commercial exploitation can be done.
IV. G. UdayagiriRnage.			
25	BhanjapadarPadar PRF	707.369	Yes, degraded.
26	Bakingia PRF	1796.93	Yes, degraded.
27	Katingia PRF	3090.532	Yes, degraded.
28	Paburia PRF	1330.145	Yes, degraded.
29	Talarimha PRF	1016.32	Yes degraded.
V. RaikiaRange			
30	Ganjuguda 'A' PRF	808.157	Yes, degraded.
31	Karada PRF	7048.55	Yes, commercial exploitation can be done.
32	Manikeswar PRF	557.52	Yes, degraded.
33	Sikabadi PRF	2242.533	Yes, commercial exploitation can be done.
VI. KaradaRange			
34	Badegarh PRF	1352.63	Yes, commercial exploitation can be done.
35	Nandabali PRF	3205.029	Yes, commercial exploitation can be done.
Source: Field observation.			

7.3. General Character of Vegetation:

7.3.1. Thereare commonly two species of Bamboo seen in this Division. ***Dendrocalamusstrictus*** (Salia Bamboo) occurs very commonly in different Forest Blocks of this Division. The other species namely ***Bambusaarundinacea*** (kanta bamboo) occurs in a very few restricted patches of this Division. This kanta bamboo is noticed in some parts of Chakapad RF &Burtang South RF along the nallah banks, streams and valleys. But this bamboo occurs very much sporadically along the nallah banks of Ranipathar, Donga &Archangi RF Blocks. On the other hand, Salia Bamboo occurs quite extensively on the hill slopes of different forest blocks on the eastern parts of this division and its composition became thinner as we move gradually from east towards western parts of the Division. Hence, Archangi 'A' RF, Archangi 'B' RF, Chakapad RF, Burtang South, Khajuripada RF, Ranipathar RF, Ganjuguda 'B' PRF, Donga RF, contain good quality of Bamboo clumps. Salia Bamboo occurs in scattered patches of variable extent in plains and valleys as an understorey in all forest types which are available in this Division. The occurrence of Salia bamboo which are generally found in this Division are reflected below in Table No.BWC-2.

Table No.:BWC.2 Occurrence and Quality of Salia Bamboo In Phulbani Forest Division.			
Sl. No.	**Forest Type**	**Name of the Blocks**	**Quality**
1	3 $C/_{C2C}$ North India Tropical moist deciduous forest (i) Moist peninsular high level Sal.	Donga RF, Ranipathar RF. Palchi RF, Burtang 'S' RF, Balandapada 'N' & 'S' PRF.	Q. 11/111
2	3 C/C_{2C} Moist peninsular low level Sal.	Burtang 'N' RF, Khajuripada RF, Chakapad RF, Baghanadi RF, Kalabagh RF	Q. 11/111
3	5B- C/C_{1C} North Indian Tropical	Dry Peninsular deciduous SalForest. At the lower plains & valleys of Ranaba, RF, Baraba RF Machhaghat RF	Q. 11/111
4	5B-C/C_{2C} North Indian Tropical Dry mixed deciduous forest.	On the upper hills of Ranaba RF, Baraba RF, Machhaghat RF, Ganjuguda 'B' PRF, Budukakhole PRF, Mundula PRF, Karada PRF, Sikabadi PRF, Nandabali PRF, Badegarh PRF, Balandapada 'N' & 'S' PRF	Q. 11/111
5	5B E_9 Dry Bamboo Brakes	Nandini 'A' PRF, Nandini 'B' PRF, Baradikia PRF	Q. 111
Source: Field study			

7.3.2. There are wide variations in the quality and growth which varies with topography, altitude, drainage, geological formation and biotic interference.

7.3.3. As elaborated above, most of the blocks had suffered the pernicious practice of 'shifting cultivation' in the past, thereby resulting in deterioration of bamboo clumps. The Bamboo being a light demander species has come up due to opening of canopy and the clumps devastated in the past are now growing well. But the areas under operation commercially at places of easy approach suffer over-felling by the lessee. Most of the clumps are damaged by over exploitation & illicit felling by the local people for their requirements in areas of the blocks which are nearer to human habitation. Due to this, the quality of the clumps has deteriorated considerably as noticed in some parts of Chakapad RF, Archangi RF, Ranipathar RF, Sudurukumpa RF, Gochhapada RF etc. In such areas existing VSS may be activated and awareness may be created for the protection. In some other forest blocks, the VSS are now actively involved for the improvement of Bamboo forests.

7.4.Felling series, Cutting sections and JFM areas

BWC-3 Felling series, Cutting sections and JFM areas of Bamboo(o) working circle				
Range	**Cutting Series**	**Forest Block**	**Area in Ha.**	
			Compt. No.	**Compt. Area**
Sudrukumpa	Ranipathar (N) C.S	Ranipathar RF	1	392.77
		Ranipathar RF	2	375.97
		Ranipathar RF	3	384.47
		Ranipathar RF	4	448.41
		Ranipathar RF	5	415.43
		Ranipathar RF	6	783.74
Sudrukumpa	Ranipathar (S) C.S	Ranipathar RF	7	367.02
		Ranipathar RF	12	544.33
		Ranipathar RF	10	380.34
		Ranipathar RF	11	429.71
		Ranipathar RF	8	280.557
		Ranipathar RF	9	331.72
Sudrukumpa	Donga (W) C.S	Donga RF	4	426.65
		Donga RF	1	465.68
		Donga RF	2	418.25
		Donga RF	3	396.91
		Donga RF	5	255.49
Sudrukumpa	Donga (E)C.S	Donga RF	6	376.62
		Donga RF	7	413.99
		Donga RF	8	354.81
		Donga RF	9	458.37
		Donga RF	10	458.80
Sudrukumpa	Bilabadi C.S	Donga RF	15	242.31
		Donga RF	16	459.72
		Donga RF	14	538.97
		Donga RF	12	409.58
		Donga RF	13	338.79
		Donga RF	11	388.42
		Donga RF	17	465.44
Sudrukumpa	Sudrukumpa C.S	Sudrukumpa RF	4	361.61
		Sudrukumpa RF	5	712.07
		Sudrukumpa RF	6	445.18

		Sudrukumpa RF	7	480.65
		Sudrukumpa RF	8	582.84
		Sudrukumpa RF	9	515.11
		Sudrukumpa RF	1	485.18
		Sudrukumpa RF	2	753.17
		Sudrukumpa RF	3	404.29
Phulbani	Burtang (N) C.S	Burtang (N) RF	2	593.51
		Burtang (N) RF	3	560.07
		Burtang (N) RF	4	412.014
		Burtang (N) RF	1	211.01
Phulbani	Khajuripada C.S	Khajuripada RF	4	546.26
		Khajuripada RF	1	527.67
		Khajuripada RF	2	536.26
		Khajuripada RF	3	1027.53
Phulbani	Kalabagh C.S	Kalabagh RF	6	416.88
		Kalabagh RF	7	174.73
		Kalabagh RF	8	270.22
		Kalabagh RF	9	301.79
		Kalabagh RF	10	413.78
		Kalabagh RF	11	448.69
		Kalabagh RF	12	307.84
		Kalabagh RF	13	705.61
		Kalabagh RF	14	555.55
		Palchi RF	1	409.42
		Palchi RF	2	637.20
		Palchi RF	3	433.42
		Palchi RF	4	408.88
		Kalabagh	1	120.26
		Kalabagh	2	348.55
		Kalabagh	3	407.10
		Kalabagh	4	299.19
		Kalabagh	5	229.94
Phiringia	Baghanadi C.S	Baghanadi RF	8	819.69
		Baghanadi RF	9	1270.476
		Baghanadi RF	10	973.82
		Baghanadi RF	11	307.10
		Baghanadi RF	4	730.66
		Baghanadi RF	5	533.87
		Baghanadi RF	6	487.82
		Baghanadi RF	7	664.39

		Baghanadi RF	1	789.996
		Baghanadi RF	2	462.68
		Baghanadi RF	3	385.1
		Baghanadi RF	12	430.39
		Baghanadi RF	13	622.815
		Baghanadi RF	14	1172.90
Phiringia	Ladapadar C.S	Ladapadar RF	4	450.38
		Ladapadar RF	5	271.772
		Kerandibali(W) RF	1	555.55
		Kerandibali(W) RF	2	571.17
		Kerandibali(W) RF	3	373.04
		Kerandibali(W) RF	4	1209.69
		Kerandibali(W) RF	5	843.70
		Kerandibali(W) RF	6	671.78
		Kerandibali(W) RF	7	732.64
		Ladapadar RF	1	340.70
		Ladapadar RF	2	208.70
		Ladapadar RF	3	246.11
Phiringia	Gochhapada CS	Kerandibali(E) RF	5	351.02
		Kerandibali(E) RF	6	273.37
		Kerandibali(E) RF	7	674.15
		Gochhapada RF	1	630.02
		Gochhapada RF	2	570.05
		Gochhapada RF	3	409.22
		Gochhapada RF	4	492.78
		Gochhapada RF	5	514.59
		Gochhapada RF	6	390.06
		Gochhapada RF	7	676.009
		Gochhapada RF	8	423.44
		Gochhapada RF	9	642.30
		Gochhapada RF	10	264.89
		Kerandibali (E) RF	1	602.861
		Kerandibali (E) RF	2	580.45
		Kerandibali (E) RF	3	532.87
		Kerandibali (E) RF	4	320.54
Tikabali	Chakapad C.S	Chakapad RF	9	659.23
		Chakapad RF	10	521.91
		Chakapad RF	11	985.22
		Chakapad RF	12	467.51
		Chakapad RF	1	682.26

		Chakapad RF	2	573.89
		Chakapad RF	3	511.76
		Chakapad RF	4	295.56
		Chakapad RF	5	610.917
		Chakapad RF	6	457.275
		Chakapad RF	7	536.32
		Chakapad RF	8	658.24
		Chakapad RF	16	719.80
		Chakapad RF	17	571.55
		Chakapad RF	18	467.32
		Chakapad RF	20	563.46
		Chakapad RF	21	644.08
		Ghudkapadar RF	-	199.81
		Chakapad RF	13	748.75
		Chakapad RF	14	577.87
		Chakapad RF	15	756.70
		Chakapad RF	19	624.73
Tikabali	Burtang (S) C.S	Burtang (S) RF	3	1201.85
		Burtang (S) RF	4	863.91
		Burtang (S) RF	5	426.38
		Burtang (S) RF	6	817.35
		Burtang (S) RF	1	1051.14
		Archangi 'A' RF	-	225.84
		Archangi 'B' RF	-	210.39
		Burtang (S) RF	2	806.96
Karada	Baraba C.S	Baraba RF	1	357.48
		BarabaRF (Part)	Part 2	388.435
		Baraba RF (Balance)	3	238.42
		Baraba RF	5	518.10
		Baraba RF	4	244.60
Karada	Ranaba C.S	Ranaba RF	4	752.456
		Ranaba RF	5	563.653
		Ranaba RF	1	433.11
		Ranaba RF	2	532.94
		Ranaba RF	3	579.27
Karada	Machhaghat C.S	Machhaghat RF	4	291.28
		Machhaghat RF	2	442.17
		Machhaghat RF	1	673.78
		Machhaghat RF	3	502.06
Phulbani	Khajuripada(Ganju	Ganjuguda 'B' PRF	1	557.62

	guda) C.s	(Part)		
		Ganjuguda 'B' PRF (Part)	2	476.90
Phiringia	Balandapada C.S	Balandapada (S) PRF	1	1569.79
		Balandapada (S) PRF	2	2141.25
		Balandapada (S) PRF	3	1013.55
		Balandapada (S) PRF	4	989.46
		Balandapada (N) PRF	1	758.08
		Balandapada (N) PRF	2	515.415
Tikabali	Chakapad C.S	Mundula PRF	1	146.93
		Mundula PRF	2	128.43
		Baradikia PRF	-	56.09
		Budukakhole PRF	-	59.73
		Nandini 'B' PRF	-	46.94
		Nandini 'A' PRF	-	151.71
Karada	Badegarh	Nandabali PRF	1	1462.629
		Nandabali PRF	2	1742.40
		Badegarh PRF	1	393.03
		Badegarh PRF	2	959.6
Raikia	karada	Sikabadi PRF	1	1307.402
		Sikabadi PRF	2	935.13
		Karada PRF	1	2305.65
		Karada PRF	4	1012.1
		Karada PRF	2	914.05
		Karada PRF	3	2816.75
			GRAND TOTAL	**99937.682**

7.5. <u>Constitution of Cutting Series and Annual Series</u>:

7.5.1. The blocks allotted to this Working Circle have been constituted into 22 nos. of cutting series and the Baraba cutting series in the last plan and scheme has been recognized into Badegarh and Karada cutting series on account of recent re-organisation of Ranges. The above cutting series have been constituted on administrative consideration and distribution of Bamboo taking into account the local demand and the economic exploitation as per availability of Bamboo. The table BWC-4 below shows different cutting series in different Ranges and the RF & PRF blocks has been separately constituted into separate cutting series as below:

Table No.: BWC-4 Cutting series in different R.F.s and P.R.F.s of Phulbani Forest Division.					
Sl. No.	**Name of C.S.**	**Name of Forest Blocks**	**Comptt. Nos. Allotted**		**Area of the C.S.**
			Comptt. No.	**Area in Ha.**	
1	**2**	**3**	**4**	**5**	**6**
I. SudurukumpaRange					
1	Ranipathar (N)	Ranipathar R.F.	1	392.77	
			2	375.97	
			3	384.47	
			4	448.41	
			5	415.43	
			6	783.74	
				2800.79	**2800.79**
2	Ranipathar (S)	Ranipathar R.F.	7	367.02	
			8	280.557	
			9	331.72	
			10	380.34	
			11	429.71	
			12	544.33	
				2333.677	**2333.677**
3	Donga (W)	Donga RF	1	465.68	
			2	418.25	
			3	396.91	
			4	426.65	
			5	255.49	
				1962.98	**1962.98**
4	Donga (E)	Donga RF	6	376.62	
			7	413.99	
			8	354.81	
			9	458.37	
			10	458.8	
				2062.59	**2062.59**
5	Sudurukumpa	Sudurukumpa R.F.	1	485.18	
			2	753.17	
			3	404.29	
			4	361.61	
			5	712.07	
			6	445.18	

			7	480.65	
			8	582.84	
			9	515.11	
				4740.1	**4740.1**
6	Bilabadi	Donga RF	11	388.42	
			12	409.58	
			13	338.79	
			14	538.97	
			15	242.31	
			16	459.72	
			17	465.44	
				2843.23	**2843.23**
II. PhulbaniRange					
7	Burtanga (N)	Burtanga (N) RF	1	211.01	
			2	593.51	
			3	560.07	
			4	412.014	
				1776.604	**1776.604**
8	Khajuripada	Khajuripada RF	1	527.67	
			2	536.26	
			3	1027.53	
			4	546.26	
				2637.72	**2637.72**
9	Kalabagh	Kalabagh RF	1	120.26	
			2	348.55	
			3	407.1	
			4	299.19	
			5	229.94	
			6	416.88	
			7	174.73	
			8	270.22	
			9	301.79	
			10	413.78	
			11	448.69	
			12	307.84	
			13	705.61	
			14	555.55	
				5000.13	

		Palchi RF	1	409.42	
			2	637.2	
			3	433.42	
			4	408.88	
				1888.92	
				6889.05	**6889.05**
III. PhiringiaRange					
10	Baghanadi	Baghanadi RF	1	789.996	
			2	462.68	
			3	385.1	
			4	730.66	
			5	533.87	
			6	487.82	
			7	664.39	
			8	819.69	
			9	1270.48	
			10	973.82	
			11	307.1	
			12	430.39	
			13	622.815	
			14	1172.9	
				9651.711	**9651.711**
11	Ladapadar	Ladapadar RF	1	340.7	
			2	208.7	
			3	246.11	
			4	450.38	
			5	271.772	
				1517.662	
		Kerandibali (W) RF	1	555.55	
			2	571.17	
			3	373.04	
			4	1209.69	
			5	843.7	
			6	671.78	
			7	732.64	
				4957.57	
				6475.232	**6475.232**
12	Gochhapada	Gochhapada RF	1	630.02	
			2	570.05	

			3	409.22	
			4	492.78	
			5	514.59	
			6	390.06	
			7	676.009	
			8	423.44	
			9	642.3	
			10	264.89	
				5013.359	
		Kerandibali (E) RF	1	602.861	
			2	580.45	
			3	532.87	
			4	320.54	
			5	351.02	
			6	273.37	
			7	674.15	
				3335.261	
				8348.62	**8348.62**
IV. TikabaliRange					
13	Chakapad	Chakapad	1	682.26	
			2	573.89	
			3	511.76	
			4	295.56	
			5	610.917	
			6	457.275	
			7	536.32	
			8	658.24	
			9	659.23	
			10	521.91	
			11	985.22	
			12	467.51	
			13	748.75	
			14	577.87	
			15	756.7	
			16	719.8	
			17	571.55	
			18	467.32	
			19	624.73	
			20	563.46	
			21	644.08	
				12634.35	

		Gudukapadar		199.81	
				12834.16	**12834.162**
14	Burtang (S)	Burtang (S) RF	1	1051.14	
			2	806.96	
			3	1201.85	
			4	863.91	
			5	426.38	
			6	817.35	
				5167.59	
		Archangi 'A' RF		225.84	
		Archangi 'B' RF		210.39	
				5603.82	**5603.82**
V. Karada Range					
15	Baraba	Baraba	1	356.48	
			2	388.435	
			3	238.42	
			4	244.6	
			5	518.1	
				1746.035	**1746.035**
16	Ranaba	Ranaba	1	433.11	
			2	532.94	
			3	579.27	
			4	752.456	
			5	563.653	
				2861.429	**2861.429**
17	Machhaghat	Machhaghat	1	673.78	
			2	442.18	
			3	502.06	
			4	291.28	
				1909.3	**1909.3**
				Total RFs	**77,477.05**
PRFs					
I. Phulbani Range					
18	Khajuripada		1	557.62	
	Ganjuguda 'B' PRF	Ganjuguda 'B' PRF	2	476.9	
				1034.52	**1034.52**

II. Phiringia Range					
19	Balandapada	Balandapada 'N' PRF	1	758.08	
			2	515.415	
				1273.495	
		Balandapada 'S' PRF	1	1569.79	
			2	2141.25	
			3	1013.55	
			4	989.46	
				5714.05	
				6987.545	**6987.545**
III. Tikabali Range					
20	Chakapad PRF				
		Baridikia PRF		56.09	
		Budukakhole PRF		59.73	
		Nandini 'A' PRF		151.71	
		Nandini 'B' PRF		46.94	
		Mundula PRF	1	146.93	
			2	128.43	
				275.36	
				589.83	**589.83**
IV. Karada Range					
21	Badegarh	Nandabali PRF	1	1462.629	
			2	1742.4	
				3205.029	
		Badegarh PRF	1	393.03	
			2	959.6	
				1352.63	
				4557.659	**4557.659**
V. Raikia Range					
22	Karada	Sikabadi PRF	1	1307.402	
			2	935.13	
				2242.532	
		Karada PRF	1	2305.65	
			2	914.05	
			3	2816.75	
			4	1012.1	
				7048.55	

Total	**9291.082**	**9291.082**
Total RF		**22460.636**
Total PRF		**77477.05**
Grand Total		**99937.682**

7.6 Block ,Compartment , JFM areas

In this Working Circle, areas where bamboo is known to be in exploitable condition have been brought under this Working Circle for better management of available crop. The extensive tracts of Ranipathar RF, Donga RF, Burtanga RF, Sudurukumpa RF, Kalabagh RF, Baghnadi RF, Chakapad RF, Archangi 'A' & 'B', Karada PRF, Ranaba RF, Baraba RF, Sikabadi PRF, Nandabali PRF etc. forest blocks have been included in this Working Circle as overlapping with Selection or other Working circles. Similarly, bamboo patches having fewer quantities like Ladapadar, Kerandibali 'E' & 'W' RFs, Gochhapada RF, Ganjuguda 'B' PRF, Nandini 'A' & 'B' PRF etc. are also included for better management and improvement of bamboo clumps. These areas are having bamboo in deteriorated condition due to heavy biotic interference to meet local requirement. The following blocks are allotted to this Working Circle comprising an area of **99937.682** Ha. The details of range wise and block wise area allotted to this overlapping circle are provided in Table No. BWC-5.

Table No.:BWC-5 Range wise and compartment wise availability of Bamboo

Sl. No.	Name of Forest Block	Compartment		Total area of the Block allotted in Ha.
		Comptt. No.	Area in Ha.	
1	2	3	4	
SUDRUKUMPA RANGE				
1	Donga R.F.	1	465.68	
		2	418.25	
		3	396.91	
		4	426.65	
		5	255.49	
		6	376.62	
		7	413.99	
		8	354.81	
		9	458.37	
		10	458.8	
		11	388.42	

		12	409.58	
		13	338.79	
		14	538.97	
		15	242.31	
		16	459.72	
		17	465.44	
			6868.8	**6868.8**
2	Ranipathar	1	392.77	
		2	375.97	
		3	384.47	
		4	448.41	
		5	415.43	
		6	783.74	
		7	367.02	
		8	280.557	
		9	331.72	
		10	380.34	
		11	429.71	
		12	544.33	
			5134.467	**5134.467**
3	Sudurukumpa R.F.	1	485.18	
		2	753.17	
		3	404.29	
		4	361.61	
		5	712.07	
		6	445.18	
		7	480.65	
		8	582.84	
		9	515.11	
			4740.1	**4740.1**
PHULBANI RANGE				
4	Burtanga 'N' R.F.	1	211.01	
		2	593.51	
		3	560.07	
		4	412.014	
			1776.604	**1776.604**
5	Khajuripada R.F.	1	527.67	
		2	536.26	
		3	1027.53	
		4	546.26	
			2637.72	**2637.72**

6	Kalabagh R.F.	1	120.26	
		2	348.55	
		3	407.1	
		4	299.1	
		5	229.94	
		6	416.88	
		7	174.73	
		8	270.22	
		9	301.79	
		10	413.78	
		11	448.69	
		12	307.84	
		13	705.61	
		14	555.55	
			5000.04	**5000.04**
7	Palchi R.F.	1	409.42	
		2	637.2	
		3	433.42	
		4	408.88	
			1888.92	**1888.92**
PHIRINGIA RANGE				
8	Baghanadi R.F.	1	789.996	
		2	462.68	
		3	385.1	
		4	730.66	
		5	533.87	
		6	487.82	
		7	664.39	
		8	819.69	
		9	1270.48	
		10	973.82	
		11	307.1	
		12	430.39	
		13	622.815	
		14	1172.9	
			9651.707	**9651.707**
9	Ladapadar R.F.	1	340.7	
		2	208.7	
		3	246.11	
		4	450.38	

		5	271.772	
			1517.662	**1517.662**
10	Kerandibali 'W' R.F.	1	555.55	
		2	571.17	
		3	373.04	
		4	1209.69	
		5	843.7	
		6	671.78	
		7	732.64	
			4957.57	**4957.57**
11	Gochhapada R.F.	1	630.02	
		2	570.05	
		3	409.22	
		4	492.78	
		5	514.59	
		6	390.06	
		7	676.009	
		8	423.44	
		9	642.3	
		10	264.89	
			5013.359	**5013.359**
12	Kerandibali 'E' R.F.	1	602.861	
		2	580.45	
		3	532.87	
		4	320.54	
		5	351.02	
		6	273.37	
		7	674.15	
			3335.261	**3335.261**
TIKABALI RANGE				
13	Chakapad R.F.	1	682.26	
		2	573.89	
		3	511.76	
		4	295.56	
		5	610.917	
		6	457.275	
		7	536.32	
		8	658.24	
		9	659.23	
		10	521.91	
		11	985.22	

		12	467.51	
		13	748.75	
		14	577.87	
		15	756.7	
		16	719.8	
		17	571.55	
		18	467.32	
		19	624.73	
		20	563.46	
		21	644.08	
			12634.352	**12634.352**
14	Ghudukapadar R.F.		199.81	**199.81**
15	Archangi 'A' R.F.		225.84	**225.84**
16	Archangi 'B' R.F.		210.39	**210.39**
17	Burtang 'S' R.F.	1	1051.14	
		2	806.96	
		3	1201.85	
		4	863.91	
		5	426.38	
		6	817.35	
			5167.59	**5167.59**
KARADA RANGE				
18	Baraba R.F.	1	356.48	
		2	388.435	
		3	238.42	
		4	244.6	
		5	518.1	
			1746.035	**1746.035**
19	Machhaghat R.F.	1	673.78	
		2	442.18	
		3	502.06	
		4	291.28	
			1909.3	**1909.3**
20	Ranaba R.F.	1	433.11	
		2	532.94	
		3	579.27	
		4	752.456	
		5	563.653	
			2861.429	**2861.429**
			Total R.F.	**77477.044**

P.R.Fs				
PHULBANI RANGE				
1	Ganjuguda 'B' PRF	1	557.62	
		2	476.9	
			1034.52	**1034.52**
PHIRINGIA RANGE				
1	Balandapada 'N' PRF	1	758.08	
		2	515.415	
			1273.495	**1273.495**
2	Balandapada 'S' PRF	1	1569.79	
		2	2141.25	
		3	1013.55	
		4	989.46	
			5714.05	**5714.05**
TIKABALI RANGE				
3	Baradikia		56.09	
4	Budukakhole PRF		59.73	
5	Nandini 'A' PRF		151.71	
6	Nandini 'B' PRF		46.94	
7	Mundula PRF	1	146.93	
		2	128.43	
			589.83	**589.83**
KARADA RANGE				
8	Nandabali PRF	1	1462.629	
		2	1742.4	
			3205.029	**3205.029**
9	Badegarh PRF	1	393.03	
		2	959.6	
			1352.63	**1352.63**
RAIKIA RANGE				
10	Sikabadi PRF	1	1307.402	
		2	935.13	
			2242.532	**2242.532**
11	Karada PRF	1	2305.65	
		2	914.05	
		3	2816.75	
		4	1012.1	
			7048.55	**7048.55**
Total PRF				**22460.636**
Grand Total				**99937.682**

7.7. Special objectives of management:

The special objectives of management in this Working Circle are:

1. To improve the growing stock of Bamboo by appropriate silvicultural operations.
2. To obtain maximum possible yield of Bamboo to meet the bonafide requirement of both the local community including artisans as well as pulp industries in perpetuity.
3. To enforce scientific cutting rules to ensure maximum yield on sustainable basis so as not to affect the future yield.
4. To rehabilitate the exhausted bamboo bearing areas through appropriate measures like tending, soil working, plantation etc.
5. To generate employment for the local poor people.

7.7.1. Analysis and Valuation of Crop:

In this Division, Salia bamboo is the predominant species with good vegetation in all most all the Forest blocks. But, due to unsystematic harvesting in the past and heavy biotic interference to meet the demand of the rising population in the last decade, has caused enormous pressure on bamboo forests and gradually the bamboo clumps have deteriorated over the period of time. Therefore, the clumps should be taken care of and necessary adequate silvicultural operation should be carried out for sustainable production of bamboos to cater to the needs of local people and nearby paper and pulp industries. Adequate precautions should be taken during harvesting and the prescriptions should be strictly followed.

7.7.2. Silvicultural System:

The silvicultural system prescribed is "culm selection-cum-clump-improvement" in consonance with the rules of the Government of India in the Ministry of Environment and Forests as amended from time to time combined with simultaneous cleaning and cultural operation for Salia Bamboos. In case of Daba Bamboos, "clump improvement" combined with simultaneous cleaning and cultural operations are prescribed.

7.7.3 Rotation period

Rotation period is taken as ten years

7.7.4 Harvestable Diameter

As per Method of execution of felling.

7.7.5. Felling Cycle:

A felling cycle of 4 years is adopted both for Salia as well as Daba bamboos as per availability. Each cutting series has been divided into four Annual Coupes (A, B, C & D).

7.8. Calculation of Yield:

7.8.1 Yield will be regulated entirely by area and the coupes in each felling series are to be worked out by rotation. However, for calculating the yield, the bamboo cutting rules communicated vide letter No. 13/FC/WP/OS-Gen dt. 24.12.1990 of Government of India, Ministry of Environment and Forests are referred to. On the basis of the above rules, culms upto one year (Karadies) of age, and the bamboo culms over one year old culms but less than 2 years of age will not be cut, under any circumstances. Such, more than one year old culms and the culms which are older than two years but less than three years of age are also to be retained in the clump and their number shall not be less than the number of Karadis. In addition to this, the minimum culms per clump to be retained after cutting shall not be less than 15 (fifteen) culms for Clump Quality-II and 10 (ten) culms for clump Quality-III.

7.8.2. Keeping the above conditions, the yield estimation has been done for each bamboo cutting series vis-à-vis annual coupes. The result of bamboo enumeration data has been taken into account for clump and culm analysis of various coupes for determining the number of culms available for harvest per clump. Since the sample point method of 0.1 Ha. plots were done during enumeration and no specific enumeration for bamboo has taken up, in certain coupes the number of culms could not be estimated as the bamboo clumps were not available in that sample plot. But the area is considered for harvesting of bamboo and hence yield cannot be ascertained. The average ocular estimated height of the culms in the clump has been considered to determine the quality of the clump as Q. II or Q. III and

different approximated average height has been taken for different areas from 4.5m. to 7.8m. for calculation of estimated yield. Since one S.U. is 2400 R.MT. or one MT. the formula used for yield calculation is as below:

Yield: [Area of annual coupe in S.U.

X No. of clumps/Hectare

X No. of harvestable culm.

X (Average culm height of clump/2400)]

From this yield, 15% is to be deducted as a standard to obtain the estimated yield in that annual coupe area. The estimated yield for different cutting series in different coupe is listed below in table No.BWC-6.

Table No.: BWC-6Estimated yield from the constituted Bamboo coupes estimated yield in S.U.

Sl. No.	Name of cutting series	Coupe A	Coupe B	Coupe C	Coupe D	Total in S.U.
1	2	3	4	5	6	7
1	Ranipathar (N) C.S	480.46	576.94	342.94	271.70	1672.04
2	Ranipathar (S) C.S	3.18	102.49	455.653	352.067	913.39
3	Donga (W) C.S	965.08	0.00	120.40	280.33	1365.81
4	Donga (E)C.S	0.00	10.82	173.81	0.00	184.63
5	Bilabadi C.S	179.89	0.00	0.00	163.37	343.26
6	Sudrukumpa C.S	247.99	0.00	109.39	112.01	469.39
7	Burtang (N) C.S	471.68	184.56	118.00	0.00	774.24
8	Khajuripada C.S	0.00	0.00	220.36	0.00	220.36
9	Kalabagh C.S	318.76	130.31	370.60	0.00	819.67
10	Baghanadi C.S	120.37	432.10	236.32	489.22	1278.01

11	Ladapadar C.S	0.00	145.98	257.82	0.00	403.80
12	Gochhapada CS	232.29	19.19	41.54	381.89	674.91
13	Chakapad C.S	1035.54	3289.07	1207.61	837.69	6369.91
14	Burtang (S) C.S	454.14	0	414.23	369.86	1238.23
15	Baraba C.S	722.007	31.04	508.60	154.10	1415.75
16	Ranaba C.S	564.34	645.85	318.80	60.34	1589.33
17	Machhaghat C.S	189.33	154.76	78.61	150.62	573.32
18	Khajuripada (Ganjuguda) C.s	13.41875	3.439	0.00	0.00	16.86
19	Balandapada C.S	526.04	266.06	160.79	148.04	1100.93
20	Chakapad C.S	0.00	0.00	172.32	9.48	181.80
21	Badegarh C.S	395.14	1527.85	208.80	701.71	2833.49
22	Karada C.S	299.61	267.45	849.55	641.23	2057.84
					Total	**26496.95**

Table No.:BWC 7 Bamboo felling series with treatment type and Quality class

Sl.No.	Name of felling series	Name of the Bamboo coupe	Treatment type	Quality class
1	**2**	**3**	**16**	**17**
1	Ranipathar (North)	A	A&B	III
		B	A&B	III
		C	C	III
		D	C	III
2	Ranipathar (S)	A	A&B	III
		B	A&B	III
		C	C	III
		D	A&B	III
3	Donga (East)	A	A&B	III
		B	A&B	III
		C	A&B	III
		D	C	III
4	Donga (East)	A	A&B	III
		B	A&B	III
		C	A&B	III
		D	A&B	III
5	Bilabadi	A	A&B	III
		B	A&B	III

		C	A&B	III
		D	C	III
6	Burtang (North)	A	A	II & III
		B	A	II & III
		C	A	II & III
		D	A&B	III
7	Khajuripada	A	C	III
		B	C	III
		C	C	III
		D	C	III
8	Sudrukumpa	A	A&B	III
		B	A&B	III
		C	C	III
		D	A&B	III
9	Kalabagh	A	A&B	III
		B	A&B	III
		C	A&B	III
		D	A&B	III
10	Baghanadi	A	A&B	III
		B	A&B	III
		C	A&B	III
		D	A&B	III
11	Ladapadar	A	A&B	III
		B	A&B	III
		C	A&B	III
		D	A&B	II & III
12	Gochhapada	A	B&C	III
		B	B&C	III
		C	B&C	III
		D	C	III
13	Chakapad	A	A&B	III
		B	A&B	III
		C	A&B	III
		D	A&B	III
14	Burtang (South)	A	A&B	III
		B	A&B	III
		C	A&B	III
		D	A&B	III
15	Baraba	A	A&B	II
		B	A&B	II
		C	A&B	II
		D	A&B	II
16	Ranaba	A	A&B	II
		B	C	III
		C	A&B	II
		D	A&B	II
17	Machhaghat	A	A&B	II
		B	A&B	II
		C	A&B	II
		D	A&B	II
18	Khajuripada (PRF)	A	C	III

		B	C	III
		C	C	III
		D	A&B	III
19	Balandapada PRF	A	A&B	III
		B	A&B	III
		C	C	III
		D	C	III
20	Chakapad (PRF)	A	A&B	III
		B	A&B	III
		C	A&B	II
		D	A&B	II
21	Badagada (PRF)	A	A&B	II
		B	A,B & C	III
		C	A&B	II
		D	A&B	III
22	Karada (PRF)	A	A, B & C	III
		B	A, B & C	III
		C	A, B & C	III
		D	A, B & C	II

7.9. Stock maps:

Stock maps have been prepared. Occurrence of Bamboo has been denoted by symbols.

7.10 Division in to periods and allotment to periodic Blocks

No periodic blocks has been allotted in this WC.

7.11Enumeration Data of Bamboo Coupes.

Enumeration of the bamboo bearing areas has been done along with the timber enumeration in all the blocks allotted to selection Working Circle and non-selection Working Circle. For this enumeration, the NRSC has provided the sample points in different forest blocks indicating the latitude and longitude of the sample point. The area of the sample point delineated by navigating in GPS in the field is 0.1 Ha. and detailed stock of bamboo clumps enumerated along with timber. No special enumeration for bamboo has been undertaken for variable intensities of occurrences of bamboo clumps with wide variation in quality. The detailed result of enumeration has been enlisted in Table No. **BWC-8.**

Table No.: BWC-8Detailed Enumeration result of Salia Bamboo in different allotted Forest Blocks to this Working Circle.

Sl. No.	Name of Forest Block	Comptt No.	Area of Comptt. in Ha.	No. of ple point enumeration	Area of enumerated sample point in Ha.	Total clumps enumerated	No. of culms enumerated					Av. Height of clump in mts.	Remarks
							1st	2nd	3rd	4th	5th		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
SUDRUKUMPA RANGE													
1	Ranipathar RF	1	392.77	2	0.2	23	3	0	20	0	0	5	
		2	375.97	2	0.2	21	0	0	21			1.5	
		3	384.47	1	0	0	0	0	0	0	0	0	
		4	448.41	1	0.1	10	3	0	7	0	0	5	
		5	415.43	3	0.3	9	91		58	49	20	5.2	
		6	783.74	1	0.1	4	5	6	1	3	0	5.2	
		7	367.02	1	0.1	1	2	0	4	0	0	3	
		8	280.57	1	0.1	8	56	37	20	0	0	5	
		9	331.72	1	0.1	0	0	0	0	0	0	0	
		10	380.34	1	0.1	5	8	0	17	22	21	5.2	
		11	429.71	1	0.1	4	6	15	0	0	0	5.75	
		12	544.33	1	0.1	11		51	42	52	23	3.52	
2	Donga RF	1	465.68	1	0.1	10	3	3	0	0	0	3.2	
		2	418.25	1	0.1	2	3	0	0	0	0	2	
		3	396.91	1	0.1	7	4	15	10	10	0	5.5	
		4	426.65	1	0.1	18	12	14	18	20	20	5.2	
		5	255.49	2	0.2	15	22	34	45	21	0	5.7	
		6	376.62	1	0.1	-	-	-	-	-	-	-	
		7	413.99	1	0.1	1	4	6	3	0	8	8	
		8	354.81	2	0.2	10	147	11	0	0	0	4.3	
		9	458.37	1	0.1	2	16	16	11	7	0	2	
		10	458.8	1	0.1	2	16	16	0	0	0	7	
		11	388.42	1	0.1	3	15	27	0	0	1	6.5	
		12	409.58	1	0.1	-	-	-	-	-	-	-	
		13	338.79	1	0.1	-	-	-	-	-	-	-	
		14	538.97	-	-	-	-	-	-	-	-	-	
		15	242.31	1	0.1	3	8	11	5			4.1	
		16	459.72	1	0.1	3	3					0.31	
		17	465.43	1	0.1	5	20		27			21.8	
3	Sudurukumpa RF	1	485.18	1	0.1	10						5.2	
		2	753.17	1	0.1	7			24	3		5.2	
		3	404.29	1	0.1	10			8			5.2	
		4	361.61	1	0.1	13			10			6.5	

		5	712.07	3	0.3	11	43	37	28	102	32	6.75	
		6	445.18	1	0.1	2	12					2.09	
		7	480.65	1	0.1	1	2	15	0	10	11	0.75	
		8	582.84	1	0.1	0	0	0	0	0	0	0	
		9	515.11	1	0.1	1	3	6	0	0	0	2.2	
PHULBANI RANGE													
	Burtanga (N) RF	1	211.01	1	0.1	25	11	17	0			4.6	
		2	593.51	1	0.1	31	112	70	56	0	0	5.2	
		3	560.07	1	0.1	22	32	44	74	0	0	5.4	
		4	412.014	1	0.1	67	41	21	98	0	0	5.3	
	Khajuripada RF	1	527.67	1	0.1	61	80	85	0	0	0	5.1	
		2	536.26	1	0.1	12	91	12	0	0	0	5	
		3	1027.53	1	0.1	30	23	14	44	0	0	5	
		4	546.26	1	0.1	1	7	44	0	0	0	5.2	
	Kalabagh RF	1	120.26	1	0.1	0	0	0	0	0	0	-	
		2	348.55	1	0.1	0	0	0	0	0	0		
		3	407.1	1	0.1	0	0	0	0	0	0		
		4	299.19	1	0.1	0	0	0	0	0	0		
		5	229.94	1	0.1	2	8	11	5	--	24	5.5	
		6	416.88	1	0.1	--	--	--	--	--	--	--	
		7	174.73	1	0.1	1	4	6	8	2	20	5.8	
		8	270.22	1	0.1	--	--	--	--	--	--	--	
		9	301.79	1	0.1	4	11	20	14	4	49	5.8	
		10	413.78	1	0.1	--	--	--	--	--	--	--	
		11	448.69	1	0.1	--	--	--	--	--	--	--	
		12	307.84	1	0.1	3	14	11	0	--	31	5.6	
		13	705.61	1	0.1	6	25	23	0	0	0	5.6	
		14	555.55	1	0.1	9	31	42	0	0	0	5.6	
	Palchi RF	1	409.42	1	0.1	3	9	8	1	--	18	5.8	
		2	637.2	1	0.1	2	4	5	11	4	24	5.8	
		3	433.42	1	0.1								
		4	408.88	1	0.1	2	4	72	58	0	0	5	
PHIRINGI RANGE													
	Baghanadi RF	1	789.890	1	0.1	37	595	469	308	184	1556	5.4	
		2	462.68	1	0.1	--	--	--	--	--	--	--	
		3	385.15	1	0.1	3	88	65	42	23	218	5.4	
		4	730.66	1	0.1	5	53	33	22	9	117	5.7	
		5	533.87	1	0.1	0	--	--	--	--	--	--	
		6	487.82	1	0.1	3	14	12	0	0	0	5.7	
		7	664.39	1	0.1	12	12	14	74	12	52	5.7	

		8	819.69	1	0.1	3	11	16	0	0	0	5.8	
		9	1270.48	1	0.1	2	12	0	0	45	0	5.8	
		10	973.82	1	0.1	1	10	13	10	0	0	5.8	
		11	307.1	1	0.1	--	--	--	--	--	--	--	
		12	430.39	1	0.1	11	276	188	118	64	646	5.5	
		13	622.81	1	0.1	18	307	195	117	43	662	5.5	
		14	1172.9	1	0.1	20	398	306	213	139	1056	5.5	
	Ladapadar RF	1	340.7	1	0.1	0	0	0	0	0	0	--	
		2	208.7	1	0.1	2	11	12	0	0	0	5	
		3	246.11	1	0.1	0	0	0	0	0	0	--	
		4	450.38	1	0.1	0	0	0	0	0	0	--	
		5	271.77	1	0.1	0	0	0	0	0	0	--	
	Kerandibali (W) RF	1	555.55	1	0.1	0	0	0	0	0	0	--	
		2	571.17	4	0.4	2	30	23	18	14	0	5	
		3	373.04	3	0.3	10	177	133	9	12	12	5	
		4	1209.69	5	0.5	13	161	122	85	55	423	5	
		5	843.7	1	0.1	--	--	--	--	--	--	--	
		6	671.78	1	0.1	--	--	--	--	--	--	--	
		7	732.64	2	0.2	2	33	28	0	0	0	5	
	Kerandibali (E) RF	1	602.861	1	0.1	--	--	--	--	--	--	--	
		2	580.45	1	0.1	2	10	30	10	8	0	5	
		3	532.87	1	0.1		--	--	--	--	--	--	
		4	320.54	1	0.1	--	--	--	--	--	--	--	
		5	351.02	1	0.1	--	--	--	--	--	--	--	
		6	273.37	1	0.1	1	5	7	1	0	0	4.2	
		7	674.15	1	0.1	3	13	7	0	3	3	5	
	Gochhapada RF	1	630.02	1	0.1	--	--	--	--	--	--	--	
		2	570.05	1	0.1		--	--	--	--	--	--	
		3	409.22	1	0.1	--	--	--	--	--	--	--	
		4	492.78	1	0.1	--	--	--	--	--	--	--	
		5	514.59	1	0.1	1	10	3	4	0	0	2.2	
		6	390.06	1	0.1	--	--	--	--	--	--	--	
		7	676	1	0.1	--	--	--	--	--	--	--	
		8	423.44	1	0.1	--	--	--	--	--	--	--	
		9	642.3	1	0.1	--	--	--	--	--	--	--	
		10	264.89	1	0.1	1	11	8	4	0	0	5.2	
TIKABALI RANGE													
13	Chakapad RF	1	682.26	5	0.5	5	24	33	0	13	4	5.7	

		2	573.89	8	0.8	7	21	61	0	3	32	5.5	
		3	511.76	1	0.1	2	2	3	0	6	3	5.2	
		4	295.56	1	0.1	0	0	0	0	0	0	0	
		5	610.91	1	0.1	0	0	0	0	0	0	0	
		6	457.27	1	0.1	0	0	0	0	0	0	0	
		7	536.32	1	0.1	4	12	6		3	--	5	
		8	658.24	1	0.1	0	0	0	0	0	0	0	
		9	659.23	1	0.1	1	3	5	8	0	0	2.2	
		10	521.91	2	0.2	1	16	18	0	8	4	5.3	
		11	985.22	4	0.4	2	58	174	0	0	3	5.4	
		12	467.51	1	0.1	1	18	12	0	0	10	5.4	
		13	748.75	1	0.1	1	15	12	0	0	0	5.8	
		14	577.87	1	0.1	2	12	18		4	0	5.8	
		15	756.7	2	0.2		-	-	-	-	-	-	
		16	719.8	1	0.1		--	--		--	--	--	
		17	571.55	1	0.1	1	5	4		0	5	4.7	
		18	467.32	1	0.1	1	17	29	0	3	4	5.3	
		19	624.73	1	0.1	2	11	24		2	2	5.8	
		20	563.46	1	0.1	2	6	16		0	5	5.3	
		21	644.08	4	0.4	2	41	110		0	0	5.3	
14	Ghudukapadar RF	--	199.81	1	0.1	2	5	3	2	0	0	3.9	
15	Archangi 'A' RF	--	225.84	1	0.1	3	26	12		9	0	5.1	
16	Archangi 'B' RF	--	210.39	1	0.1		--	--		--	--	--	
17	Burtang (S) RF	1	1051.14	2	0.2	3	10	19	6	6	7	6	
		2	806.96	1	0.1	2	4	16	5	6	0	5	
		3	1201.85	1	0.1	1	12	10	2	2	0	2	
		4	863.91	4	0.4	1	59	15	0	0	0	1.5	
		5	426.38	1	0.1	4	41	25	0	0	0	6.5	
		6	817.35	1	0.1	2	9	3	0	0	0	5	
	V. Karada Range												
18	Baraba RF	1	356.48	4	0.4	7	29	56	1	3	9	4	
		2	388.43	1	0.1	5	14	14	5	5	0	3	
		3	238.42	1	0.1	2	7	8	2	8	0	5	
		4	244.6	1	0.1	3	4	6	2	5	5	4.2	
		5	518.1	1	0.1	2	2	12	9	10	0	6.2	
19	Machhaghat	1	673.78	1	0.1	2	3	14	2	0	0	7	
		2	442.17	1	0.1	1	9	17	11	1	0	7	
		3	502.06	1	0.1	2	6	12	0	2	3	7.2	
		4	291.28	1	0.1	3	2	0	10	0	0	5.2	
20	Ranaba RF	1	433.11	1	0.1	5	3	13	5	2	0	1.2	
		2	532.94	2	0.2	11	16	15	4	0	0	1.5	

		3	579.27	3	0.3	3	2	0	5	7	0	5	
		4	752.45	1	0.1	2	1	1	9	9	0	5	
		5	563.65	1	0.1	5	15	12	5	0	6	5	
PRFs													
I. Phulbani Range													
1	Ganjuguda 'B' PRF	1	557.62	3	0.3	4	12	111	2	4	0	2.5	
		2	476.9	1	0.1	2	6	4	0	0	0	5.2	
II. Phiringia Range													
2	Balandapada (N) PRF	1	758.08	2	0.2	0	0	0	0	0	0	0	
		2	515.41	2	0.2	2	0	0	4	5	0	6.2	
3	Balandapada (S) PRF	1	1569.79	2	0.2	2	18	17	6	2	0	1.2	
		2	2141.25	3	0.3	5	37	19	10	0	0	1.5	
		3	1013.55	2	0.2	2	15	15	5	5	5	4.2	
		4	989.46	4	0.4	8	32	45	9	6	0	1.3	
III. Tikabali Range													
4	Baradikia PRF	--	56.09	1	0.1	8	10	14	10	0	0	5	
5	Budukakhole PRF	--	59.73	1	0.1	0	0	0	0	0	0	0	
6	Nandini 'A' PRF	--	151.71	1	0.1	1	0	0	1	2	3	2.5	
7	Nandini 'B' PRF	--	46.94	1	0.1	2	1	5	4	4	3	5.9	
8	Mundula PRF	1	146.93	1	0.1	1	10	38	0	0	0	5.2	
		2	128.43	1	0.1	0	0	0	0	0	0	0	
IV. Karada Range													
9	Nandabali PRF	1	1462.62	8	0.8	21	110	159	9	10	0	1.3	
		2	1742.4	17	1.7	43	220	207	8	8	0	5.2	
10	Badegarh PRF	1	393.03	7	0.7	17	20	21	5	5	5	3.5	
		2	959.6	8	0.8	54	400	321	5	0	0	5.2	
V. Raikia Range													
11	Sikabadi PRF	1	1307.4	10	1.0	22	27	52	5	0	0	5	
		2	935.13	5	0.5	11	16	75	4	0	2	5.2	
12	Karada PRF	1	2305.65	13	1.3	20	110	254	5	0	0	1.2	
		2	914.05	10	1.0	37	45	158	5	2	0	1.3	
		3	2816.73	18	1.8	29	110	199	4	3	0	1.2	
		4	1012.1	20	2.0	110	725	563	6	2	0	1.2	

7.12Bamboo Cutting Operation:

Coupes will be opened up for working from 1st October to 30th June every year to provide conducive season suitable for the growth of bamboo crops during closed season, which is mainly the rainy season. If cutting operation could not be taken up in a particular year due to any kind of reason, then those forest areas or coupes will be taken for execution of cutting of bamboos in subsequent years in addition to the area earmarked for the said current year.

7.12.1 Sequence of felling and tabular statement of felling:

Considering the present status of bamboo forests the following tabular statement of felling has been constituted as in table BWC-9 with the annual coupes.

Table No.: BWC- 9 Range wise detailed table of cutting series with annual coupes.

Year	Range	Cutting Series	Coupe No.	Forest Block	Status	Compt. No.	Area in Ha.	
							Compt. Area	Coupe Area
2021-22	Sudrukumpa	Ranipathar (N) C.S	A	Ranipathar	RF	1	392.77	768.74
2025-26								
2029-30								
						2	375.97	
2022-23			B	Ranipathar	RF	3	384.47	832.88
2026-27								
2030-31								
						4	448.41	
2023-24			C	Ranipathar	RF	5	415.43	415.43
2027-28								
2031-32								
2024-25			D	Ranipathar	RF	6	783.74	783.74
2028-29								
2032-33								
							TOTAL	**2800.79**
2021-22	Sudrukumpa	Ranipathar (S) C.S	A	Ranipathar	RF	7	367.02	367.02
2025-26								
2029-30								

2022-23								
2026-27			B	Ranipathar	RF	12	544.33	544.33
2030-31								
2023-24								
2027-28			C	Ranipathar	RF	10	380.34	380.34
2031-32								
						11	429.71	429.71
2024-25								
2028-29			D	Ranipathar	RF	8	280.557	280.557
2032-33								
						9	331.72	331.72
							TOTAL	**2333.677**
2021-22								
2025-26			A	Donga	RF	4	426.65	426.65
2029-30								
2022-23						1	465.68	
2026-27			B	Donga	RF	2	418.25	883.93
2030-31								
	Sudrukumpa	Donga (W) C.S						
2023-24								
2027-28			C	Donga	RF	3	396.91	396.91
2031-32								
2024-25								
2028-29			D	Donga	RF	5	255.49	255.49
2032-33								
							TOTAL	**1962.98**
2021-22								
2025-26			A	Donga	RF	6	376.62	376.62
2029-30								
2022-23								
2026-27			B	Donga	RF	7	413.99	413.99
2030-31	Sudrukumpa	Donga (E)C.S						
2023-24						8	354.81	
2027-28			C	Donga	RF	9	458.37	813.18
2031-32								

2024-25								
2028-29			D	Donga	RF	10	458.80	458.80
2032-33								
							TOTAL	**2062.59**
2021-22						15	242.31	
2025-26			A	Donga	RF	16	459.72	702.03
2029-30								
2022-23								
2026-27			B	Donga	RF	14	538.97	538.97
2030-31								
	Sudrukumpa	Bilabadi C.S						
2023-24						12	409.58	
2027-28			C	Donga	RF	13	338.79	748.37
2031-32								
2024-25						11	388.42	
2028-29			D	Donga	RF	17	465.44	853.86
2032-33								
							TOTAL	**2843.23**
2021-22						4	361.61	
2025-26			A	Sudrukumpa	RF	5	712.07	1073.68
2029-30								
2022-23								
2026-27			B	Sudrukumpa	RF	6	445.18	445.18
2030-31								
	Sudrukumpa	Sudrukumpa C.S						
2023-24						7	480.65	
2027-28			C	Sudrukumpa	RF	8	582.84	1578.6
2031-32						9	515.11	
2024-25						1	485.18	
2028-29			D	Sudrukumpa	RF	2	753.17	1642.64
2032-33						3	404.29	
							TOTAL	**4740.1**
2021-22								
2025-26	Phulbani	Burtang (N) C.S	A	Burtang (N)	RF	2	593.51	593.51
2029-30								

2022-23								
2026-27			B	Burtang (N)	RF	3	560.07	560.07
2030-31								
2023-24								
2027-28			C	Burtang (N)	RF	4	412.014	412.014
2031-32								
2024-25								
2028-29			D	Burtang (N)	RF	1	211.01	211.01
2032-33								
							TOTAL	**1776.604**
2021-22								
2025-26			A	Khajuripada	RF	4	546.26	546.26
2029-30								
2022-23								
2026-27			B	Khajuripada	RF	1	527.67	527.67
2030-31								
	Phulbani	Khajuripada C.S						
2023-24								
2027-28			C	Khajuripada	RF	2	536.26	536.26
2031-32								
2024-25								
2028-29			D	Khajuripada	RF	3	1027.53	1027.53
2032-33								
							TOTAL	**2637.72**
2021-22						6	416.88	
2025-26						7	174.73	
2029-30			A	Kalabagh	RF	8	270.22	1577.40
						9	301.79	
						10	413.78	
2022-23	Phulbani	Kalabagh C.S				11	448.69	
2026-27			B	Kalabagh	RF	12	307.84	2017.69
2030-31						13	705.61	
						14	555.55	
2023-24			C	Palchi	RF	1	409.42	1888.92
2027-28						2	637.20	

2031-32						3	433.42	
						4	408.88	
2024-25			D	Kalabagh	RF	1	120.26	1405.04
2028-29						2	348.55	
2032-33						3	407.10	
						4	299.19	
						5	229.94	
							TOTAL	**6889.05**
2021-22	Phiringia	Baghanadi C.S	A	Baghanadi	RF	8	819.69	3371.09
2025-26						9	1270.476	
2029-30						10	973.82	
						11	307.10	
2022-23			B	Baghanadi	RF	4	730.66	2416.74
2026-27						5	533.87	
2030-31						6	487.82	
						7	664.39	
2023-24			C	Baghanadi	RF	1	789.996	1637.776
2027-28						2	462.68	
2031-32						3	385.1	
2024-25			D	Baghanadi	RF	12	430.39	2226.11
2028-29						13	622.815	
2032-33						14	1172.90	
							TOTAL	**9651.71**
2021-22	Phiringia	Ladapadar C.S	A	Ladapadar	RF	4	450.38	722.152
2025-26						5	271.772	
2029-30								
2022-23			B	Kerandibali(W)	RF	1	555.55	2709.45
2026-27						2	571.17	
2030-31						3	373.04	
						4	1209.69	
2023-24			C	Kerandibali(W)	RF	5	843.70	2248.12
2027-28						6	671.78	
2031-32						7	732.64	

2024-25			D	Ladapadar	RF	1	340.70	795.51
2028-29						2	208.70	
2032-33						3	246.11	
							TOTAL	**6475.232**
2021-22	Phiringia	Gochhapada CS	A	Kerandibali(E)	RF	5	351.02	1298.54
2025-26						6	273.37	
2029-30						7	674.15	
2022-23			B	Gochhapada	RF	1	630.02	2616.66
2026-27						2	570.05	
2030-31						3	409.22	
						4	492.78	
						5	514.59	
2023-24			C	Gochhapada	RF	6	390.06	2396.70
2027-28						7	676.009	
2031-32						8	423.44	
						9	642.30	
						10	264.89	
2024-25			D	Kerandibali (E)	RF	1	602.861	2036.721
2028-29						2	580.45	
2032-33						3	532.87	
						4	320.54	
							TOTAL	**8348.62**
2021-22	Tikabali	Chakapad C.S	A	Chakapad	RF	9	659.23	2633.87
2025-26						10	521.91	
2029-30						11	985.22	
						12	467.51	
2022-23			B	Chakapad	RF	1	682.26	4326.22
2026-27						2	573.89	
2030-31						3	511.76	
						4	295.56	
						5	610.917	
						6	457.275	
						7	536.32	
						8	658.24	
2023-24			C			16	719.80	3166.02

2027-28				Chakapad	RF	17	571.55	
2031-32						18	467.32	
						20	563.46	
						21	644.08	
				Ghudkapadar	RF	-	199.81	
2024-25			D	Chakapad	RF	13	748.75	2708.05
2028-29						14	577.87	
2032-33						15	756.70	
						19	624.73	
							TOTAL	**12834.15**
2021-22	Tikabali	Burtang (S) C.S	A	Burtang (S)	RF	3	1201.85	1590.76
2025-26						4	388.91	
2029-30								
2022-23			B	Burtang (S) RF, Bal.	RF	4 Bal.	475.00	1718.73
2026-27				Burtang(S)		5	426.38	
2030-31						6	817.35	
2023-24			C	Burtang (S)	RF	1	1051.14	1487.37
2027-28				Archangi 'A'		-	225.84	
2031-32				Archangi 'B'		-	210.39	
2024-25			D	Burtang (S)	RF	2	806.96	806.96
2028-29								
2032-33								
							TOTAL	**5603.82**
2021-22	Karada	Baraba C.S	A	Baraba	RF	1	195.00	583.44
2025-26				Baraba (Part)		Part 2	388.435	
2029-30								
2022-23			B	Baraba	RF	1	161.48	399.9
2026-27				Baraba (Balance)		3	238.42	
2030-31								
2023-24			C	Baraba	RF	5	518.10	518.10
2027-28								
2031-32								

2024-25 2028-29 2032-33			D	Baraba	RF	4	244.60	244.60
							TOTAL	**1746.04**
2021-22 2025-26 2029-30	Karada	Ranaba C.S	A	Ranaba	RF	4	752.456	752.456
2022-23 2026-27 2030-31			B	Ranaba	RF	5	563.653	563.653
2023-24			C	Ranaba	RF	1	433.11	966.05
2027-28 2031-32						2	532.94	
2024-25 2028-29 2032-33			D	Ranaba	RF	3	579.27	579.27
							TOTAL	**2861.429**
2021-22 2025-26 2029-30	Karada	Machhaghat C.S	A	Machhaghat	RF	4	291.28	291.28
2022-23 2026-27 2030-31			B	Machhaghat	RF	2	442.17	442.18
2023-24 2027-28 2031-32			C	Machhaghat	RF	1	673.78	673.64
2024-25 2028-29 2032-33			D	Machhaghat	RF	3	502.06	502.06
							TOTAL	**1909.16**

2021-22 2025-26 2029-30	Phulbani	Khajuripada (Ganjuguda) C.s	A	Ganjuguda 'B' (Part)	PRF	1	282.50	282.50
2022-23 2026-27 2030-31			B	Ganjuguda 'B' (Bal)	PRF	1	275.12	275.12
2023-24 2027-28 2031-32			C	Ganjuguda 'B' (Part)	PRF	2	237.50	237.50
2024-25 2028-29 2032-33			D	Ganjuguda 'B' (Bal)	PRF	2	239.40	239.40
							TOTAL	**1034.52**
2021-22 2025-26 2029-30	Phiringia	Balandapada C.S	A	Balandapada (S)	PRF	1 2	1569.79 2141.25	3711.04
2022-23 2026-27 2030-31			B	Balandapada (S)	PRF	3	1013.55	1013.55
2023-24 2027-28 2031-32			C	Balandapada(S)	PRF	4	989.46	989.46
2024-25 2028-29 2032-33			D	Balandapada (N)	PRF	1 2	758.08 515.415	1273.495
							TOTAL	**6987.545**
2021-22 2025-26 2029-30	Tikabali	Chakapad C.S	A	Mundula	PRF	1	146.93	146.93

2022-23								
2026-27			B	Mundula	PRF	2	128.43	128.43
2030-31								
2023-24				Baradikia		-	56.09	
2027-28			C	Budukakhole	PRF	-	59.73	162.76
2031-32				Nandini 'B'		-	46.94	
2024-25								
2028-29			D	Nandini 'A'	PRF	-	151.71	151.71
2032-33								
							TOTAL	**589.83**
2021-22								
2025-26			A	Nandabali	PRF	1	1462.629	1462.629
2029-30								
2022-23								
2026-27			B	Nandabali	PRF	2	1742.40	1742.40
2030-31								
	Karada	Badegarh						
2023-24								
2027-28			C	Badegarh	PRF	1	393.03	393.03
2031-32								
2024-25								
2028-29			D	Badegarh	PRF	2	959.6	959.6
2032-33								
							TOTAL	**4557.659**
2021-22								
2025-26			A	Sikabadi	PRF	1	1307.402	1307.402
2029-30								
2022-23								
2026-27	Raikia	karada	B	Sikabadi	PRF	2	935.13	935.13
2030-31								
2023-24						1	2305.65	
2027-28			C	Karada	PRF	4	1012.1	3317.75
2031-32								

2024-25						2	914.05	
2028-29				Karada	PRF			3730.8
2032-33			D			3	2816.75	
							TOTAL	**9291.082**
							GRAND TOTAL	**99937.682**

Table No.: BWC 10Abstract				
Sl. No.	**Name of Range**	**RF**	**PRF**	**Grand Total**
I	Sudurukumpa	16743.367	0	16743.367
II	Phulbani	11303.374	1034.52	12337.894
III	Phiringia	24475.559	6987.545	31463.104
IV	Tikabali	18437.982	589.83	19027.812
V	Karada	6516.764	4557.659	11074.423
VI	Raikia	0	9291.082	9291.082
G. Total		**77477.046**	**22460.636**	**99937.682**

BWC-11 ABSTARCT OF BAMBOO COUPES								
Sl. No.	**Range**	**Name of Cutting Series**	**Forest Block Name**	**Coupe Name**				**Total**
				A	**B**	**C**	**D**	
1	Sudrukumpa	Ranipathar (N) C.S	Ranipathar RF	768.74	832.88	415.43	783.74	2800.79
2	Sudrukumpa	Ranipathar (S) C.S	Ranipathar RF	367.02	544.33	810.05	612.277	2333.677
3	Sudrukumpa	Donga (W) C.S	Donga RF	426.65	883.93	396.91	255.49	1962.98
4	Sudrukumpa	Donga (E) C.S	Donga RF	376.62	413.99	813.18	458.8	2062.59
5	Sudrukumpa	Billabadi C.S	Donga RF	702.03	538.97	748.37	853.86	2843.23
6	Sudrukumpa	Sudrukumpa C.S	Sudrukumpa RF	1073.68	445.18	1578.6	1642.64	4740.1
7	Phulbani	Brutanga N C.S	Burtang (N) RF	593.51	560.07	412.014	211.01	1776.604
8	Phulbani	Khajuripada C.S	Khajuripada RF	546.26	527.67	536.26	1027.53	2637.72
9	Phulbani	Kalabagh C.S	Kalabagh RF	1577.4	2017.69	1888.92	1405.04	6889.05
10	Phiringia	Baghanadi C.S	Baghanadi RF	3371.09	2416.74	1637.776	2226.11	9651.716
11	Phiringia	Ladapadar C.S	Ladapadar RF	722.152	0	0	795.51	1517.662
12	Phiringia	Ladapadar C.S	Kerandibali(W) RF	0	2709.45	2248.12	0	4957.57
13	Phiringia	Gochhapada CS	Kerandibali (E) RF	1298.54	0	0	2036.721	3335.261
14	Phiringia	Gochhapada CS	Gochhapada RF	0	2616.66	2396.7	0	5013.36
15	Tikabali	Chakapad C.S	Chakapad RF	2633.87	4326.22	2966.21	2708.05	12634.35
16	Tikabali	Chakapad C.S	Ghudukapadar RF	0	0	199.81	0	199.81
17	Tikabali	Burtang (S) C.S	Burtang (S) RF	1590.76	1718.73	1051.14	806.96	5167.59

18	Tikabali	Burtang (S) C.S	Archangi 'A'	0	225.84	0	0	225.84
19	Tikabali	Burtang (S) C.S	Archangi 'B'	0	210.39	0	0	210.39
20	Karada	Baraba C.S	Baraba RF	583.44	399.9	518.1	244.6	1746.04
21	Karada	Ranaba C.S	Ranaba RF	752.456	563.653	966.05	579.27	2861.429
22	Karada	Machhaghat C.S	Machhaghat RF	291.28	442.18	673.64	502.06	1909.16
23	Phulbani	Khajuripada C.S	Ganjuguda 'B' PRF	282.5	275.12	237.5	239.4	1034.52
24	Phiringia	Balandapada C.S	Balandapada (S) PRF	3711.04	1013.55	989.46	1273.495	6987.545
25	Tikabali	Chakapad C.S	Mundula PRF	146.93	128.43	0	0	275.36
26	Tikabali	Chakapad C.S	Baradikia PRF	0	0	56.09	0	56.09
27	Tikabali	Chakapad C.S	Budukakhole PRF	0	0	59.73	0	59.73
28	Tikabali	Chakapad C.S	Nandini 'B' PRF	0	0	46.94	0	46.94
29	Tikabali	Chakapad C.S	Nandini 'A' PRF	0	0	0	151.71	151.71
30	Karada	Badegarh C.S	Nandabali PRF	1462.629	1742.4	0	0	3205.029
31	Karada	Badegarh C.S	Badegarh PRF	0	0	393.03	959.6	1352.63
32	Karada	Karada C.S	Sikabadi PRF	1307.402	935.13	0	0	2242.532
33	Karada	Karada C.S	Karada PRF	0	0	3317.75	3730.8	7048.55
GRAND TOTAL								**99937.682**

7.13. Method of execution of operation:

7.13.1. Bamboo coupes have been formed in such a way that coupe boundaries generally coincide with compartment or sub-compartment or Block boundaries. Natural features like nallahs, extraction path, foot path, ridges have also been taken as coupe lines. This has been shown in the topo maps in suitable scales of management i.e. in 1:50,000 or 1:25,000.

7.13.2 Bamboo coupes shall be demarcated by giving double coaltar rings at the breast height of all the trees standing on the coupe lines, which are distinctly visible from each other. Also, single coal tar rings will be given on the trees or any rocks etc. on the line to show the section lines. Signboards specifying the details of bamboo coupes shall be displayed on compartment lines, road crossing, nallah crossings and any other strategic points for proper identification. In signboards, details like area, compartment No., Coupe No. Block name, year of working shall be mentioned.

7.14. Cutting Operation:

7.14.1. The State Government decides the agency for working of Bamboo as the bamboo working has been nationalized. The Orissa Forest Development Corporation ltd. is the agent nominated by the Government to work out Bamboo coupes. The RMP working in this Division for OFDC ltd. was the J.K. Paper mills ltd. Bamboo working continued in this Division upto 1999-2000 and has not worked from 2000-2001 to 2003-04. Again, the Bamboo working was going on from 2004-05 to 2016-17 by OFDC ltd through RMP JK Paper mill ltd. Rayagada. At present as the RMP is not taking interest to workout the coupes, the OFDC ltd. is taking up harvesting of Commercial bamboos.

7.14.2. The bamboo cutting shall be done between 1st October to30th June. Cutting should be done by OFDC ltd. through RMP or any agency as per the decision of Government from time to time. It should be strictly as per the cutting rates. The coupe shall be divided into four sections running along the contours. The section from top hill side shall be executed first. It should be observed that the works in 1st section should be completed in all respects before commencement of the work in the second section and so on.

7.14.3 The agency working out the bamboo coupes shall be responsible to supply bamboo to local people and artisans making bamboo furniture and bamboo crafts etc. This will create less pressure on the bamboo forests by the local tenants.

7.14.4. Bamboo shall be worked by a definite set of rules that has been prescribed by the CCF (Central) Eastern Regional Office, Ministry of Environment and Forests, Government of India, Bhubaneswar as per his letter No. 13/FCWP/US-GeN.dt.24/12/90 and communicated vide PCCF, Orissa's memo No. 26951 (40) dt.28.12.1990.

The above-sited prescription by CCF (Central) envisages preparation of treatment maps and following different rules.

A. Treatment Maps:

i) After demarcation of Bamboo coupes and before taking it up for working, a treatment map will be prepared by the agency on a copy of the available. Management map in 1:25,000 scale, indicating Salia and Daba Bamboo areas separately.

ii) Treatment types to be distinguished shall be based on the assessment of the standard Salia bamboo quality classes and actual clump condition.

In both these cases areas less than 4 Ha.in extent will not be separated out as distinct treatment types.

iii) Treatment types of Salia Bamboos:

The following treatment types have been identified for Salia bamboo forest will be categorized for different treatment as described below:

Treatment type A:

Areas with healthy and well stocked Bamboo clumps consisting of:

Clump Quality-I: Culmheight of Bamboos from 9m. & above.

Clump Quality-II: Culm height of Bamboos between 6m. & 9m.

Clump Quality-III: Culm height of Bamboos between 6m.

Treatment type B:

Areas with well stocked but degraded, damaged, congested or fire burnt Bamboo clumps.

Treatment type C:

Areas where bamboo clumps are sparse or scattered.

If necessary the treatment types B & C may be further classified into the above three clump quality classes.

7.15. Cutting Rules for Salia Bamboos (*Dendrocalamus strictus*):

Salia Bamboos (*Dendrocalamus strictus*) will be worked out as per the following prescriptions.

7.15.1 Rules which are uniformly applicable to all treatment types:

i) Karadi (culm upto one year of age) and the bamboo culm over one year but under two years of age will not be cut under any circumstances. Such more than one-year-old culms and the culms, which are older than 2 years, but less than 3 years of age, shall be retained in the clump and their number should not be less than the number of karadies.

ii) The minimum number of culms to be retained in a clump is fixed on the basis of quality of the clump and it is as follow:

Clump Quality-I- 20 culms

Clump Quality-II- 15 culms

Clump Quality-III- 10 culms

iii) Clumps having the minimum or less than minimum prescribed number of culms shall not be commercially exploited. Only broken, dead, dry, badly damaged and deformed bamboos will be felled.

iv) A clump will be distinguished as an independent clump where its periphery is easily discernible from other. Only where such a distinction is not possible, two clumps within one meter distance will be regarded as one.

v) The retained culms in a clump should be well spaced preferably at the periphery in the following order of preference.

- **a.** Karadi bamboos,
- **b.** Kasi bamboos (older than one year but less than 2 years)
- **c.** Pakala bamboos (young green bamboos)
- **d.** Older live bamboos
- **e.** Other as may be available.

vi) Rhizomes will not be dug.

vii) The height above which culms are cut shall not be less than 15cm or more than 45cm from the ground level and in no case below the first prominent node from the ground.

viii) The cut shall be made with a sharp instrument to ensure that the stump remains intact without splitting.

ix) Lops and tops of bamboos will be simultaneously cleared to a distance of at least one meter away from the periphery of the worked clumps to avoid fire hazard.

x) Climbers shall be cut from all the bamboo clumps during working of the coupes.

xi) Bamboo strips will not be used in tying bamboo bundles.

xii) Bamboo cutting will not be done from 1st July to 30th September.

xiii) In case of sporadic flowering of bamboo, the flowered clumps will be clear-felled, once the seeds from such clumps have fallen.

xiv) In case of gregarious flowering, the clumps will be clear felled and extracted early just after the shedding of ripe seeds, so that the bamboo do not dry or deteriorate or become prone to fire damage. Disposal of such bamboos should be expeditiously arranged to prevent deterioration in quality and the prescribed treatment as mentioned below shall be adopted in the gregariously flowered areas.

xv) Lopping of bamboos wither for feeding livestock or otherwise is strictly prohibited.

xvi) As far as possible, bamboo cutting should be completed by the end of May.

xvii) Bamboo forests should be rigidly protected from fire. In any case, forest fire should not occur during the year of working and the year following it.

xviii) No grazing shall be permitted during rains in bamboo forests, which have been worked in the previous season.

7.15.2 Rules applicable to specific treatment types:

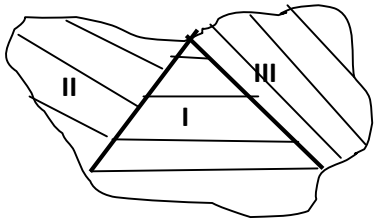
i) Treatment type – A:

1. Commercial felling will be done in those clumps, which have more than the prescribed minimum number of culms in each.

2. Cultural operations will be carried out in clumps having less than the prescribed minimum number of culms in each. In such clumps, commercial felling will not be done.

ii) Treatment type – B:

1. There will be no commercial felling in any clump.
2. Only cultural operations will be carried out, which will include:
   - Felling of all dead, dried, over-matured, burnt, broken and grossly damaged bamboos.
   - Broken or cut Bamboos or high stumps in green condition, having length of 2.5 m. or more, may be retained, if necessary, to maintain size of the clumps.
   - The minimum number of culms to be retained per clump as prescribed in foregoing paras for various quality classes may not be strictly followed if necessity so arises.
   - The congested bamboo clumps shall be clear felled by forming segments. The maximum number of segments, under which a congested clump shall be worked, will be three and at each working not more than one segment will be cut where three segments are formed, the middle segment will be in shape of a triangle having apex at the periphery. Only this middle segment shall be felled at first working. In subsequent cycles side segments should be felled. Diagram showing Divisions of the clump in these segments is give in the picture below.



iii) Treatment type – C:

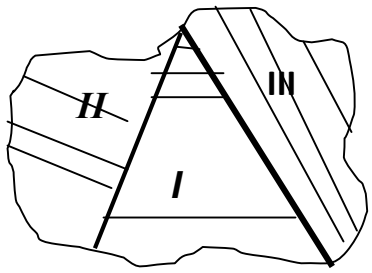
1. Only silvi-cultural operations will be carried out in existing bamboo clumps.
2. The bamboo potentiality of such forests will be augmented by raising bamboo plantation. The minimum area to be planted annually will be 40 hectares or one third of the area under to this type.

3. Tending and cultural operations in the area planted with bamboo will be done as per the standard practice.

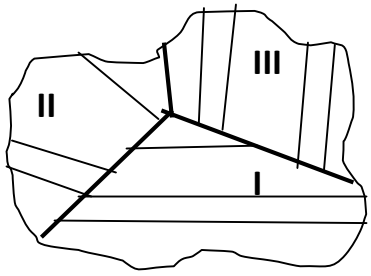
7.15.3 Cutting Rules for Daba bamboos (*Bambusa aurundinacea*)

i) All bamboo culms in a clump, which are more than 3 years old, shall be harvested on culm selection basis provided the number of culms, left uniformly distributed in a clump, shall not be less than 10.

ii) In case of congested clumps, where culm selection is not possible, the culm should be carefully, felled by forming segments as per any of the two diagrams given below depending on the interlacing of bamboos, with a view to provide support to the remaining segments against wind damage. The maximum number of segments, under which a congested clump shall be worked, will be three and at each working not more than one segment will be cut. Stumps higher than 50cm or more than two internodes should not be left. Where three segments are formed, the middle segment will be in the shape of a triangle. Only the middle segment (I) shall be felled at the first working. Two diagrams showing divisions of the clump in three segments are given below.



First preference



Second preference

7.16.Simultaneous Silvicultural Operations(SSO)

It needs proper and timely execution of simultaneous silvicultural operation for the increase in productivity of the bamboo forests. These operations should be immediately executed during or after the year of actual harvest. So that it can be beneficial for the existing available natural regeneration in the forest to get proper nourishment and will enrich in the composition of bamboo forest. These operations shall preferably be done along with the main cutting and comprise of the following components.

1. All cutting debris shall be removed and the clump shall be left cleaned.
2. If any clump has not been cleaned at the time of felling, such clumps shall also be attended to through pruning in addition to the climber cutting. If any high stumps have left those shall be rectified as far as practicable.
3. The exposed rhizomes shall be covered with soil scrapped from surrounding plain areas as per availability and preferably from uphill side of a hilly undulating terrain. In some steep slope hilly areas, stone walls may be given on downhill side to stabilize the soil covered to the rhizome from erosion by making a shape half-mound trench.
4. During this process, it should be taken to ensure that no damage is caused to the rhizomes and rootstock.

7.17. Treatment of Gregariously flowered areas:

i) Bamboo seedlings at a spacement of about 4m x 4m are to be adopted and retained and the rest are to be thinned out.

ii) Cleaning, soil working and seedling is to be done around the adopted bamboo seedlings upto a radius of 50m.

iii) To maintain the continuity, planting up of bamboo rhizomes is also to be resorted to especially in big gaps.

iv) All the flowered clumps are to be worked up following the prescriptions of the working plan.

v) The area shall be closed for grazing.

vi) Elaborate fire protection measures shall be taken.

7.18. Flowering in Bamboos:

7.18.1 In nature the plant has the reproductive system. Like other plants, bamboo also flowers, but it is not annual. In general flowering and fruiting in Bamboo crop occurs once in its life time at certain age of the clump, after which it dies. This flowering cycle of bamboo varies from 7 years to 60 years, depending upon the species. There are three different types of flowering.

Annual – The culms remain healthy after flowering.

Sporadic – Only some clumps in area flower, bear seeds, and die thereafter.

Gregarious – The whole population of bamboo, over an extensive area, flower over a period of time and die out.

7.18.2. Generally, most bamboo species flower gregariously at fixed intervals and all culms including those of current year die after flowering. The bamboo clumps belonging to a particular stock flower simultaneously it has been reported that the entire population of a given species raised from the same seed source, no matter where they are situated, would flower at the same time. As a precaution, it is required to raise bamboo crop of different species to ensure constant supply of bamboos. In Salia Bamboo (Dendrocalamus strictus), which is predominant in Orissa and in this Division, sporadic and gregarious flowering occur at long intervals of 20-65 years depending edaphic and other factors.

7.18.3. In this division bamboo is mainly available all most in all selection forests. In selection forests, the age of clump varies and accordingly varies the intensity of gregarious/sporadic flowering. The delay in flowering in poor sites due to poor growth and storage of starch, sugar and other substances in the clump, which help in flowering. In well-managed forests, intensity of flowering is less in comparison to an un-worked forest containing congested clumps. Similarly, intensity of flowering is more in area having more biotic interference in the form of grazing and fire in comparison to protected area. This probably is nature's typical way of dealing with adversity. It is important to identify the character of flowering in Salia bamboo to decide appropriate management techniques. A comparative statement showing the distinction between two types of flowering is given in table as below:

Table No.: BWC-11 Characteristics of flowering in Salia bamboo	
Sporadic flowering	**Gregarious flowering**
1. Scattered nature of flowering only a few clumps are involved in flowering.	**1**. Flowering occurs almost in the entire area.
2. Only a few culms flower in a clump.	**2**. It involves almost all or some proportion of place in all the culms in a clump.
3. The culm may or may not die after flowering.	**3**. All the culms of a clump die after flowering.
4. The culm does not die.	4. Flowering is followed by the death of the clump.
5. It takes place usually irregularly almost	**5**. It follows a cycle of long interval of 20-65

every alternate year.	years.
6. It does not progresses in a definite direction like an epidemic wave, but it is random.	**6**. It progress in a definite direction like an epidemic wave.
	7. It takes 2 to 4 years to complete the flowering in the area.

7.19. Main threats to the management of Bamboo Forests:

The main threats to the management of bamboo forests are:

1. Indiscriminate cutting of bamboos by tenants and artisans.
2. Annual forest fire.
3. Excessive grazing.
4. Clear felling of daba bamboos.
5. Over felling and improper working of coupes by Agents.

7.19.1 The above factors need to be checked. In order to check these factors, new modern techniques should be developed to improve in the quality and quantity of bamboo clumps, so that the day by day depletion of bamboo forests can be conserved and sustainability can be achieved to cater the needs in subsequent years. It can be observed that the decreasing trend in production of bamboo has already indicated the deterioration. Therefore, it is the high time for application of appropriate silvicultural techniques to manage the bamboo forests, for restoration of the valuable bamboo forests of the division. Simultaneous, awareness programmes should be taken up in the peripheral localities by providing them the modern techniques for use of bamboo in a sustainable basis and protection of the forests by the village folk for their future need.

7.20Remedial Measures for Improvement of Bamboo:

To reclaim the present damaged bamboo plantations and natural bamboo areas the first and foremost requirement is effective closure of the areas. In addition to this the following measures should be taken:

1. Clearing of bamboo should be restored to in the 3rd, 5th and 7th year and thereafter fellings should be done in 10th year. Subsequent fellings at 4 years cutting cycle must be ensured without fail to get rid off the congestion problems.

2. Clumps should be cut stump height and should never be cut at a height more than this.
3. After cutting, the piling of earth around and over clumps should be done essentially in the same year. Loosening of earth around the clumps at least 15cm deep and 30cm in width should be done. The present faulty practice of piling the earth, on stumps making a dome shaped structure, should be stopped.
4. In case of "flower based" clumps, where exploitation of utilizable bamboo has become impossible, should be cut at 1 meter height, in a way that the green culms remain evenly distributed all over the periphery to act as support to new clumps. In case where still greater congestion is found the only solution is to clear fell the entire clumps at stump height in order to remove the whole congested mass. In such converted clumps clearing should be done in 1st and 2nd year. The regular felling should be taken up in 3rd year.

If protection should be ensured successfully, it is hoped that the yield of the bamboo will definitely increase. Some important information about bamboo (*Dendrocalamusstrictus*) on ideal locations is given below in a Tabular format.

Table No.: BWC-12 Information on Salia Bamboo

Sl. No.	Item	Specification
1	Average survival	100 clumps/Ha.
2	Average diameter	5-8 cm
3	Average height	3-5 mt.
4	Maximum height	5.00 mt.
5	Average yield	12 M.T./ha.
6	750 culms	1 MT
7	Bamboo weight	5 MT Green 3.5 MT Dry
8	New culms per clump	5-7 nos.
9	Gregarious flowering	30 years
Source: Indian Forester, September 1995.		

7.20.1 The occurrence and quality of bamboo are defined as follows:

Table No.: BWC-13 Bamboo cluster

Sl. No.	Item	Quantity
1	Pure bamboo	200 or more clumps per Ha.
2	Very dense	150-200 clumps/Ha.
3	Dense	100-150 clumps/Ha.
4	Moderately dense	50-100 clumps/Ha.
5	Scattered	25-50 clumps/Ha.
6	Sparse	1-25 clumps/Ha.
7	Bamboo forest but clumps completely hacked by the	1-10 clumps/Ha.

	people	
8	No bamboo	Bamboo totally absent.
9	Regeneration crop	Clump formation has not yet taken place.
Source: Indian Forester, February 1998.		

7.21 Bamboo quality in descending order:

1. Average culm height 6 mt. or more for *Dendrocalamus strictus* and 14 mt. or more for *Bambusa arundinacea*.
2. Average culm height 4 mt. or more but less than 6 mt. for *Dendrocalamus strictus* and 10 mt. or more but less than 14 mt. for *Bambusa arundinacea*.
3. Average culm height of 2 mt. or more but less than 4 mt. for *Dendrocalamus strictus* and 2 mt. or more but less than 10 mt. for *Bambusa arundinacea*.
4. Regeneration Crop.

7.22. Distinguishing morphological characters of bamboo:

7.22.1 From the morphological characters, it is observed that bamboo is a complex, woody, stemmed perennial grass belonging to family Poaceae. The portion of bamboo below the ground level is called Rhizome and the tall, cylindrical, persistent culms with branches & leaves forms the clump. Rhizomes are spreading below the ground and are responsible for the growth of the clump. During young state, the culms are covered with sheath at each internodes, which falls off as the bamboo grows.

7.22.2 Observation reveals that the culms are very tender during early growing period. These tender culms are cut to be used as vegetables and pickles by the poorer class of people in different tribal areas. This resulted restriction in development of bamboo clumps. Therefore, this practice as far as after the 1st year, the culms continue to grow tough and became attained maturity after 3 years, acquiring full strength & density. After 5 years, the culms start to dry and become susceptible to attack by insects, diseases and wind/fire damage.

7.23. Distinguishing morphological characters of the culms at different ages:

Table No.: BWC-14 Morphological characters of the culms of different ages	
Culm Age	**Morphological character**
Karadi (the 1st year culm)	Culm sheath present on lower half of culm. Branches present throughout the length of culm. Culm green uniformly, bloom is abundantly present and comes off easily on finger. A fresh cut just under the node shows the same fresh coloration even after one or two minutes.
Kasi (the 2nd year culm)	Culm sheath mostly absent except for some reminances. Culm dark in colour, branches present practically at all nodes. Bloom is patchy, grayish-white in colour and comes off less easily on finger. A fresh cut just under the node shows the same fresh coloration even after one or two minutes.
Pakala (the 3rd& 4th year culm)	Culm sheath absent. White bloom absent. Blackish grey or dark blotches appear which come off on finger slightly, on rubbing. A fresh cut just under the node shows reddish-brown coloration after one or two minutes.

7.24. Uses of Bamboo:

7.24.1 For the various morphological characters, bamboo is useful in almost every need of life in rural and urban sector as it is strong, versatile and renewable woody material. It is generally called as "the poor man's timber". It has been an integral part of India's cultural, social and economic traditions. Millions of people depend on bamboo for their livelihood and for household purposes & functional uses.

7.24.2 The important characteristics for which bamboo has been considered as the most cost effective woody material are below:

1. It has got a fibrous structure and the fibres are longer as compared to wood.
2. The strength properties are better than many timber species.
3. The circular and hollow crass-section of bamboo gives it a high strength to weight ratio.
4. Bamboo is elastic in comparison to wood.
5. The cross partition wall at each node make the bamboo strong and hard to bend or break at joints.
6. It has a smooth and clean surface.

7. It can be easily cut into required size and split up into strips with house hold tools.
8. Bamboo culms can be easily stored and transported.
9. Ordinary methods of seasoning and treatment such as submerging in water can increase its durability.
10. The culm growth is faster and mature within 3 years.

7.24.3. Also, the use of bamboo for various applications depends upon the age of the culm. Those are preferentially as:

- Less than 30 days – For food.
- 6 months to 1 year – For making baskets & fancy articles.
- 1 year to 2 years – For bamboo board & laminations.
- 3 year to 5 year – For construction purposes.
- More than 5 year – Bamboo gradually loses strength & dies.

7.24.4. It is observed that the local artisans generally use 1-2 year old bamboos for their products. In most cases they harvest bamboos from easily accessible areas of forests causing over exploitation in an unregulated manner, thereby causing splitting of left out stumps in the clump which ultimately degrades the entire crop, both qualitatively and quantitatively.

7.24.5. Technological and financial interventions are required to improve the present condition of artisans. They should be encouraged to adopt scientific harvesting methods and prophylactic treatment of their products. Marketing tie-ups for industrial applications of bamboo composites and crafts can enhance their economic growth.

7.25. Strategies for Value addition:

7.25.1 The following strategies should be adopted by using bamboos for production of value added items:

1. Exploring the export potential for semi-processed bamboo items like high density pulp, mats, chops etc. to other parts of the Division where there are provisions of pulp and paper industry.
2. Forming clusters comprising 5-10 closely situated villages and providing them with know-how, hand tools, machine tools and marketing avenues for promoting cottage

industries requiring minimum investment, like units manufacturing "*agarbati*" sticks, tooth picks, bamboo mats etc.

3. Exploring the possibility of using muli bamboo fruits/seeds, rich in protein context for animal feed and oil extraction.
4. Exploring possibility of formation of plywood units by using appropriate techniques for conversion of bamboo into high value construction material.

7.25.2 Bamboo plays a significant role in the housing sector. The National Housing Policy announced by the Government of India in 1994, emphasized the construction of low cost houses with locally available material. In this context, bamboo as a construction material assumes greater significance. Bamboo has been used traditionally by various sections of society since times immemorial. Of late, there has been a significant decline in the number of bamboo houses of the Division. Although, bamboos are available in plenty in some of the forest blocks of the Division, the housing sector experiences severe shortage of the same as the OFDC limited has been entrusted for harvesting of bamboo. Apart from above, low income of the people and non-availability of good quality bamboos constitute two major constraints in the promotion of bamboo houses.

7.26. Miscellaneous Regulations:

Grazing will be regulated in this working circle in accordance with the Orissa Forest (Grazing of cattle) Rule – 1980 and carrying capacity of the forest. The regeneration in Bamboo coupes shall be protected from grazing.

7.27. Fire Protection:

Fire is the major threat to bamboo forests. So fire protection is essential to prevent the damage of young bamboo crops.

7.27.1 Fire lines of 5 meter width on boundaries of each coupe shall be meticulously cleared to prevent spread of fire. The Orissa Forest Fire Protection Rule-1980 and provisions of Orissa Forest Department Code shall be strictly implemented.

7.28. Rights and Concessions:

They shall be regulated as laid down in Chapter-I and prevailing Government Policy.

7.29Plantations of Bamboos:

Deficient areas in different forest Blocks should be planted with bamboo, where density of bamboo clumps is less than 20 nos. per Ha. No felling of natural trees shall be resorted to for this purpose. The technique of raising bamboo plantations prescribed as per Orissa Forest Plantation Manual-1977 or any new guidelines developed by silviculture Divisions shall be adopted. However, the Nursery aspect including propagation of bamboo through adventitious rhizogenesis in clump cuttings are reflected below:

7.29.1. Nursery Aspect: The interaction of locality factors (temperature, moisture, light, soil type and configuration of land etc.) has a profound effect on germination of seeds. If conditions are not right or care is not taken, viable seed either will not germinate or will be lost to predators and diseases.

7.29.2 The Nursery practices in many cases as adopted in the field are not always based on scientifically laid out experiments. The results obtained at one place under a set of agro-ecological conditions are quite often applied to areas, where the locality factors are different resulting in poor growth of seedlings. The production of healthy and plantable seedlings depend on channelling and tapping the bio-chemical energy inherent in the seed. This process is influenced by operations like orientation of seed, its depth, density, irrigation, method of sowing, the impact of soil mixture, temperature, light etc. The raising of healthy and plantable seedlings, therefore, can not only ensure initial success of plantations but also disease free healthy growth throughout the life of the tree. The impact of various operations right from seed collection to adequate soil mixture, method of sowing, depth and density of sowing, optimum irrigation, shade and mulch, fertilization, containers etc. have profound influence on successful nursery management.

7.29.3 The afforestation programmes are labour intensive and structured on the premise of rural development and linked with poverty alleviation. The seedlings are planted on difficult sites devoid of soil and moisture, often in extremely inhospitable climatic conditions. It is thus of paramount importance that the seedlings raised are capable of tolerating the unfavourable climatic conditions.

7.29.4 The basic parameters of observations in nursery experiments are:

- **a.** Shoot length.

b. Root length.

c. Shoot diameter.

d. Number of days for commencement of germination.

e. Total germination percentage.

f. Plant percentage.

g. Germination value with respect to viability and dormancy.

7.30. Bamboo propagation through Adventitious Rhizogenesis in culm cutting:

Every node of segmented axes of a bamboo plant bears a bud or a branch. Several studies on vegetative propagation have aimed at transforming as many as possible of these innumerable buds into planting material through induction of adventitious rhizogenesis. It is a viable cloning option having the advantage of obtaining enormous number of cuttings from single clump with lower cost of transport, handling and labour. For these reasons, rooting of culm/branch cuttings needs to be adopted for propagation of bamboo species specially at central nurseries of the Division.

7.31Natural Regeneration:

The early stage established natural regeneration shall be taken care of at the time of silvicultural operations, so as to add to the future crop of the bamboo forests. In such natural young clumps sufficient soil working, half mound trenches in steep slops (if required) etc. operations may be carried out to develop the density of bamboo forests in that locality.

7.32 Associated Regulation and measures

7.32.1 Treatment of Bamboo:

Bamboo is a versatile material that has been in use for construction of houses and huts since long and occupies an important place in the economy of rural areas. Being a fast growing and short maturity period species, it provides an excellent alternate structural material. The natural resistance against fungi and insect attack is rather low and this has to be regarded as a major shortcoming. Natural service life of bamboo is only a few months and after preservative treatment, a long service life is expected. There are a number of

preservatives and methods adopted to treat bamboo. Green round bamboo can be treated by modified Boucherie, steeping, wick, sap displacement and diffusion methods. For dry bamboo, pressure treatment is found suitable. Ammonical copper arsenate solution to treat dry bamboo by soaking process is also found suitable in round form. Treatability of the bamboo varies from outer to inner surface, as the flow of fluid depends upon the size, shape and number of the vascular bundles occurring in the culm. The vascular bundles occurring in the inner zone of the culm treat better than the vascular bundles at the periphery. The degree of penetration decreased with increasing distance of the tissues such as fibres and parenchyma from the vessels.

7.32.2 Maintenance Records:

Compartment history files and control forms besides other records shall be maintained for each coupe/compartment and felling series in accordance with the National Working Plan Code-2014.

7.32.3 Intermediate Revision:

No intermediate Revision is anticipated. However, the results of prescriptions can be reviewed after 5 years and if found necessary, the concerned Regional Chief Conservator of Forests (Territorial) in consultation with the Chief Conservator of Forests (Working Plan) may recommend for intermediate Revision of the same, to the competent authority, whose decision shall be final.

7.33. Cost norm for implementations of the Prescriptions of this Working Circle:

The cost norm for this Working Circle is given and the estimated cost for this Working Circle is given in the relevant Chapter that is Financial forecast and cost of the plan.

Plate-V-A
Bamboo species available in Phulbani Forest Division

Dendrocalamusstrictus clumps in forest with flowers.

Flowering in Dendrocalamusstrictus

Bambusaaurundinacea

***Bambusaaurundinacea* clumps in forest**

Young shoots of Bamboo with sheath

Hollow culm

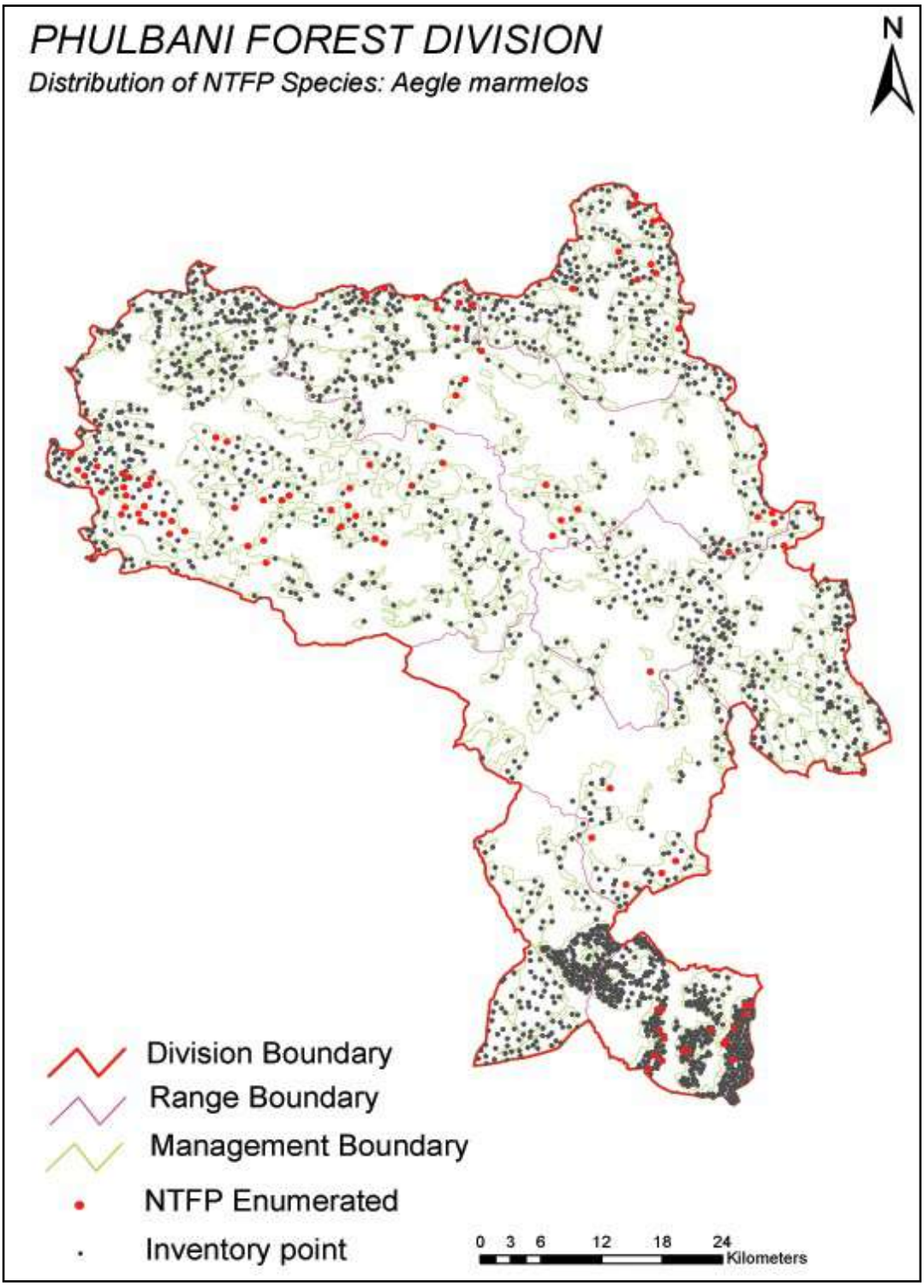
Bamboo flower

Solid culm

CHAPTER-8

The Non-Timber Forest Produce (Overlapping) Working Circle

8.1



8.2 General Constitution of Working Circle:-

8.2.1 Non-Timber Forest Products (NTFPs) are significant source of subsistence products ensuring and augmenting employment generation and household income in areas which are in close vicinity to the forests. The Non-Timber Forest Products have immense role in shaping the rural economy of the forest dwellers. With the changing forest management profile in favour of eco-friendly products and participatory management of forest areas, the NTFPs can have valuable contribution. In a forest ecosystem, the NTFPs provide maximum inputs into the domestic economy of the rural household. Tribal population depends heavily on NTFPs for income and subsistence. One reason why NTFP are so important for tribals is that they have been pushed toward more and more marginal areas. Since agriculture yields are lower and more uncertain in marginal areas, the reliance on NTFPs is high, both for food security during seasonal shortages and famine periods and as well as for household medicines and income needs.

8.2.2 Although the products, items and material obtained and collected from forests/trees are innumerable, the main items of importance include food (edible products), fodder and grasses, bamboo, medicinal products (plant, leaves, flower, fruit, bark and root with curative properties), spices, essential oils, gums, commercial leaves, natural dyes and tannins, starches, oil and fats, fibre and flosses and animal products like lac, silk, honey etc.

8.2.3 The forests of Phulbani Forest Division have tremendous potential for NTFPs such as Kenduleaf, Mohua flower, Mohua seeds, Sal seeds, Siali fibre, and Siali leaves; Char seeds, Kusum seeds, Chakunda seeds, Myrabolans, Banatulasi, Lodha, Medha, Phenphena, and Satabari etc. Extraction, processing and marketing of NTFPs is the source of employment and income to a vast majority of the tribal population. Very often NTFPs are collected haphazardly without looking into quality and sustainability of the produce.

8.3General Characteristics of vegetation:-

8.3.1 The detailed description of vegetation and composition of the crop has already been discussed in **Chapter-II (Part-I).** The details of NTFP items available forest block wise are described in **Chapter-VII (Part-I)** alongwith out-turn and royalty fetched by various NTFPs. NTFPs are more or less available in all the forest blocks of

the division. There is a general decline in the productivity of the NTFP items warranting remedial measures on priority basis.

Some of the characteristics of NTFPs are reflected below:

1. There exist substantial number and quantity of NTFPs available in the forests but investigation and research is required to know their uses for development and utilization.
2. A large number of NTFPs are not collected and are wasted because people do not find their uses and remunerative value.
3. There is very little knowledge about natural chemicals present in various parts of plants. Investigations and development of valuable chemical products from waste are necessary.
4. About 60% of NTFPs are directly consumed or bartered away by the people in and around the forest areas.
5. In the past, NTFPs were collected for trading in such small quantities that they made an insignificant contribution to economy. But now these products have acquired major importance.
6. The growing commercialization of NTFPs appears to be a world-wide phenomenon. The quantity collected, traded, price obtained have registered significant increase in market demand.
7. Harvesting of NTFPs is generally done manually. Plants are either uprooted or branches of the trees cut for collection of fruits, barks, roots etc. In some cases like collection of mohua flower and Sal seeds, the areas are burnt by fire for which the resource base is rapidly decreasing.
8. Unscientific and indiscriminate exploitation of NTFPs has been making serious inroads into the resource base. Various NTFP species have been "bled" for gums and resins in various parts of the forest blocks, which otherwise having luxuriant cover and comprising of matured trees. In order to prevent "death tapping" and instill quality consciousness, an awakening has to be created amongst the people.
9. Even now majority of the NTFPs supply depend solely on wild resources from the forests. Regeneration of NTFPs has to be given preference besides their protection and cultivation, wherever possible.

10. On private lands, communities show a greater awareness of sustainability and practice fairly effective resource stewardship. The owners harvest NTFPs after they are mature and due consideration in given in protecting the plants.

11. The whole family, including men, women, old and children are involved in the collection of NTFPs. Post-harvest operations, such as cleaning, removing wings and other waste, sorting and grading, drying and packing are carried out mostly or entirely by women. The collection of NTFPs provides jobs and works to entire household during the season.

12. Due to poor storage and preservation, quality deterioration is a common phenomenon. Circumstances warrant development of improved technology for storage and preservation of NTFPs.

13. The most crucial problem is the marketing of NTFPs. The tribal collector at the lowest level receives pitifully low recompense for the product he collects, while the consumer has to pay the inflated price and the middlemen mainly appropriate the large difference. A definite procurement strategy for NTFPs based on site specific condition is called for.

14. First stage processing should be organized within the forest areas for value addition and employment generation.

15. Development of processing technique and technologies that are appropriate to NTFPs have to be developed for improving economic and social status of people for generating employment and ensuring better value for the material collected by them. This will result in poverty alleviation.

8.3.2 Under the present scenario, special efforts are required to strike a balance between the protection of the interests of the primary gatherers; thereby enhancing their subsistence and side by side the protection/conservation of the natural resources, thereby increasing the productivity and making the forests sustainable. This working circle attempts to address the above difficulties. To address issues as described above including the felt needs to ensure long term sustenance of this varied forest resource, the Non Timber Forest Produce (Overlapping) Working Circle has been prescribed which overlaps the entire working plan area of the division.

8.4 Felling Series, Cutting sections and JFM areas:-

Not applicable to this working circle.

8.5 Blocks, Compartments and JFM area (marked on GIS bases Maps)Area and Allotment:

This working circle is entirely an overlapping working circle and covers all the areas where NTFPs are available. The total area of this working circle is 97697.575 (R,F) and 48336.421 (P.R.F.) hectares comprising of respective R.Fs and P.R.Fs areas of Phulbani Forest Division.

Since this working circle overlaps the entire plan area (RFs and PRFs), details of area allotment to this circle has not been furnished.

8.5.1Field study scenario:

Field study has been conducted regarding NTFP availability status in different forest blocks of Phulbani Forest Division in their distribution on the basis of selected criteria as detailed below:

Table: NTFP-1 Criteria for NTFP availability status

Sl. No	Plants/ha.	Availability Status
1.	More than 625 plants per Hectare	Abundant
2.	Between 400 to 625 plants per Hectare	Good
3.	Less than 400 plants per Hectare	Sparse
4.	No NTFP plants available	Nil

Table:NTFP-2
The Range-wise/Block-wise distribution and availability of various NTFPs

Forest block	Major NTFP items found.	Status
Range:- Karada		
1. Baraba RF	(i) Sal seeds &leaves, Siali leaves & fibre.	Good
	(ii) Banahaladi, Char seeds, Mahua flowers & seeds, Honey, Genduligum, Kusum seeds, Bhuineem, Bana kolathi, Hill brooms, Banakhajuri, Kamalagundi, Fruits, Dhatki, Satabari, Palas leaves, Kendu leaves, Myrabolan.	Sparse
2. Machhaghat RF	(i) Bana Haladi, Sal leaves.	Abundant
	(ii)Siali leaves, Siali fibre, Char seeds, Bhuineem.	Good
	(iii) Satabari, Bana khajuri, Bana tulasi, Aonla, Harida, Bahada, Dhatki, Char seeds, Mahula flower & seeds, Kamalagundi, Kendu leaves, Modafal, Satabari, Hill brooms, Kusum seeds etc.	Sparse

3. Ranaba RF	(i) Sal leaf & seed, Siali leaves & fibre, Banahaladi.	Good
	(ii) Bhuineem, Aonla, Harida, Bahada, Char seeds, Dhatki, Satabari, Kamalagundi, Hill broom, Bana khajuri, Kusum seed, Kendu leaves, Genduli gum, Honey etc.	Sparse
4.Badegarh PRF	(i) Bana Haladi, Sal leaves & seeds.	Abundant
	(ii) Siali leaves & fibre, Bhui neem, Char seeds, Kusum seeds.	Good
	(iii) Kendu leaves, Bana Khajuri leaves, kusum seeds, Kamalagundi, Dhatki, Palas leaves & loi, Aonla, Harida, Bahada, Genduli gum, Char seeds, Hill broom, Honey, Satabari.	Sparse
5. Nandavali PRF	(i) Bana Haladi, Sal leaves & seeds, etc.	Abundant
	(ii) Siali leaves & fibre, Bhuineem, Genduli gum.	Good
	(iii) Bana Khajuri, Kusum seeds, Aonla, Harida, Bahada, Char seeds, Hill brooms, Honey, Kendu leaves, Bana kolathi, Bana tulasi, Kamalagundi, Dhatki, Satabari.	Sparse
(II) Range:- Sudurukumpa		
1. Ranipathar RF	(i) Sal leaves & seeds, Genduli gum, Siali leaves.	Good
	(ii) Mohua flower & seed, Aonla, Harida, Bahada, Kamalagundi, Bana haladi, Bhuineem, Satabari, Patalgaruda, Bana khajuri, Bana kolathi, Hill brooms, Dhatki, Kendu leaves, Kusum seeds, Char seeds, Bana tulsi, Palas leaves, Kusum seeds, Honey.	Sparse
2. Donga RF	(i) Sal leaf & seed, Genduli gum, Siali leaf & fibre.	Good
	(ii) Kamalagundi, Aonla, Harida, Bahada, Banakolathi, Bhuineem, Banahaladi, Satabari, Kendu leaf, Char seed, Mahula flower & seed, Hill broom, Palas leaf & loi, Honey, Bana tulsi, Kusum seed etc.	Sparse
3. Sudurukumpa RF	(i) Sal leaves & seed.	Abundant
	(ii)Kendu leaves, Kusum seeds, Char seeds, Satabari, Mahua flower & seed, Hill brooms, Bana kolathi, Bhuineem, Palas leaves & loi, Atundi, Dhatki, Aonla, Harida, Bahada, Kamalagundi, Bana tulsi etc.	Sparse

4. Sudreju RF	(i) Sal leaves & seeds, Kendu leaves, Genduli gum, Siali leaves & fibre, Mahula seeds & flower, Hill brooms, Bhuineem, Banakolathi, Aonla, Harida, Bahada, Char seeds, Bana Tulsai, Satabari, Banakhajuri, Kamalagundi, Palash leaves, Bana Haldi.	Sparse
(III) Range: Raikia		
1. Dibari RF	Siali leaves, Bhuineem, Bana kolathi, Bana Khajuri, Satabari, Mahua flowers & seeds, Kendu leaves, Sal leaves.	Sparse
2. Kilundi RF	Sal seeds & leaves, Mahua flower & seeds, Siali fibre & leaves, Satabari, Bhuineem, Bana kolathi, Kamalagundi, Bana haladi, Palas leaves, Aonla, Harida, Bahada, Char seeds, Bana khajuri,	Sparse
3. Raikia RF	(i) Sal leaves & seeds.	Good
	(ii) Char seeds, Aonla, Harida, Bahada, Siali leaves & fibre, Bhuineem, Bana kolathi, Satabari, Banakhajuri, Kamalagundi, Dhatki, Modafal, Banatulsi, Bana haladi, Kendu leaves.	Sparse
4. Lendrikia RF	Sal leaves, Banatulsi, Bhui neem, Satabari, Bana khajuri, Dhatki, Modafal, Bana haladi, Palas, Kendu leaves.	Sparse
5. Manikeswar PRF	(i) Sal leaves.	Good
	(ii) Satabari, Bhui neem, Palas leaves, Aonla, Harida, Bahada, Bana haladi, Bana tulasi, Kendu leaves, Kamala gundi, Modafal, Datki, Char seeds, Mahua flower & seed, Siali leaves & fibre.	Sparse
6. Ganjuguda 'A' PRF	Sal leaves, Siali leaves & fibre, Bana haladi, Bana tulasi, Kendu leaves, Char seeds, Satabari, Datki, Bana khajuri, Bana Kolathi.	Sparse
7. Karada PRF	(i) Sal leaves & seed, siali fibres & leaves.	Good
	(ii) Mahuaflower & seed, Genduli gum, Honey, Kamalagundi, Bana khajuri, Bana haladi, Satabari, Bhuin neem, Bana kolathi, Bana tulasi, Kendu leaves, Aonla, Harida, Bahada, Hill broom, Kusum seeds, Dhatki, Char seeds.	Sparse
8. Sikabadi PRF	(i) Sal leaves & seed, Siali fibre & leaves	Good
	(ii) Bana haladi, Bana tulasi, Aonla, Harida, Bahada, Hill brooms, Bana khajuri, Bhuin neem, Satabari, Dhatki, Genduli gum, Char seed, Kusum seed, Kamalagundi, Kendu leaves, Modafal.	Sparse

(IV) Range:-Tiakabali		
1. Tikabali RF	Sal leaves, Siali leaves, Bana tulasi, Bhuineem, Bana haladi, Satabari, Kendu leaves etc.	Sparse
2. Shankarkhole RF	Sal leaves & Seeds, Siali leaves & fibre, Bhuineem, Bana tulasi, Kendu leaves, Broom grass, Mahul flower & seed, Aonla, Harida, Bahada, Bana khajuri, Kamalagundi, Dhatki, Bana kolathi.	Sparse
3. Archangi 'A' RF	(i) Siali leaves & fibre, Sal leaves & seeds, Bhuineem, Genduli gum, Bana tulsi.	Good
	(ii) Bana haladi, Char seeds, Mahula flower & seed, Bana khajuri, Bana kolathi, Bhalia seeds, Kamalagundi, Dhatki, Aonla, Harida, Bahada, Palas leaves, Hill broom, Honey, Satabari, Kendu leaves.	Sparse
4. Archangi 'B' RF	(i) Siali leaves & fibre, Sal leaves & seeds, Bhuineem.	Good
	(ii) Satabari, Hill broom, Bana khajuri, Dhatki, Mohua flower & seed, Char seeds, Bana haladi, Kendu leaves, Bhalia seeds, Kusum seeds.	Sparse
5. Ghudukapadar RF	Siali leaves, Sal leaves, Satabari, Bhuineem, Dhatki, Chara seed, Aonla, Harida, Mahua flower & seeds, Kendu leaves, Bana tulasi.	Sparse
6. Linepada RF	Sal leaves & seeds, Siali fibre & leaves, Dhatki, Kamalagundi, Aonla, Harida, Bahada, Bana khajuri, Bana kolathi, Bana tulasi, Bana haladi, Kendu leaves, Satabari, Bhuineem, Genduli gum.	Sparse
7. Burtang(s) RF	(i) Sal leaves & seed, Siali fibres & leaves.	Good
	(ii) Genduli gum, Dhatki, Kamalagundi, Bhalia, Aonla, Harida, Bahada, Hill broom, Satabari, Bana khajuri, Char seeds, Kendu leaves, Palas leaves, Mahua flower & seed, Kusum seed, Bana haladi, Bana kolathi.	Sparse
8. Chakapad RF	(i) Sal leaves & seed, Siali fibres & leaves.	Abundant
	(ii) Mahua flower & seed, Kusum seeds, Genduli gum, Dhatki, Kamalagundi.	Good
	(iii) Bana khajuri, Kendu leaves, Bana haladi, Bana tulasi, Aonla, Harida, Bahada, Hill brooms, Satabari, Char seeds, Honey.	Sparse
9. Beheragaon PRF	(i) Sal leaves & seed, Bana haladi, Aonla, Harida, Bahada, Kendu leaves, Bana tulasi, Siali leaves,	Sparse

	Siali fibres, Char seeds, Bhuineem, Bana khajuri, Mahua flower & seed, Genduli gum etc.	
10. Budukakhole PRF	Aonla, Harida, Bahad, Kusum seeds, Mahua flower & seed, Bhuineem, Bana tulasi, Siali leaves & fibre, Bana khajuri, Genduli gum, Sal leaves & seed, Satabari.	Sparse
11. Baradikia PRF	Kusum seeds, Genduli gum, Satabari, Siali leaves, Sal leaves, Siali fibre, Bana tulasi, Bhuineem, Bana khajuri, Char seeds, Aonla, Harida, Bahada, Mohua leaves & seeds, Palas, Honey, Kendu leaves.	Sparse
12. Nandini 'A' PRF	Siali leaves & Siali fibres, Aonla, Harida, Bahada, Dhatki, Kamalagundi, Char seeds, Mahua flower & seed, Bana tulasi, Bhuineem, Satabari, Bana khajuri, Genduli gum.	Sparse
13. Nandini 'B' PRF	Dhatki, Aonla, Harida, Bahada, Char seeds, Mahua flower & seed, Bana tulasi, Bhuineem, Satabari, Kendu leaves, Bana khajuri, Siali leaves, Sal leaves.	Sparse
14. Tudipaju PRF	(i) Sal leaves & Sal seeds, Genduli gum, Hill broom, Char seeds, Mahua flower & seed, Bana haladi, Bhuineem, Aonla, Harida, Bahada.	Good
	(ii) Satabari, Bana khajuri, Char seeds, Dhatki, Kamalagundi, Kendu leaves, Suamo loi.	Sparse
15. Ragaguda PRF	(i) Sal leaves & seed, Siali leaves & fibres.	Good
	(ii) Bana khajuri, Mahua flower & seed, Char seeds, Kendu leaves, Dhatki, Kamalagundi, Satabari, Genduli gum, Bana tulasi, Bhuineem, Bana khajuri, Bana haladi, Aonla, Harida, Bahada.	Sparse
16. Mundula PRF	(i) Sal leaves & seed, Siali leaves & fibre.	Good
	(ii) Bana haladi, Kendu leaves, Aonla, Harida, Bahada, Bhuineem, Bana khajuri, Bana kolathi, Genduli gum, Bana tulasi, Satabari, Mahua flower & seed, Suamo loi.	Sparse

(V) Range: Phulbani		
1. Balas kumpa RF	(i) Sal leaves.	Abundant
	(ii) Kamalagundi, Gilri, Bhuineem, Dhatki.	Good
	(iii) Siali leaves & fibre, Bana khajuri, Bana kolathi, Aonla, Harida, Bahada, Kendu leaves, Bana haladi, Mahua leaves & seeds, Suamo loi.	Sparse
2. Bhaliapada RF	(i) Dhatki, Kendu leaves, Bhuineem, Gilri, Satabari, Siali leaves, Genduli gum, Bana tulasi, Char seeds, Sal leaves & seed, Atundi, Siali leaves.	Sparse
3. Burtang(N) RF	(i) Sal seeds & leaves, Genduli gum, Satabari, Mahua flower & seed, Aonla, Harida, Bel.	Good
	(ii) Dhatki, Bana kolathi, Bana tulasi, Char seeds, Atundi, Hill brooms, Suamo loi, Bana haladi, Bana khajuri, Honey, Kendu leaf, Kusum seeds, Siali leaves & fibres, Sal resin, Bhalia seeds.	Sparse
4. Dakapalla 'A' RF	(i) Sal leaves Siali leaves.	Good
	(ii) Satabari, Bhuineem, Bana kolathi, Bana tulasi, Aonla, Char seeds, Bana khajuri, Dhatki, Kendu leaves Suamo loi.	Sparse
5. Dakapalla 'B' RF	(i) Sal leaves.	Good
	(ii) Siali leaves, Bhuineem, Dhatki, Bana tulasi, Satabari, Kamalagundi, Bana kolathi, Bana khajuri leaves, Kendu leaves, Aonla, Char seeds.	Sparse
6. Dutimendi RF	(i) Sal leaves & seed.	Good
	(ii) Aonla, Char seeds, Dhatki, Kendu leaves, Satabari, Bana khajuri, Bana haladi, Siali leaves, Suamo loi, Bhuineem, Bana tulasi, Bana kolathi.	Sparse
7. Ghugulasahi RF.	Siali leaves, Suamo loi, Kendu leaves, Satabari, Char seeds, Bana haladi, Bana khajuri, Bhuineem, Dhatki, Atundi, Tunga Alu.	Sparse
8. Gumagarh RF.	Sal leaves, Siali leaves & fibres, Mahua flower & seed, Satabari, Bhalia seeds, Genduli gum, Bana khajuri, Suamo loi, Bhuineem, Kendu leaves, Char seeds, Bana tulasi.	Sparse
9. Kalamuri RF	Siali leaves, Bana khajuri, Char seeds, Sal seeds and leaves, Kendu leaves, Aonla, Suamo loi, Gilri, Dhatki, Satabari, Bhuineem.	Sparse
10. Khajuripada RF	(i) Sal seeds & Sal leaves.	Abundant

	(ii) Siali leaves & fibres, Bhuineem, Mahua flower & seed, Kendu leaves, Genduli gum, Sal resin, Honey, Bhalia seeds, Char seeds, Kusum seeds, Hill broom, Suamo loi, Atundi, Aonla, Harida, Bahada, Satabari, Dhatki.	Sparse
11. Muskuli RF	Sal leaves, Siali leaves, Suamo loi, Char seeds, Bhuineem, Bana tulasi, Siali fibres, Kendu leaves, Atundi, Satabari, Kendu leaves, Dhatki.	Sparse
12. Pandrisuka RF	Suamo loi, Siali leaf, Dhatki, Bana kolathi, Bhuineem, Kendu leaves, Bana tulasi, Bana haladi, Char seeds.	Sparse
13. Ganjuguda 'B' PRF	(i) Sal leaves & seeds.	Abundant
	(ii) Siali leaves & fibre, Satabari, Bhalia seeds, Char seeds.	Good
	(iii) Bhuineem, Bana kolathi, Bana tulasi, Hill broom, Genduli gum, Kendu leaves, Mahua flower & seeds, Kamalagundi, Suamo loi, Bana khajuri.	Sparse
14. Phulbani PRF	Sal leaves & seed & leaves, Siali fibres, Bhuineem, Char seeds, Satabari, Bana kolathi, Bana tulasi, Bhalia seed, Suamo loi, Mahua flower & seed, Kamalagundi.	Sparse
15. Pilasalunki(E) PRF	Sal leaves & seeds, Siali leaves & fibre, Bhalia seeds, Dhatki, Chara seeds, Mahua flower & seed, Bhuineem, Satabari, Char seeds, Genduli gum, Suamo loi, Kendu leaves.	Sparse
16. Pilasalunki(W) PRF	Sal leaves & seeds, Siali leaves & fibre, Bhalia seeds, Dhatki, Chara seeds, Mahua flower & seed, Bhuineem, Satabari, Char seeds, Genduli gum, Suamo loi, Kendu leaves.	Sparse
17. Khaumunda RF	Sal leaves, Siali leaves, Suamo loi, Siali fibre, Bhalia, Satabari, Bhuineem, Bana kolathi, Bana tulasi etc.	Sparse
18. Kalabagh Ext. PRF	(i) Sal seeds & leaf	Good
	(ii) Myrabolans, Mahua flower & seeds, Bel, Genduli gum, Mango kernel, Sikakai, Hill broom, Siali leaf, fibres & seeds.	Sparse
19. Dariki RF	Sal seeds & leaves, Char seeds, Bhalia seeds, Mankada kednu, Sidha fruits, Kusum seeds, Mango kernels, Mahua flower & seeds, Dhataki flower, Indragaba, Khajuri patti, Bana haladi, Bhuineem, Suamo loi / Krushna sharika, Atundi loi, Simul cotton, Bana tulasi,	Sparse
20. Kalabagh RF	(i) Sal seeds & leaves	Good
	(ii) Siali leaves, seeds & fibres, Mahua flower	Sparse

	&seeds, Bhalia, Seeds, Char seeds, Genduli gum, Mankada kendu, Aonla, Harida, Bahada, Satabari, Sidha fruits, Honey, Bee wax, Bel, Suamo lai, Atundi lai & fruits, Bana haladi, Rasna.	
21. Palchi RF	(i) Sal seeds & leaves.	Good
	(ii) Siali leaves & seeds, Char seeds, Sal resin, Mohua flower & seeds, Simul cotton, Mango kernel, roots of patala garuda, Karanga seeds, Aonla, Bahada, Harida, Genduli gum, Bana kolathi, Gillo seeds, Rasna.	Sparse
Range:- G.Udaygiri		
1. Rotingia RF	Siali leaf, Siali fibre, Sal seed, Bhuineem, Palas seeds, Aonla, Harida, Bahada, Char seeds, Gilo seeds, Kaincha seeds, Bana tulasi, Atundi lai, Satabari.	Sparse
2. Sujeli RF	Tentuli, Mango, Bhalia, Myrabolan, Hill broom, Siali leaf & fibres, Palas seeds, Char seeds, Bhuineem, Kendu, Atundi lai.	Sparse
3. Pukulingia RF	Palas seeds, Kusum seeds, Bana haladi, Bana kolathi, Aonla, Harida, Bahada, Atundi seeds & lai, Satabari, Kurei, Bhalia, Chara, Sal seeds, Bel, Bana tulasi.	Sparse
4. Kalinga-I (Jobedi-RF)	Palas seeds, Kusum seeds, Tamarind seeds, Char seeds, Bhalia seeds, Kendu, Mango, Atundi seeds & loi, Siali leaf fibre, Sal seeds, Gilo seeds, Genduli gum, Bana haladi etc.	Sparce
5. Kalinga-II (Godingia)	Palas seeds, Sal seeds, Bana haladi, Bana kolathi, Mahua flower & seed, Kendu, Mango, Bana tulasi, Kamalagundi, Satabari, Moda fruits, Bhuineem, Atundi seeds & lai, Suamo loi etc.	Sparce
6. Kalinga-II (Kurmingia RF)	Hill broom, Siali fibres & leaves, Myrabolans, Neem seeds, Karanja seeds, Bana haladi, Bana kolathi, Bhuilimba, Sabai grass, Gilo seeds, Genduli Gum, Honey, Bhalia seeds, Atundi fruits & Lai, Kusum seeds, Mango kernel, Bel, Suamo lai,	Good
7. Kalinga-IV (Kalinga Sandal wood RF)	Sal seeds, Satabari, Bhalia seeds, Char seeds, Siali leaf & seeds, Bana kolathi, Bana haladi.	Sparse
8. Kanabagedi RF	Atundi seeds & lai, Bana kolathi, Bana haladi, Bhuineem, Neem seeds, Karanga seeds, Anantmula, Wood mushroom, Satabari, Phenphena fruit, Bel, Gillo seeds, Palas seeds, Dhataki flower, Bhalia, Aonla, Harida.	Sparse

9. Gedipabali RF	Hill broom, Sabai grass, Bhalia seeds, Char seeds, Sal seeds, Kendu fruits, Palua, Bana kolathi, Siali leaf, Seeds etc.	
10. Gutingia-A-RF	Sal seeds, Mahua flower & seed, Bhalia seeds, Char seeds, Lodha, Medha, Phenphena, Genduli gum, Honey, Kamalagundi fruit, Gilo seeds, Siali leaf & fibres,	Good
11. Gutingia-B-RF	Palas seeds, Gillo seeds, Mahua flower & seeds, Karanga seeds, Bhalia seeds, Kusum seeds, Char seeds, Bana khajuri, Dhatki flower, Simuli cotton, Sikakai, Honey, Myrabolans, Sal seeds, Hill brooms, Siali leaf & fibres.	Sparse
12. Dakapalla RF	Sal seeds, Palas seeds, Bhalia seeds, Char seeds, Hill brooms, Myrabolans, Palua, Siali leaf & fibres.	Good
13. Baliapatta RF	Bhalia seeds, Char seeds, Kendu, Mahula seeds & flower, Myrabolans, Siali leaf & fibres, Honey, Palas seeds, Satabari etc.	Sparse
14. Tuduballi RF	Sal seeds, Char seeds, Bhalia seeds, Kusum seeds, Karanga seeds, Mahua flower & seeds, Mango kernel, Myrobolans, Baghanakhi, Bel, Hill broom, Siali leaf & fibres, Atundi seeds & lai, Satabari, Baidanka seeds etc.	Sparse
15. Podangi RF	Sal seeds, Myrabolans, Kusum seeds, Karanga, Char, Bhalia seeds, Kendu, Atundi seeds & lai, Siali leaf & fibres, Phoenix broom etc.	Sparse
16. Bakingia PRF	Sal seeds, Kendu, Atundi seeds & lai, Palas seeds & flower, Suamo loi, Aonla, Harida, Bahada, Bhalia Kusum seeds, Bana kolathi, Bana haladi, Phenphena, Lodha, Medha, Sikakai, Dhataki flower, Mango kernel, Siali leaf & fibres, seeds, Kochila seeds, Tamarind seeds, Baghanakhi seeds, Gillo seeds, Satabari, Mushroom, Neem seeds etc.	Sparse
17. Katingia PRF	Sal seeds, Mahula flower & seeds, Kendu, Bhalia seeds, Char seeds, Bhuineem, Bana haladi, Myrabolans, Sidha fruits.	Sparse
18. Paburia PRF	(i) Char seeds, Bhalia seeds, Kusum seeds, Mahua flower & seeds, Kendu, Bana haladi, Bana Kolathi etc.	Sparse
	(ii) Sal seeds.	Good
19. Talarimaha PRF	(i) Sal seeds.	Good
	(ii) Mahua flower & seeds, Bhalia seeds, Char seeds, Kendu, Aonla, Siali leaf, & fibre, Bhuikhajuri, Bana haladi, sidha fruits.	Sparse
20. Bhanjapadar PRF	(i) Sal seeds.	Good

	(ii) Bhalia seeds, Char seeds, Kendu, Mahula flower & seeds, Suamo loi, Atundi loi, Palas flower & seeds, Bhuineem, Bana haladi, Bana kolathi, Bel, Sidha fruits etc.	Sparse
Range:-Phiringia		
1. Bandhagarh A PRF	(i) Sal seeds, Sal leaf, Bhalia seeds, Char seeds, Mahua seeds & flower.	Good
	(ii) Myrabolans, Kendu, Genduli gum, suamo loi, Khelua loi, Bana kolathi, Palasa flower & seeds, Siali fibre & leaf, Bhuikhajuri, Gillo seeds, Satabari, Atundi lai & fruits, Kusum seeds, Mango kernel, Phenphena fruits, Palua.	Sparse
2. Balandapada (S) PRF	Mahua flower & seeds, Harida, Bahada seeds, Kendu fruits, Char seeds, Siali leaves & fibre, Hill broom, Gillo seeds, Aonla, Bana khajuri & Bana haladi.	Sparse
3. Balandapada (N) PRF	(i) Sal seeds, Sal leaves	Good
	(ii) Hill broom, Bhalia seeds, Char seeds, Sikakai, Siali leaves, Seeds, Fibres, Simuli cotton, Mahua flower, seeds, Genduli gum, Aonla, Bel & Patala garuda root	Sparse
4.Damingia PRF	Sal seeds & leaf, Mahua flower & seeds, Bhalia seeds, Karanga seeds, Bel, Dhatki flower, Root of Patalagaruda, Sikakai, Bana haladi, Bana kolathi, Aonla.	Sparse
5. Damingia Ext. PRF	(i) Sal seeds & leaves	Good
	(ii) Myrabolans, Mahua flower & seeds, Siali leaves, Seeds, Bel, Sikakai, Simuli cotton, Char seeds, Genduli gum, Bhuineem, Khajuri patta, Gillo seeds, Sidha fruits.	Sparse
6. Katringia PRF	(i) Sal seed & leaves. (ii) Kendu, Char seeds, Bhalia seeds, Mahua seeds & flower, Siali leaves, fibres & seeds, Myrabolans, Kusum seeds, Palas seeds, Sidha fruit, Baidanka seeds, Atundi lai & fruits, Dhataki flowers, Hill brooms, Genduli gum, Bana haladi, Kurei seeds/Indragaba, Khajuri patti, Bhuineem, Suamo loi, Karanga seeds, Rasna, Nirmala etc.	Sparse
7. Kelapada A PRF	Sal seeds & leaves, Mankada kendu, Bhalia seeds, Char seeds, Khajuri patti, Rohini fruits, Dhataki flower, Kurei seeds / Indragaba, Bhuineem, Rasna, Sidha fruits, Satabari, Suamo loi, Atundi lai & fruits, Mahua flower & seeds, Kusum seeds &Palas seeds.	Sparse

8. Kelapada B PRF	Sal seeds & leaves, Mahua seeds & flower, Bhalia seeds, Char seeds, Khajuripatti, Indragaba, Palas seeds, Sidha fruits, Bhuineem, Bana haladi, Atundi lai & fruits.	Sparse
9. Kelapada C PRF	Myrabolans, Mahua flower & seeds, Bhalia seeds, Mankada kendu, Kusum seeds, Char seeds, Sal seeds & leaves, Palas fruits, Siali leaves & fibres, Seeds, Bana haladi, sidha fruits, Indragaba, Khajuri patti, Bhuineem, Landa Baguli, Kochila seeds.	Sparse
10. Kiamunda PRF	(i) Sal seeds & leaves.	Good
	(ii) Harida, Bahada, Amla, Fruits, Bhalia seeds, Char seeds, Mankada kendu, Sidha fruits, Indragaba, Kusum seeds, Palas seeds, Siali leaves, seeds & fibres, Atundi loi & fruits, Satabari, Khelua lai, Katha chhatu, Bana kolathi & Bana haladi, Bel Khajuri patti.	Sparse
11. Mallikapada PRF	(i) Sal seeds & leaves.	Good
	(ii) Bhalia seeds, Char seeds, Mahua flower, seeds, Siali leaves, seeds & fibres, Myrabolans, Satabari, Sikakai, Palas seeds, Simuli cotton, Bana haladi, Khajuri patti & Indragaba, Genduli gum, Suamo loi, Atundi loi & fruits.	Sparse
12. Baghanadi RF	(i) Sal seeds & leaves	Good
	(ii) Mahua flowers, Seeds, Bhalia seeds, Char seeds, Mankada kendu, Myrabolans, Sidha fruits, Palas seeds, Genduli gum, Karangia seeds, Kusum seeds, Hill brooms, Khajuri patti, Siali leaves, seeds & fibres, Simuli cotton, Palua, Dhatki flower, Sikakai, Satabari, Nirmasa/Kataka, Indragaba, Phenphena fruits, Atundi loi & fruits, Rasna, Bana haladi, Bana kolatha, Bhuin neem.	Sparse
13. Bandhagarh 'B' RF	(i) Sal seeds & leafs	
	(ii) Genduli gum, Palas seeds, Atundi lai & fruits, Indragaba, Gaba, Char seeds, Bhalia seeds, Landa baguli, Gillo seeds, Simuli cotton, Aonla.	Sparse
14. Dahisara RF	Sal seeds & leaves, Bhalia seeds, Char seeds, Kusum seeds, Palas seeds, Genduli gum, Indragaba, Mango kernel, Harida, Bahada, Aonla, Mankadakendu, Dhataki flower, Atundi loi & fruits.	Sparse
15. Gerupada(E) RF	Sal seeds & leaves, Mankada kendu, Bhalia seeds, Khajuri patti, Harida, Bahada, Simul cotton, Palas seeds, Kusum seeds, Indragaba, Sidha fruits.	Sparse

16. Gerupada(W) RF	Sal seeds & leaves, Mankada kendu, Bhalia seeds, Indragaba, Char seeds, Khajuri patti, Palas seeds, Bana haladi, Bana kolathi, Hill broom, Aonla, Gillo seeds, Bhuineem etc.	Sparse
17. Gochhapada RF	(i) Sal seeds & leaves.	Good
	(ii) Mahua seeds, Flower, Char seeds, Bhalia seeds, Kusum seeds, Karanga seeds, Siali leaves, seeds & fibres, Mankada kendu, Palas seeds, Kamalagundi, Bel, Myrabolans, Hill brooms, Kochila seeds, Nirmala, Honey, Wax, Simul cotton, Dhatki flower, Sikakai, Indragaba, Bel, Satabari, Phenphena, Simo loi, Atundi loi & fruits, Sidha fruits, Bana haladi, Bana kolathi, Bhuineem,	Sparse
18. Kerandibali (E) RF	(i) Sal seeds & leaves	Good
	(ii) Siali leaves & seeds, fibres, Kusum seeds, Mahua flower & seeds, Simul cotton, Bel, Genduli gum, Mankada kendu, Char seeds, Bhalia seeds, Sidha fruits, Myrabolans, Hill brooms, Kanta brooms, Baidanka seeds, Rasna, Indragaba, Gillo seeds.	Sparse
19. Kerandibali (W) RF	(i) Sal seeds & leaves, Mahua seeds & flower	Good
	(ii) Genduli gum, Char seeds, Bhalia seeds, Kusum seeds, Karanga seeds, Palas seeds, Kendu, Bel, Rohini fruits, Sidha fruits, Satabari, Myrabolans, Mango kernel, Atundi lai & seeds, Suamo lai etc.	Sparse.
20. Ladapadar RF	(i) Sal seeds &leaves, Mahua flower & seeds.	Good
	(ii) Mango kernels, Char seeds, Bhalia seeds, Karanga seeds, Palas seeds, Genduli gums, Roots of Patala garuda, Mankada kendu, Aonla & bahada.	Sparse
21. Nuapadar RF	(i) Sal seeds & leaves	Good
	(ii) Mahua flower & seeds, Siali leaves & seeds, Mango kernel, Aonla, Bhalia seeds, Char seeds, Kusum seeds, Satabari, Indragaba, Bhuineem, Bana haladi.	Sparse
22. Sadingia RF	(i) Sal leaves & seeds	Good
	(ii) Char seeds, Bhalia seeds, Dhataki flower, Indragaba, Satabari, Bhuineem, Myrabolans, Kusum seeds, Palas seeds, Siali leaves, fibres & seeds, Suamo loi, Atundi loi & seeds, Khajuri patti, Sidha fruits, Simul cotton & Palua.	Sparse
Source:Field study by grid/strip sampling method		

8.6Special objectives of management

The special objectives of management of this working circle are within the scope of general objective of management prescribed for this Division. These are as follows:

1. To assess the potentiality of the various NTFP produces of the Division.
2. To regulate the collection of various NTFPs and to develop the area for increased and sustainable production.
3. To meet the bonafide needs of the local people.
4. To create maximum rural employment in the interior and remote areas during the lean season.
5. To explore the scientific utility of many NTFPs, which are not collected at present by the primary collectors, even though abundant in the forests.
6. To regulate and optimize extraction and utilization of various NTFPs in confirmity with Government policy with a view to promote sustainable management of forests.
7. To enhance the value of forests by way of developing new NTFPs, creating additional opportunities for further value addition in the existing NTFPs and strengthening the marketing network.
8. To develop and extend skills to the local people, including the tribal, for sustainable collection, extraction and utilization of various NTFPs so as to distract them from shifting cultivation.
9. To encourage small cottage industries, which can run on non-timber forest produces available in the nearby areas, instead of exporting them to outside.
10. Special emphasis on planting of species, which are known for their NTFP values during artificial regeneration in the forest areas.

8.6.1 Analysis of the crop:-

The major NTFPs available forest block wise of the Division has already been reflected in Table NTFP-3 as below

In addition to it, important fibres and tannian yielding species, fruit bearing trees, oil yielding species, gum and resin yielding species etc. pertaining to Phulbani Forest Division as revealed during field study have also been reflected in **Table Nos.NTFP 3, 4, 5, 6, & 7.**

Table NTFP-3: Important Fruit bearing trees of Phulbani Forest Division				
Sl. No.	**Local name**	**Botanical name**	**Collection period**	**Utilization**
1.	Amba	*Magnifera indica*	April/May	Ripe fruits are eaten and raw are use for making pickles etc.
2.	Aonla	*Emblica officinalis*	October/April	Fruits is eaten raw and used in pickles.
3.	Ata	*Anona squamosa*	July/August	Ripe fruits are eaten.
4.	Bankhajuri	*Phoenix acaulis*	May/June	Ripe fruits are eaten.
5.	Barakoli	*Zizyphus jujuba*	January/March	Ripe fruits are eaten and used for pickles.
6.	Bel	*Aegle marmelos*	One year after fruiting	Leaves eaten and used in curry.
7.	Bhalia	*Semicarpus anacardium*	June/July	Fruit, kernel eaten and used for pickles.
8.	Bhrusunga	*Murraya koenigi*	Throughout the year	Leaves eaten and used in curry.
9.	Jamu	*Syzyigium cumini*	June/July	Ripe fruits are eaten
10.	Kadamba	*Antocephalous cadamba*	October	Ripe fruits are eaten
11.	Kendu	*Diospyros melanoxylon*	May/June	Ripe fruit is eaten
12.	Kusum	*Schleichera oleosa*	June/July	Flesh of the fruit is eaten.
13.	Mahula	*Madhuca lindica*	May to July	Flowers eaten & used for preparation of country liquor, unripe fruit used as vegetable, oil from seeds used for cooking.
14.	Panas	*Artocaprpus heterophylius*	May/August	Unripe fruits are vegetable, pickle, ripe fruits and seeds are eaten.
15.	Rai	*Dillenia poentagyana*	August	Young fruits are cooked and eaten.
16.	Sajna	*Moringa pterigosperma*	Throughout the year	Flowers, leaves & fruits used as vegetable.
17.	Tentuli	*Tamarindus indica*	December/ January	Fruits, flowers & leaves are used for

				vegetable, pickles.
18.	Ambada	*Spondius magifera*	January / February	Edible
19.	Baula	*Mimusops elengi*	April / May	Edible
20.	Char	*Buchanania lanzan*	April / May	Edible
21.	Harida	*Terminalia chebula*	February / March	Medicinal
22.	Kaitha	*Limonia acidissima*	November / December	Edible for man and elephant.
Source: Field Survey				

Table No.-NTFP-4 Important fibre yielding Forest species of Phulbani Forest Division

S. No.	Common name	Botanical name	Part yielding fiber	Utilization
1.	Bamboo	*Bambusa arundinacea*	Stem	Manufacture of paper.
2.	Bamboo	*Dendrocalamus strictus*	Stem	Manufacture of paper.
3.	Dhaman	*Grewia tiliaefolia*	Inner bark	Used for rope making.
4.	Kanchan	*Bauhinia variegate*	Bark	Used for cordage.
5.	Palas	*Butea monosperma*	Bark	Used for rope making and for caulking boats
6.	Siali	*Bauhinia vahlii*	Inner bark	Used as cordage, Binding of kendu leaf and paper making.
7.	Sisal	*Agave sisalana*	Leaves	Used for rope making, weaving mats.

Table No. – NTFP. 5 Important oil yielding forest species of Phulbani Forest Division

S. No.	Common name	Botanical name	Part yielding fiber	Utilization
1.	Karanja	*Pongamia pinnata*	*Seeds*	*Oil used as medicine, antiseptic, sod making, perfume, and leather tanning.*
2.	Kusum	*Schleichera oleosa*	*Seed, Kernels*	*Oil as hair oil, for cooking, lighting, soap making.*
3.	Mahua	*Madhuca indica*	*Seeds*	*Oil used for soap, hair-oil & adulterant for ghee.*

4.	Neem	*Azadirachta indica*	*Seeds*	*Oil used as medicine, for soap making oil cake as fertilizer.*
5.	Sal	*Shorea robusta*	*Seeds*	*For cooking, lighting, soap making, in confectionary.*
6.	Kochila	*Strychnos nuxvomica*	*Seeds*	*Medicine.*
7.	Champa	*Michelia champaca*	*Flower*	*Perfume.*
Source: Field Survey				

Table No. NTFP – 6Important tannin yielding Forest species of Phulbani Forest Division

S. No.	Local name	Botanical name	Part yielding fiber	Utilization
1.	Babul	*Acacia arabica*	Bark of tree	Tanning of leather.
2.	Dhaura	*Anogeissus latifolia*	Dry matured leaves.	Dyeing
3.	Sunari	*Cassia fistula*	Bark	Blending and tanning of leather.
4.	Kamalagundi	*Mallotus philippinesis*	Fruit	Colouring of clothes
Source: Field Survey				

Table No.- NTFP-7Important gum and resin yielding plants of Phulbani Forest Division

S. No.	Common name	Botanical name	Part yielding fiber	Utilization
1.	Asan	*Terminalia tomentosa*	Stem	Gum used as incense and in cosmetics
2.	Genduli	*Sterculia urens*	Stem	Gum Karaya, used in confectionary.
3.	Khair	*Acacia catechu*	Heartwood	Consumed in betel, pan masala.
4.	Moi	*Lannea coromandelica*	Stem (Thingan gum)	In calico printing, paper and clothe sizing, adhesive,varnishes & confectionery.
5.	Piasal	*Pterocarpus marsupium*	Stem (Kino gum)	Used as medicine.
6.	Sal	*Shorea robusta*	Stem (Oleoresin)	Used as an incense and disinfectant, fumigant.
7.	Salai	*Boswellia serrata*	Stem (Guggal)	Used in incense, curing rheumatism and nervous disorders.
8.	Dhaura	*Anogeissus latifolia*	Stem	Sizing paper and in calico printing.
Source: Field Survey				

It is a wrong notion that collection of NTFPs causes little or no deleterious effect on forests. In fact, NTFP harvest may affect plant population at two different levels:

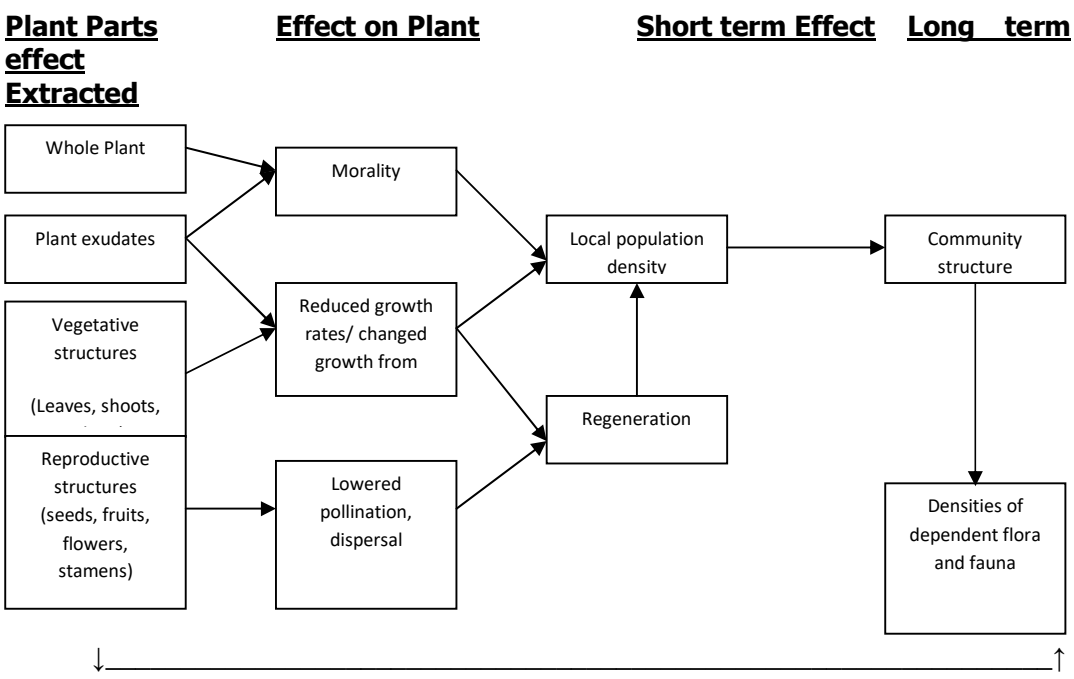
1. Firstly, at the individual level on vital rates such as growth and reproductive capacity.
2. Secondly, at the level of population, this manifests in its demographic structure and long term dynamics.

The direct effects of intensive forest produce collection may cause decline in productivity, density and /or regeneration of the targeted plant species, depending on the part of the plant that is utilized.

The possible ecological impacts of NTFP extraction are reflected below in figure I:

Figure-I

Possible Ecological Impacts of NTFP Extraction



An important approach to studying impacts of NTFP harvest on natural population has been to examine whether there is sufficient regeneration of the resource population, particularly for tree species. The underlying rationale is that a continuously regenerating population will ensure that the resource is not depleted and there will be a continuous flow of benefits to people dependent on these resources over time. However, assigning cause and effect between resource use and observed

regeneration is not straightforward for several reasons. First, it is difficult to locate control (unharvested) populations that differ from treatment (harvested) populations in every respect except for the intensity of harvest. This is because anthropogenic factors such as grazing, firewood use, fire, hunting, timber cutting and NTFP extraction are often correlated. The negative aspects of NTFP collection, exploitation and utilization deserve greater attention by the Divisional Administration and proper monitoring of collection should be ensured. Training of V.S.S. member in collection, processing and value addition of the major NTFPs collected should be carried out.

8.6.2 Silviclture System :-Not applicable to this Working Circle.

8.6.3 Rotation Period:-Not applicable to this Working Circle.

8.6.4 Harvestable Diameter :-Not applicable to this Working Circle.

8.6.5 Reducing factor and reducing area :-Not applicable to this Working Circle.

8.6.6 Felling cycle :-Not applicable to this Working Circle.

8.6.7 Division into periods and allotment to periodic blocks :-Not applicable to this Working Circle.

8.6.8 Calculation of yield :-Not applicable to this Working Circle.

8.6.9 Table of felling:- Not applicable to this Working Circle.

8.6.10 Methods of execution:

The primary collectors should be properly guided to collect the NTFPs in non-destructive way. Latest techniques of collection, drying and storage should be imparted to them. Value addition to collected NTFPs locally will enhance their earnings, thereby augmenting their livelihood status during lean period.

8.7New Policy on procurement and Trade of NTFPs:

8.7.1 Despite the rich potential of NTFP in Orissa forests, having about 120 numbers of species, there have been inadequate efforts in the past by the State Government with regard to its collection, processing, marketing and income generation to benefit large number of rural population in general and tribal in particular. As a result, gross underutilization of available NTFP resources has adversely affected the livelihood sustenance of poor forest dwellers living in and around forests, as also the forest

revenues to the State exchequer. Keeping stock of the situation, various forest acts and laws have been formulated and implemented from time to time and also a number of institutions have been established to do away with exploitative interests of middlemen, traders, businessmen.

8.7.2 Trade on few NTFP items such as Kendu leaves, Sal seeds and Bamboos has been nationalized in 1973, 1983 and 1988 respectively by the State Government partly to enable the primary collectors to derive the minimum procurement price for their products with lesser harassment. But, despite varied policy interventions to check exploitation of the primary collectors in NTFP trade through TDCC (Tribal Development Co-operative Co-operation), OFDC (Orissa Forest Development Corporation Ltd.), LAMPs (Large Size Agricultural Multipurpose Society), TRIFED (Tribal Co-operative Marketing Federation), ORMAS (Orissa Rural Development Marketing Society) etc., exploitation of primary collectors still continues.

8.7.3 On careful consideration of the problems highlighted in the previous paragraph, the Government of Orissa issued a new policy on procurement and trade of NTFP in their Resolution No. 5503/F&E Dated 31st March, 2000. According to this policy, Gram Panchayats have been authorized to regulate the purchase, procurement and trade of NTFPs including 68 items of MFPs so that the primary gatherers get fair price for the NTFP gathered by them. The policy resolution contains a list of 60 items of NTFP in its Annexure-A, 7 items including the seeds of various NTFP species in its Annexure-B and 9 restricted items of NTFP in Para 4(b) of the resolution.

8.7.4Aim of the Policy:

The new policy aim at the following:

(i) To provide the primary collectors wide access to market.

(ii) A fair price to the primary gatherers.

(iii) Collection of NTFPs on non-destructive basis, to ensure sustainability of forests.

(iv) To ensure reasonably, the NTFP based livelihood of tribals and rural people.

8.8 Regulation of Trade:

Under the policy, any person desirous of purchasing NTFP items from primary gatherers or trading in NTFP so purchased shall undertake the trade after registration

with the Gram Panchayat concerned on payment of registration fee fixed by the Gram Panchayat. No lease shall be granted by the Government in respect of any NTFP items nor shall it levy any royalty on these items. No transit permit will be required for transport of any NTFP items within the state. Other than 68 items of the NTFP listed in Annexure-A and B of the Policy Resolution 2000, collection and trading of 9 restricted items listed in Para 4(b) of the resolution require permission from the Government of Orissa.

8.9 Price Fixation:

In order to ensure the payment of fair procurement prices of the NTFP to the primary gatherers, Government of Orissa on 12th October 2001 has brought out a resolution No. 16467/F&E Dated 12/10/2001 relating to price fixation mechanism of the NTFP. The Resolution came out as a modification over the earlier notification dated 9th July 2001 (Notification No. 20665/SSD) through which the existing state level price fixation committee was dissolved and instead a system of price fixation at the district level has been introduced. The resolution says that the District Collector is empowered to fix the Minimum Procurement Price in respect to all the NTFP items including 68 Minor Forest Products. In this regard District Collector shall consult DFO (Territorial), District Panchayat Officer, District Welfare Officer, local representatives of TRIFED, the local representative of the Orissa Forest Development Corporation Ltd. and the local representative of the Women and Child Development Department. Although the above changes made are quite encouraging, it is too early to assess its efficacy for which it has been made.

8.10 Minor Forest Produce:

8.10.1 Prior to National Forest Policy, 1988, NTFPs were popularly known as Minor Forest Products (MFP). National Forest Policy (1988) incorporated following provisions:

- **(i)** MFP provides sustenance to tribal population and to other communities residing in an around the forests. Such produce should be protected, improved and their production enhanced with due regard to generation of employment and income.
- **(ii)** Production, regeneration and optimum collection of minor forest produce alongwith institutional arrangements for the marketing of such produce.

(iii) Increasing the productivity of MFPs per unit area per unit time by the application of modern scientific and technological methods.

(iv) Promoting appropriate small-scale forest-based enterprises for supporting rural development and local entrepreneurship.

8.10.2 Monopoly rights on MFP species have not yielded encouraging results. The problems of securing permits and licenses have discouraged many cultivators to grow such species. Simple rules and regulations should be evolved to encourage conservation, cultivation, harvesting and sale of MFPs and NTFPs. The list of items of NTFP to be treated as MFP may however be modified by the Government from time to time. Table No. NTFP-8 gives the list of MFPs as reflected below:

Table No:NTFP-8List of Minor Forest Produce Items

Sl. No.	Common Trade name of MFP	Sl. No.	Common Trade name of MFP
1	Tamarind/deseeded Tamarind & Seed	31	Bana Kolatha
2	Mahua Flower	32	Gaba
3	Hill Broom	33	Basil
4	Thorn Broom (Jhadu or Ghoda Lanji)	34	Makhana seed
5	Phula Jhadu.	35	Tala Makhana seed
6	Broom Grass	36	Baidanka Seeds
7	Nux Vomica (Kochila seeds)	37	Baghanakhi Seeds
8	Harida	38	Kamala Gundi Fruit
9	Bahada	39	Landa Bagudi
10	Anla	40	Bela
11	Soap Nut (Ritha Phala)	41	Chireita (Bhui Neem)
12	Marking Nut (Bhalia)	42	Khajuripata
13	Cleaning Nut (Nirmala)	43	Rohini Fruit
14	Honey	44	Bhursunga Leaves
15	Siali Leaves	45	Rasna Root
16	Sabai Grass	46	Phenaphena Fruit
17	Mango Kernel	47	Sidha Fruit
18	Thatch Grass	48	Sathabari
19	Simul Cotton.	49	Katha lai
20	Arrow Root (Palua)	50	Atundi Lai
21	Dhatuki Flower.	51	Khelua Lai
22	Putrani	52	Suam Lai
23	Sikakai	53	Eksira Fruit
24	Jangal jada or Gaba	54	Katha Chhatu (Mushroom)
25	Palasa Seed	55	Mat Reed (Sapa Masina Grass)
26	Suaku Seed	56	Ananta Mula
27	Indra jaba (Koral Seed)	57	Antia Pata
28	Gila (Seed and Coat)	58	Nageswar Flower
29	Benachera	59	Mabjad Dio mel
30	Banahaladi	60	Atundi Fruit

8.11 Ownership of NTFPs:

The ownership of the MFPs on area specific basis are reflected below:

(i) Gram Panchayat/Gram Sabha in the scheduled areas will have the ownership over MFP produced within its territorial jurisdiction i.e. revenue villages comprising the Gram Panchayat.

(ii) In non-scheduled areas ownership of MFP is not vested in Gram Panchayats.

(iii) No Gram Panchayat, whether situated within or outside the scheduled area, will have ownership over MFP produced in Reserved Forests, in Forest areas under Wildlife Sanctuaries and National Parks which are outside the limits of revenue villages. The Gram Panchayats will not therefore have the right to grant lease or license to any individual or agency for collection of MFP from these areas. However, members of V.S.S., tribals, Artisans etc. as part of their customary rights will be free to collect MFP from Forest areas, excluding sanctuaries and National Parks.

(iv) But, both in the scheduled and non-scheduled areas, the Panchayats will have the authority to regulate purchase, procurements and trading on MFP in their territory even when such MFP is coming to a village from forest area.

(v) Where V.S.S. has been formed these Samities and its members will have priority over the Gram Panchayat in the matter of collection and disposal of MFP of respective forest areas.

8.12 Regulation of Trade of MFP:

8.12.1 Registration: Any person desirous of purchasing MFPs from primary gatherers or trading in MFPs so purchased, shall apply for registration to the concerned Gram Panchayats and they may register such dealers or traders for a season, from the first day of October to the last day of September of the following year (Working Season). Dealers and traders will have to seek fresh registration for the next season. No person shall be allowed to operate as dealer or trader in MFP items in any area without being registered by the concerned Gram Panchayats.

8.12.2 Competition among Buyers: Gram Panchayat will make all efforts to promote free competition on procurement of MFP by engaging as many dealers for each item of MFPs as reasonably practicable.

8.12.3 Registration fee: The Gram Panchayat shall levy an annual registration fee from dealers or traders at such rates as may be determined by the Gram Panchayat and shall issue a certificate of registration to that effect.

8.12.4 Monthly return: The dealers registered with Gram Panchayats (GPs) will have to furnish a monthly return to the concerned Range officer, indicating the items of MFP procured, quantity procured and the Gram Panchayat from which procured. The Government Agencies like OFDC Ltd., TDCC Ltd., AMCS Ltd., etc. may register themselves with one or more GPs for procurement or trading on one or more items of MFPs.

8.12.5 Cancellation of Registration:A Gram Panchayat may cancel the registration of any dealer/traders or may refuse to grant registration for subsequent seasons if, after summary enquiry in course of which the affected party shall be given an opportunity to show cause, it is satisfied that the dealer/trader has procured any MFP from the primary gathers at a rate lower than the minimum procurement price fixed for that item of MFP.

8.13 Lease of MFPs:

No lease shall be granted in respect of any MFP item.

8.14 Royalty of MFP items:

No royalty shall be levied on any of these MFP items after commencement of Government Resolution.

8.15 Control by DFO:

The collection of MFP by the primary gatherers will be subject to reasonable control to be exercised by the DFO in accordance with the provisions of law and sound silvicultural principles laid down in the Working Plan, which shall be given due publicity in advance in the adjoining GPs.

8.16Transit permit:

No forest department transit permit will be required for transport/movement of any MFP within the state.

8.17 Other NTFP items:

The regulation of trade, registration, price fixation, royalty etc. of other Non-MFP NTFP items has already been described in the earlier foregoing paragraphs.

8.18 Marketing of NTFPs:

8.18.1 Marketing in general can be defined as a social and managerial process through which human beings needs/wants are identified, tailoring a product that suits to identified needs of human beings by way of exchanging money for goods most effectively and efficiently. The basic elements of marketing include:

- **(a)** Product (NTFPs)
- **(b)** Price (exchange value of NTFP)
- **(c)** Place (movement of the product from harvest to the end user)
- **(d)** Promotion (providing information about markets/products, educating the end user)
- **(e)** People (primary collector, middlemen, controlling agencies, end user etc.)

8.18.2NTFP marketing is defined as a process which starts with an NTFP harvest (procure) that can be sold in an organized/unorganized market. It involves all activities comprised in the process of making available NTFPs in a desired fashion from primary collectors to end users (consumers). That consist of harvesting NTFP, adding value (like cleaning, washing, separation of unwanted parts, drying, grading, storage, processing), branding, packaging, transportation, credit and market distribution channel network. The members in NTFP market distribution channels are collectors, local collection agents, processors, handlers, commission agents, middlemen, carriers, wholesaler, retailers and finally the producer (industry) or consumer. The interplay of these middlemen in trade acts as impenetrable shields, blocking the vital communication between the primary collectors and their consuming centres.

8.18.3 The economics of tribal people substantially depend on the collection and sale of NTFP round the year. NTFP markets are by and large imperfect, and the collectors do not get a fair return for their labour. NTFP traders sell the NTFPs to consumers on a profit ranging from 100-700 per cent of the price which collectors receive. In fact, because of this imperfect and inefficient marketing system and the absence of well-established market channels, the NTFPs collectors share in the consumers' rupee is very small and the lion share goes to the intermediaries/processors. Over the years

there is a substantial change in procurement and sale of NTFPs. Nonetheless the efficient marketing system for NTFP did not evolve so far in the Division.

8.18.4 The list of markets and marketable NTFP products of the Division have already been reflected in Table No. 3.7 Chapter-III (Part-I). Almost entire marketing system functions in line with ever lasting economic principle of demand and supply. During the field survey it was found that multiple agencies at different levels of marketing and feeble bargaining power are prime criterion of NTFP marketing. NTFP trade is practically in the hands of tribal people, Government and private agencies. One of the problems encountered by the NTFP collectors is ineffective and inefficient marketing system, which has substantial impact on the well being of the tribal. The actual fruits of NTFP harvest, collection and sale must be duly acknowledged only to the hard working tribal. This can be achieved only through a systematic and efficient marketing technology.

8.18.5 It has been observed during field study that in most of the cases NTFPs are sold by the primary collectors without any value addition that could have been otherwise elevated the earnings of the primary collectors. Simple value addition in the form of grading, storage, de-seeding, drying in some NTFPs, like mohua, tamarind etc. can be done very easily without having any sophisticated technology, thereby enhancing the selling price of the NTFPs at the level of primary collectors. It has also been found during field study that some primary collectors are industrious and add value to their collected NTFPs before they sell off, but what is discouraging them is lack of market and market information which force gullible collectors to approach thirsty middlemen who purchase NTFPs at a throw away price.

8.18.6 Moreover, the prices of NTFP items are practically determined by the middlemen by grossly violating the prices fixed by District Price Fixation Committee. Poor and gullible primary collector almost has no say on price determination process. Moreover, it was observed that a sizable NTFP trade has been materializing under the aegis of barter system.

8.18.7 It is also observed that local traders who purveys basic needs like grocery items takes away the primary collectors stock at a throw away price and this is prevalent/predominant only at village level.

8.18.8 In many cases primary collectors are compelled or are bound to sell to the local trader in lieu of the earlier taken provisions or for repayment of loans availed during lean period. It is suggested that village level institutions like village syndicate should be promoted for collection and trading of available NTFPs in the locality. In addition to it collective harvest, storage, value addition and collective sale of huge quantities will certainly enhance the earnings of the primary collectors from NTFP sale. Committed NGOs and V.S.S. can play as catalyst in villages for collective harvest and collective sale of NTFPs, thereby eradicating exploitation of poor tribal who struggle every now and then for their bread and butter.

8.19Techniques for scientific and sustainable extraction of 15 major and important NTFP including medicinal plants:

8.19.1 Hill Broom:

The Hill Broom Grass (***Thysanolaena maxima***), otherwise known as Bouquet grass or Tiger grass, is the only species of its genus. It is a tall, reed-like, perennial grass usually found on shady florest slopes, particularly near ravines and water courses as it thrives well in soils having high moisture content.

The panicles of this grass which are 30 to 90 cm long contain the inflorescence, and are the most valuable part of this wild growth. On an average inflorescence itself is approximately 30 to 40 cm long and constitutes the major portion of Hill Brooms.

It is the only species of its genus and thus has no related species. Hence, it is unique in itself, but with a significant variation in soil quality and other ecological parameters, the Hill Broom Grass may produce panicles/inflorescence of different size and weight. If not harvested on time, the inflorescence gradually loses its colour and strength, thus depreciating in quality. The green and fine-textured inflorescence is of the best quality, while its maturity (development of flowers) makes it coarse textured and rough along with a change in colour, thus degrading the quality.

Collection of Hill Broom Grass is mostly done by women and is a tedious and dangerous process. The women collectors often have to walk at least 15 to 20 kms through deep forests and hilly slopes to reach the source of this product and thus, a lot of time is wasted only in the perilous journey.

The harvesting period ranges from late December to April, but the bulk amount is collected between January and March. The inflorescence, if left on the plant to dry by itself, loses its quality because drying on the plant means maturity and development of flowers. The traders advise for an early collection of this grass when it is green. It can be sun-dried in 3 days, which causes a weight loss of upto 30 %. For sun-drying, the Broom Grass is spread evenly on the ground or on the thatch roofs of huts and is turned over frequently so as to avoid depreciation in quality due to differential drying.

The dried inflorescence is at times sold out by the primary collectors, but many prefer a value addition in the form of broom making, as brooms fetch a higher price. Before binding them, the stalks of the broom-sticks are first shaved with the help of a knife because if the loose leaf sheaths are not removed, then tying them together would not give them enough strength.

After drying, the sticks are sorted on the basis of their size and quality. The next ideal step is to make small bundles of the broomsticks of specified size or weight. Binding the broom or tying the sticks together is a tedious process by itself because each stalk is to be tied otherwise the binding would not be strong and long lasting. The traditional tying material used to be Siali rope but this rope is stronger only when it remains wet, a condition which is difficult to achieve in its day-to-day use. Hence, metal wires or plastic strings have now been introduced, of which the latter has been the most adopted one.

The average production of Broom Grass, if taken as 6000 quintals per annum, means an employment opportunity for one lakh man-days, taking into account the average collection potential per man-day to be 6 kg. Processing for broom production means an additional opportunity for 1, 80,000 man days, if the average production of brooms per man-day is 10 at the rate of 3 brooms per kg. of raw material.

However, the employment opportunity estimated on the above basis does not necessary ensure adequate income for a person. For example, in terms of collection potentiality, women may find enough potentiality of Broom Grass in the forest so as to remain engaged for its collection for two months in a year, but there is no guarantee that she would always get her dues from this source. As with other NTFPs, the primary collector still have not been able to derive full benefits of this bounty provided by nature because of underpayment and exploitation by the middle man.To meet the

demand this division is doing hill broom plantation and distributing seedlings among public for the plantation in their homestead lands.

8.19.2 Mahua:

Mahua (Called Mahul in Oriya) is the flower of *Madhuca indica*, a tree also named after its flower. This plant has been very popular among the tribals of India since time immemorial, for its flowers and seeds. In tribal culture, Mahua tree occupies a special position and they do not cut it unless compelled by circumstances.

Mahua is a medium-sized or large deciduous tree, found both in forests as well as non-forest areas. The concentration of this species is less in the coastal areas of Orissa than in other parts of the state (particularly, the western side) probably because prevalent food culture in the coastal part has not seen the Mahua flower or its fruit (seed) as a source of food and fodder, thereby not taking care for its existence. On the contrary, people in some other parts of the state have planted this tree in their homestead or cultivated lands because the tree has been significantly associated with their livelihood in one way or another.

Mahua flowers are sugary and thus, quite tasteful. They also contain good amount of vitamins and calcium. The tribals have traditionally been using Mahua as a major food item. It is eaten either raw or cooked (boiled, fried or cooked with other ingredients).

However, the most popular use of Mahua is in liquor making. The distilled liquor thus prepared is known as "Mohuli" and is stronger in its effect than that made from fermented rice (Handia).

During their showering season in March and April, the cream-coloured corollas of Mahua fall on the ground by themselves after their moulting on the tree. Usually, the showering takes place between 4 O'clock to 10 O'clock in the morning. Knowing the on set of the showering season, the primary collectors clean the ground so that the flowers falling there would remain free from unwanted materials like leaf, grass; etc.Total sugar content of the corollas is highest when the flower is mature and ready to fall. So the primary collectors do not apply any pressure on the tree for harvesting the flowers and wait for the showers.

The collection hour starts early in the morning and may continue upto the noon. Almost the whole family of the primary collectors takes part in the collection so as to ensure the maximum collection possible. The collection season lasts maximum for three to four weeks. It is marked by three different phases, viz, the beginning, the middle and the end. Collection is at the peak during the middle phase when most of the flowers are mature enough to fall down. The average collection by a person may be 8 kg in approx. 4 hours during the peak period of the season (i.e., the Middle phase) and good sunshine facilitates showering. The whole family goes for the collection of Mahul so as to ensure maximum collection in a day, but back home some of the related jobs are usually handled by the women. For example, separation of the bitter component (stamen), sun-drying and storage etc. involves significant role of women. However, Puduga making is often done by men.

The flowers collected are taken home and spread on open grounds for sun drying. More the moisture content less would be the thickness of the spread out layer. Racking is needed twice or thrice a day to avoid blocking and to ensure uniform drying. After 3 or 4 days of good sun drying, the flowers turn reddish with a reduction in weight by 70%. Cloudy weather makes the flower blackish, thus reducing its quality due to insufficient drying. This degradation in quality may cause a lowering in the market price by 30% or more.

In some cases (particularly, for self consumption), the dried flower is hammered so as to separate and remove the bitter part i.e., the stamen, but if the stock is huge then this kind of processing is difficult to implement manually and is thus often ignored. The dried flower becomes storable for a comparatively longer period than the raw flower. For processing it as an item of food, mostly this dried flower is used.

The commercial end use of Mahul is in the making of country liquor. This liquor is extracted through the distillation process from the fermented Mahul and has been highly profitable business in different parts of the country; but at the same time its fatal effect on the value system of society has earned it such a bad name that it can have no place in the schemes for the economic upliftment of the marginalized & the poor. It is however an irony that the Mahul market has survived till date almost solely due to the demand at this end and the primary collectors of this produce can hardly be assured of its disposal without any attention to the demand in the liquor industry.

The simplest form of micro-enterprise advisable in case of Mahul is the storage enterprise. It works on a simple principle: store well the Mahul flower in the harvesting season (when its price is comparatively low) and sell the same in the lean season when the price is higher.

Prior to the year 2000, it was the State Forest Department which exercised authority over this produce. In March that year, the Government decided to confer the licencing rights of Mahul to the Gram Panchayats and declared that henceforth, Panchayats in the schedule areas would exercise ownership rights over it provided they are situated outside the Protected Areas. The Panchayats in the non-schedule areas have only the power of legalizing and monitoring its trade and procurement. This way, an attempt has been made to some extent to transfer rights to the people over the resources of their area.

8.19.3 Char Seeds:

Char is the fruit of *Buchanania lanzan* / *latifolia*, an evergreen species of upto 15 meters in height. Commonly found in deciduous forests, it is a close associate of Sal and Mahua.

The tree grows well in clayey and lateritic soils, but water-logged area is not suitable for its growth. In afforestation projects, this tree has an advantage of rapidly covering the arid & bare hill slopes. Char tree can also act as a host for Kusum lac insects, but any such use is hardly preferred since lac cultivation would damage the valuable Char crop.

Although various parts of this tree are used differently (for example, Char gum is of commercial demand), it is identified by its delicious fruit which is often regarded as the poor man's grape. These fruits or berries often save the mature tree from being cut down by humans for timber or other purposes.

Char seeds are mostly collected by women (and children), although male companions may occasionally co-operate with them by climbing the tree to shake the branches. Decortication work is also done by women since men hardly show patience for such a delicate job. In tribal areas Char berry is a favourite of young children. The seeds are almost value less in themselves if incapable of producing the marketable quality of kernels. The kernels have a pleasant, sub-acidic flavour and are either eaten directly or used in flavouring sweet meats, confectionery & betel nut powder. They

have good nutritious value and are even used for therapeutic purposes in various parts of the country. But the primary collectors of Orissa can hardly afford any such end use by themselves. For example, the kernels can yield oil (approx. 40% on an average) which is said to be a substitute of Olive & Almond Oils and is also claimed to have the therapeutic potentiality of curing baldness when applied as hair oil.

The tree flowers during the first quarter of the year and the fruits ripen in the summer (April-June). Mature fruits either falls themselves on the ground or birds and monkeys drop the seeds after eating the flesh portion of the fruit. These fruits/seeds are collected by the primary collectors. However, primary collectors often themselves pluck the fruits and either eat them or take home for further processing. Both immature & mature fruits are processed, though differently. Mature fruits are soaked overnight after which they are rubbed against the palm to separate the seeds from the pulp. These seeds are then sun-dried after which they are either broken with the help of a stone or chakki to yield the kernel. On the other hand, immature fruits are battered carefully and lightly with the help of a husking pedal (dhinki) and are then sun-dried to separate pulp from the kernels/seeds. In this method there is greater loss of quality and quantity of out turn. The kernels are vulnerable to insect attack ('ghun' and 'ants'), more particularly when left unprotected from moisture. Hence, in addition to drying them for two/three days under sun, care is also taken for their proper bagging. Some of the primary collectors say that wrapping the kernels in a cotton cloth is better than keeping in plastic bags, although the maximum period to which the quality can be kept intact in this method is said to be 15 days.

Prior to the year 2000, it was the State Forest Department which used to have authority over the commercial exploitation and trade of Char seed in the state. The regulation was applicable even to production or stocks in private holdings. In March 2000, the Government declared many items as "Minor Forest Produce" and handed over the licensing rights of the same to the Panchayats. But Char seed was still under the Forest Department. However, responding to the resentment in various circles, the Government in August 2000 decided to confer the rights of Char seed also to the Panchayats. Accordingly, the ownership right of this item is with the Panchayats only in scheduled areas (provided these are situated outside the Protected Areas like National Parks) and the Panchayats of non-schedule areas only have the right to regulate its trade in their own respective areas. Also, the primary collectors are now allowed to process this item (and all other 'minor forest products'), a right which was not

recognized during the days of monopoly leases, when only the lessee had the right to process the produce leased out to him.

As per the analysis done by Haat Bazaar, a fortnightly bulletin on market prices, the average price which the primary collectors of Orissa got for Char seed in its season in the year 2001 was always less than the minimum procurement price fixed by the Government. The situation was of course just the opposite for decorticated Char seeds. The tribal are normally cheated by (Kuchias) in prevailing barter system on the purchase of decorticated Char seeds in the local haats. It is emphatically suggested that due emphasis be given by Divisional field staff to curb this exploitative activity/ trading.

8.19.4 Siali Leaf:

Siali (*Bauhinia vahlii*) is a huge climber and the mature climber is said to be capable of exerting so much pressure on the branches of host tree that the latter sometimes collapse under its load.

This species has been popular among the forest dwellers as well as forest dependant people for its multifarious beneficial uses. For example, the seeds are eaten and the bark produces a fibre which is used in making ropes and flexible baskets. However, its most common and important part used is the leaf. The leaves of B. vahlii are distinguished in their quality on the basis of their size, thickness as well as the extent of sun-drying. For example, the bigger the size, the better; but beyond a certain limit, greater thickness creates problem by reducing the flexibility of the leaf considerably. Similarly, too much exposure to sun light makes the leaf black and difficult for use in plate-making.

However, the commercial use is in the form of packaging material (when loose) as well as in the form of cups (dona) and plates (*khali*). As a packaging material, the leaves are used by the local junk food makers as well as some fish-suppliers/sellers to serve/wrap their products and deliver/dispatch them to the customers. As a wrapping material, Siali leaf is more preferred than Sal leaf (in loose form) because of its larger size. For making plates and cups, Siali leaves are stitched to one another, which may be hand-made or machine-made. Also, the cups/plates may be pressed or plain.

Machine pressed plates/cups are more preferred in towns and cities because of their finishing as well as better strength and hygiene.

Thousands of marginalized people depend on Siali leaves as a major source of income. They either sell the leaves in loose form or processed form (khali-dona). Women-folk are mostly engaged in collection and processing of these items. Siali leaves are available between the months of October and February both in terms of quality & quantity; hence this is the peak period of collection. The lean period is during March to May (when availability of leaves decreases by 75%) and as monsoon arrives in June, new leaves come out.

The primary collectors go for collection of leaves early in the morning and return by the noon. They often have to climb up hills to get to the source of Siali leaves since the species is less available in plain areas.

The male collectors often tend to loose patience in plucking the leaves one by one and hence, cut down the climber to get the whole resource to their feet. Sometimes cutting is done either for a silvicultural purpose or to access the leaves which are at greater heights and thus inaccessible to female collectors. However, women collectors are careful and pluck leaves of requisite size and thickness, leaving immature and old leaves on the climber itself.

The average collection potential per man-day during peak season about is 1000 leaves. Immature and old leaves are usually not collected because immature or small-sized leaves would take additional time in *khali* stitching (there numbers being more) while old leaves are less flexible.

The leaves are sun-dried after turning them upside down so as to prevent blackening of the surface. Unlike Sal leaves, Siali leaves take only a few hours of drying and usually the process is complete within a day, unless the weather is cloudy. Drying however is limited to an extent beyond which the leaf would lose its flexibility. If the leaf is plucked leaving its petiole or stalk on the plant itself, then drying is better facilitated and also, waste is reduced since the stalk has no use in the making of leaf plate or cup. Dried leaves are storable for a longer period. However, for immediate use in plate making, these leaves are sprayed with little water so as to regain their flexibility and softness which is necessary for stitching.

The minimum procurement price fixed by the Government from time to time has been associated with three major issues. Firstly, the Government does not clarify clearly the basis of gradation of leaves (for e.g. differences between Gr.I and Gr.II leaves); hence, for a trader there is enough flexibility to grade the leaves as per his own criteria which can go against the interest of primary collectors. While specifying the rates of Siali leaf plates per 80 pieces, the size of the plates for which this rate is applicable is not mentioned.

As per the Orissa Forest Produce (Control of Trade) Act, 1981 the Government exercised full control over the commercial exploitation and trade of Siali leaves, whether grown or found in Government or private lands. Accordingly, the Forest Department used to have authority over this forest produce on behalf of the Government. However, the new NTFP policy of 2000 conferred the ownership rights of Siali leaf to the Panchayats of Scheduled Areas (situated outside the Protected Areas like National Parks) and Panchayats of other areas were given only the regulatory power over its trade in their respective areas.

Also, the primary collectors are now allowed for the processing of this item (and all other 'minor forest products'), a right which was not recognized during the days of monopoly leases when only the lessee had the right to process the produce leased out to him. For many, collection of Siali leaves is a part-time job, it still helps in sustaining the livelihood of thousands of poor people in the State. This activity is carried out for four to six months in a year. Unfortunately the primary collectors are often underpaid. The irony is that if the primary collectors fix the price on the basis of minimum wage rate, then their product would remain unsold. Hence, the production can be profitable only if they can ignore their labour to some extent.

Siali leaf collection is predominantly a woman headed activity often supported by young girls of the family. Male members occasionally get involved in it. Besides collection, the processing activities such as drying, bundling, stitching etc. are done by women only. The activity involves tremendous strain on the part of women but they do not get enumeration which is commensurate to their labour. Our interaction with women pluckers in different areas reveal that one lady can collect one head load of siali leaf in one day ie 8AM to3PM.Another day she can make out of one head load leaf 240 khaliie three Chaki consists of 7 leaf one khali and 80 khali one chaki then she will dry in sun light. After that she will sell one Chaki of leaf plate @ Rs 60, for Three

Chaki-Rs180. In two days she is earning Rs 180, One Day she will earn 90 rupees. an earning of only Rs.90/day is much lesser than the present Government wage rate.

8.19.5 Sal Seed and leaves:

Though Sal (*Shorea robutsta*) is not the major NTFP species of the Division, its multifarious uses justify a description on collection of its seeds and leaves. The tree can grow up to the height of 45 meters. It sheds leaves in late winter and foliage is renewed by March when it flowers. The fruit matures by May-June. The tree is a light demander.

8.19.5.1 SalSeed:

Though commercial use of Sal seed has picked momentum during the last two to three decades, the extraction of oil for domestic consumption has been in practice since long. Now, it has found many alternative uses in soap making, manufacture of vanaspati, sweets and chocolates etc.

Sal seeds are raked from the forest floor along with litter and humus. During the process of raking, all previous year seedlings are either killed or their root system damaged. The removal of litter and humus exposes the soil and dries up the moisture which in turn kills the micro flora and fauna. Sal growth which is dependent on mycorrhiza is adversely effected. It is therefore necessary that at a time limited area of Sal forest should be worked out. Further, some quantity of the seeds should be left on the forest floor to facilitate natural regeneration. Moreover, no collection shall be allowed beyond 15th June. To check this aspect, strict enforcement and field monitoring is very necessary.

Another point that needs consideration is proper drying of the seeds after collection. If moisture content is not regulated, it becomes susceptible to fungal infection. Though it can be checked through application of fungicides, care should be taken to ensure timely purchase of seeds by the trader so that primary collectors do not suffer loss due to such damage. Moreover, less time of storage also ensures quality and would fetch a better price. The staff of the Division as well as purchaser should work in close cooperation with the primary collectors in the larger interest of forest and all stakeholders.

8.19.5.2 Sal leaves

Though in tribal areas, the use of Sal leaves for making cup and plates is an age old, it has now become a commercial activity with the introduction of mechanical press and moulding machines. The leaves are even used for making pika (Bidi like country cigarette), though not for commercial purpose. Its other uses are as wrapper for food, betel etc.

After defoliation, fresh leaves appear in March. The tree coppices well, particularly near the ground level, the advantage of which is taken by leaf puckers. Better quality leaves are available to them at a convenient height from these coppice shoots. However, collection of tender leaves from such coppice shoots has harmful effects on the growth of plants. Hence, collection should not be allowed during March to May and even during rainy season.

The ideal time for collection is between September to January. Further, total sweeping of the plants for collection of leaves should be discouraged. The limit should be fixed for extraction of leaves and in any case it shall not be more than two quintal per hectare of forest area.

8.19.8 Kenduleaf:

The collection, processing and sale of kenduleaf were nationalized in the year 1973. The revenue from this Non-timber forest produce is quite substantial. It generates vast employment in remote and interior areas during lean season. "*Diospyros melanoxylon*" or kendu tree yields a timber otherwise known as Coromondal Ebony. The fruit is edible and it was this NTFP for which the kendu has been popular before its leaves assured commercial significance in bidimaking. The plant can grow up to 25 meter under suitable conditions. The more common occurrence in the Division, particularly in open areas, is in the form of bushes or shrubs, probably because of regular bush cutting operations for production of qualitative and quantitative leaves. After bush cutting in January and February, leaves are collected during April to May.

Phulbani kendu leaves Division has 3 Forest Ranges namely, Phulbani,Gochhapada (E), and Gochhapada (W) in the jurisdiction of this Division. The average kendu leaves production from 2007-08 to 2016-17 is about **10,858.53** quintals & the production of Kenduleaf from 2017-18 to 2020-21 raised to 18000

Quintals per annum. Ensuring production of good quality kendu leaves and maximization of its production are the sole objectives of kendu leaves trade in the State. In order to achieve these objectives, research programmes can centre around irrigation and manurial trial, plucking of kendu leaves, drying and duration of drying etc. The details of kendu leaves production, man-days generated, past and present rates and revenue realized has been reflected in Table No. **NTFP-9.**

Table No.- NTFP-9 Kendu leaf production in Phulbani(KL)Division			
Informaiton pertaining to Phulbani, Gochhapada East, Gochhapada West KL Ranges			
Year	Kenduleaf production (In Qntls)	Mandays generated	Revenue realised (In Rs.)
2011-12	8121.6	157512	92535481
2012-13	109944.6	217986	108615927
2013-14	10720.8	208117	98676870
2014-15	9186.65	195838	72053517
2015-16	6555.6	156605	97962960
2016-17	7162.2	143100	198250740
2017-18	8390.4	187615	156275182
2018-19	7235.4	179309	101315577
2019-20	4782	97457	86112349
2020-21	4422	99878	76143780
Source:- DFO(KL) Phulbani			

8.19.9 Myrobalans:

The fruits of *Terminalia chebula*, *T.bellerica* and *Emblica officinalis* (collectively known as Myrobalans) are used for tanning and also for medicinal purposes. The best time for collection is March. Myrobalan tan is usually blended with other quickly penetrating tans to produce good leather colour.

As observed, Amla (*Emblica officinalis*) is generally harvested using unsustainable techniques such as lopping and hacking of branches and at times even felling of trees. The competition for early fruit collection among the locals has resulted in plucking of unripe fruits and over exploitation. This has adversely affected the natural regeneration. Hence, pre mature harvesting should be discouraged. The best time for collection of Amla is the month of Chaitra (March-April) when it is ripe and mature. The fruits should be carefully plucked using long poles with a hook or by shaking the plant. Collection should be done in the morning hours because increasing heat may turn the fruits black, thus damaging the quality. After collection they should be stored under shade till the processing works begins. The main problem observed is that the collection techniques are quite harmful to the forest, the collectors are in a

hurry to collect more quantity with less effort and they tend to break the bigger branches or even fell the whole tree for the few fruits. Sometimes they collect immature fruits fearing that other collectors will collect the same before them. These practices should be avoided at any cost. The processing of Amla begins within two days of its collection, the immature and blackened fruits should be separated and the selected ones are to be boiled for 8-10 minutes. The boiled fruits are deseeded in a neat and clean place, after which they are sun dried on bamboo mats. The sun drying makes Amla little reddish, and this fetches a better price in the market. The processed Amla should be stored in gunny bags in dry places with a normal room temperature.

The time of maturity of fruits should be notified. In the absence of standards for sustainable harvesting regime, at least one third of the fruits should be left on the trees for natural regeneration to take place.

Generally, the primary collectors dry the fruits using simple sun drying techniques, which blackens the produce in small bags can do value addition. Pulverizing and selling Amla power either individually or collectively as triphala mixture can also add value to the produce.

Terminalia chebula is popularly known as chebulic myrabaa and belong to the family "combretaceae". It is a moderate sized large deciduous tree with a cylindrical bole, rounded crown and spreading branches. The leaves are ovale, elliptic, glabrous with a pair of large glands on the top of the petiole. The flowers are dull-white with an offensive smell. The flowering usually takes place during the month of January to March. The fruits are glabrous, shinning, ellipsoidal, obovoid and yellow to orange brown in colour. Ripe fruits of Terminatia chebula, Terminalia bellerica and Emblica officinalis form the well-known laxative and tonic "Triphala". The mature and immature fruits of Terminalia chebula have medicinal properties.

Terminalia bellerica is popularly known as belleric myrabolan. It is a large deciduous buttressed tree with thick brownish grey back having shallow longitudinal fissures. The flowers are pale greenish yellow with an offensive odour. The bark is mildly diuretic and useful in anemia and leucoderma. The mature and dry fruit is constipating and is useful in diarrhea and dysentery. The oil obtained from the seeds is trichogenous and is useful in dyspepsia, skin diseases, leucoderma and grayness of hair.

8.19.9.1 Development strategies for myrabolans:

1. A survey need to be carried out to assess their available potential in the natural habitat and to identity the high concentration areas. This survey is essential to formulate a judicious plan of exploitation so that no myrabolans become endangered in future.

2. A number of valuable NTFP plants have become endangered due to over-exploitation, deforestation, biotic interferences and unscientific utilization from their natural habitat without adequate replacement by way of artificial regeneration. Therefore, attempts should be made for ex-situ conservation of myrabolans in nurseries so that planting material will be available for future plantation at suitable sites.

3. Research work is required to be carried out to identity genetically superior myrabolans with reference to :
   (i) The content of active ingredient.
   (ii) The quantity of exploitable part of the plant produced.
   (iii) Disease and drought prone resistance, and
   (iv) Vigour of growth.

4. Package of practices need to be developed for cultivation of myrabolan plants so that their plantations can be raised to meet the demand of various drug industries available in the locality.

5. The concentration of active ingredient in the exploitable part of the myrabolan plants varies with age of the plant and month/season of the year of collection. Therefore, research work need to be carried out to find out the minimum age of harvesting without sacrificing the yield of active ingredients and the month of the year in which highest concentration of the active ingredient occurs in the exploitable part of the myrabolan plants. Investigations are also to be carried out for proper harvesting technique. The branches of myrabolan plants should not be cut by axe during collection.Very little information is available on the post harvest technology of medicinal plants. A sizeable quantity of the valuable myrabolan plant material is lost due to improper post-harvest operation such as

drying, grading, storage, transport etc. Therefore, research work is required to be carried out to optimize various post-harvest operations.

6. Chemical and pharmacological investigations are to be carried out on myrabolan plants to isolate and identity the active constituents and to develop suitable methods for the preparation of their concentrates. Synthetic methods by shortest and economical process need to be developed for the active constituents so that exclusive dependence on myrabolan plants in the wild for the preparation of drugs can be overcome.

8.19.10 Genduli Gum and Other Gums:

Genduli gum or Gum karaya is the most important of all gums. It is extracted from Sterculia urens. The sound procedure for collection of gum karaya is that the tapping should be done from the trees of at least 0.9 meter girth. Two blazes should be done on the tree of up to 1.35 meter girth. The initial blaze needs to be made at the breast height with sharp instrument and having dimensions of 7.5 cm wide and 16 cm long. This should be gradually increased to 25 cm and 45 cm respectively. Not more than 1.5 mm to 3.0 mm of fresh bark needs to be cut and removed each time.

Care should be taken to ensure that hammering of the bark is not done; it will lead to closing of pores and thus, preventing the exudation of gum. The exudation of gum is highest with in 24 Hours of blazing and continues for a couple of days. Exudation takes place round the year but it is highest during the hot summer from April to June, though the collection time starts from September itself. However, gum harvested during rainy season is poor in quality and hence, no tapping should be done during this season. A tapping cycle of 4-5 years may be adopted.

8.19.11 Bahada Gum:

Bahada gum is another important gum and is extracted from Terminalia bellerica. The methodology adopted for its extraction is same as that of Genduli gum. However, the tree from where extraction is to be done should be of at least 1.20 meter girth.

8.19.12 Medicinal Plants and their prescription:

8.19.12.1 Medicinal plants are local heritage with global importance. The Division is endowed with a rich wealth of medicinal plants. Herbs always have been the principal

form of medicine and presently they are becoming popular throughout the nation, as people strive to stay healthy in the face of chronic stress and pollution, and to treat illness with medicines that work in concert with the body's own defenses. Medicinal plants also play an important role in the lives of rural people, particularly in remote areas with inadequate health facilities.

8.19.12.2 The history of medicinal plants is as old as history of human civilization globally. In spite of significant development in synthetic drug industry, the medicinal plants still constitute important source of drugs all over the nation. WHO (World Health Organisation) estimated that 80% of the population of developing countries rely on traditional medicine mainly plant drugs. There is growing appreciation throughout the World for greater use of Indian System of Medicine (ISM) to provide comparatively cheaper and safer health care. Indian System of Medicine (which includes Ayurveda, Sidha and Unani) and Homoeopathy, predominantly use plant based raw materials in most of their preparations and formulations.

8.19.12.3 Increasing demand for medicinal plants in sectors like pharmaceutical, health product companies and traditional medicine, necessitates the usage of both variety of species and volume of plant material. Plant materials collected from the wild are considered to have higher therapeutic benefits. An estimated 95% medicinal plants collected are gathered from the wild and about 70% of it is from **destructive collections** which include either the entire plant, reproductive parts like fruits and seeds or tuber, root and stem. Such destructive and non-sustainable collection methods coupled with low regeneration and habitat destruction have posed serious threat to the survival and availability of various medicinal plants in the wild. It is therefore, necessary to introduce methods for systematic cultivation of medicinal plants and sustainable harvesting technique to protect these plants. Systematic cultivation of many medicinal plants needs specific cultural practices including proper selection and identification of the species, propagation, cultivation and harvesting techniques.

8.19.12.4 Harvesting medicinal herbs requires careful planning to ensure the parts are processed in peak condition and fast enough to retain their active ingredients. Wild plants offer a free and natural source of herbal remedies and give the satisfaction of collecting herbs in the traditional way. Furthermore, active constituents are often highly concentrated in wild plants as the herb is generally likely to be growing in its preferred environment. Proper identification of wild plants is essential. In many cases,

different parts of the same plant for example the leaves and seeds, can have quite different actions and uses. In addition to this, the material should be collected from healthy plants that are free from disease and insect/fungal damage.

8.19.12.5 Harvesting should be done in dry weather, preferably on a sunny morning after the dew has evaporated. Picking in the right weather conditions when the plant is at its peak of maturity, ensures that it will have a high concentration of "active constituents". The leaves should be best collected during autumn month as the plants have drawn their vitality back during the season. Bark must be gathered with great care if the shrub or tree is to survive. In most cases harvesting of bark should be done during spring or autumn season.

8.19.12.6 The active principles contained in every medicinal plant consist of a number of compounds, which, individually or in groups, can have a specific action on the organs of our bodies. Different methods have therefore been devised to extracts these substances, either singly or collectively, depending on the result required. Some forms of extraction, being particularly complex, are beyond the skills of laymen and are exclusively the province of the Pharmaceutical chemists or similar specialists. Others, of a more simple nature, can be carried out by any one. There are four basic simple preparation techniques like decoction, maceration, infusion and juice extraction.

8.19.12.7 Spreading and preserving the knowledge on medicinal plants and their use has become important for human existence. There is growing tendency all over the world to shift from synthetic to natural based products, including medicinal plant. Also, there is a steady decline in the human expertise capable of recognizing various medicinal plants. Much of this wealth of knowledge is totally getting lost as traditional culture gradually disappears.

8.19.12.8 It is only in nature that plant diversity at the genetic, species and eco-system level can be conserved on a long-term basis. Unless plant populations are conserved in the wild, that is in natural habitats, in variable breeding populations, they run the risk of extinction. For long-term conservation and management of medicinal plants, in situ conservation needs to be integrated into regular forestry and wildlife management practices. Therefore, appropriate changes in forest management priorities backed by intensive trainings at various levels, including training of community people to involve them in the protection and management of the forest reserves is necessary.

8.19.12.9 The ideal strategies evolved through field observations are solely intended for conservation of medicinal plants of the Division and include the following:

(i) To ensure long-term conservation in situ, of viable breeding populations of medicinal plants diversity in a range of natural habitats corresponding to their natural distribution in forest blocks.

(ii) To encourage and support a range of ex-situ conservation measures as a supplementary and complementary measures to the above.

(iii) To encourage medicinal plants requirements of local industry to be met sustainably through policy instruments that create a favourable economic environment for the large scale cultivation of medicinal plants.

(iv) To ensure access of medicinal plants to village communities for their primary health care needs and address issues relating to participation and empowerment of village communities in conserving and managing forest and non-forest resources.

(v) To regulate, improve and where ever necessary, ban medicinal plants collection from the wild.

(vi) To protect the traditional knowledge of herbs, shrubs and plants by the tribals and emphasis to pass on to future generations.

(vii) To maintain an equilibrium between those on one hand who would brush aside the superstition of ignorant tribals, with the other who glorify primitive man as possessing some uncanny intuition concerning plant properties.

(viii) To develop a cadre of taxonomists, para-taxonomists and forest scientists to support and sustain rapid, prioritized baseline surveys for medicinal plants conservation status and to monitor changes on a long-term basis.

(ix) To generate financial support for native Medicinal Plants Conservation Projects and to facilitate development and co-ordination of project proposals.

(x) To promote the establishment of a conservation trust fund for NTFPs, including medicinal plants.

(xi) To create wide spread public awareness on the importance and need for medicinal plants conservation.

(xii) To encourage local processing and enterprise development for value addition at local levels where plants are collected for the market.

(xiii) To preserve indigenous and traditional knowledge, culture and bio-diversity through education aimed at retaining, reinforcing and revitalizing this knowledge of medical plants.

(xiv) To establish an elder link, which involves inviting elder and experienced persons to participate and set directions for actions.

(xv) To encourage meetings in the Sub-Division/Division headquarters on indigenous medicinal plant aspect so as to bring together tribal and non-tribal knowledge on the subject of medicines.

(xvi) To monitor, evaluate and analyze the impact of the above stated medicinal plant conservation strategies at regular intervals for successful implementation of the programme in a sustained manner.

8.19.12.10 The important medicinal plants available in the Division, including their parts used for treatment of relevant diseases have already been reflected in Table No. 3.16, Chapter-III (Part-I). The National Medicinal Plants Board, Government of India has sanctioned several projects on medicinal plants in the State which are of multifarious objective and are under implementation under Orissa State Medicinal Plant Board. In spite of all these activities, marketing of medicinal plants is still inefficient, informal, secretive and opportunistic. As a result, the raw material supply situation is shaky, unsustainable and exploitative. Nearly 25 species of medicinal plants are red listed and endangered and many are threatened to be endangered due to non-scientific and opportunistic harvest from the wild. What is required is to formalize and organize the collection, processing, marketing and trade of these species and integrate the development of NTFPs and medicinal plants from production to consumption.

8.19.12.11 The important issues which are of primary concern in trade of the medicinal plants are as follows:

1. Lack of information on the market size and market sites.
2. Insufficient data on peak and lean periods of raw drug collection .
3. Absence of comparative studies of price structure.
4. Lack of time service data on prices.
5. Lack of data on demand and supply.
6. Ineffective regulatory bodies.
7. Lack of information on grading specifications.
8. Insufficient initiatives in value addition studies.
9. Lack of standardization on quality parameters.

The medicinal plants available in Phulbani Forest Division has already been discussed in Chapter-III (Part-I). However, the most abundantly found medicinal plants which can be commercially exploited to fetch good market value thereby augmenting the livelihood status of the tribals are enumerated below:

8.19.13 Bhunineem*(Andrographis paniculata)*:

It is popularly known as "kalmegh" in hindi and belongs to the family Acanthaceae. It is distributed in almost all the R.F/PRF blocks having vegetal cover.

The plant is an erect annual herb of 0.4-1 meter high. The stems are quadrangular and much branched. The leaves are opposite, short-petioled, oblong-attenuate at both ends, glabrous and pale beneath. The inflorescence is auxiliary and terminal raceme or panicle. The flowers are white with pink spots. The fruits are like capsule, linear-oblong, acute at both ends and pubescent. The seeds are numerous, oblong and glabrous. The propagation is preferably by seeds and cuttings which can be planted on a commercial scale by easy poly pot nursery techniques.

The whole plant has medicinal value. The chemical constituent of the plant contains glucosides, andrographolide, neoandrographolide, panaculoside, flavonoids, andrographin, panicalin, apigeinin, 7-4-dimethyl ether. The whole plants, principally the leaves, possess antibacterial, anti-inflammatory and immunosuppressive properties. The leaves are used in treating dysentery, diarrhoea, enteritis, fever, coroyza, cough, sore throat, tonsillitis, bronchitis, osteodynia, arthralgia, menstrual and post-partum haemtometra, serofula, hypertension and snake-bite.

8.19.14 Satabari (Asparagus racemosus):

It is an armed, climbing under shrub with woody terete stems having recurved or rarely straight spines. The young stems are very delicate, brittle and smooth. The leaves are reduced to minute chaffy scales and spines and curved in tuffs. The flowers are white and fragrant having branched racemes on the naked nodes of the main shoots or in the axils of the thorns. The fruits are globular, pulpy berries and purplish black when ripe. The tuberous succulent roots are 30 cm to a meter or more in length, fascicled at the stem base, smooth, and tapering at both ends. The propagation of the plant is mainly by seeds and tuber. There is avenues for commercial exploitation of the plant in the forest areas of the Division.

The chemical constituent of the plant contains four saponins viz. Shatavarin I to IV. Shatavarin IV is a glycoside of sarsasapogenin having two molecules of rhamnose and one molecule of glucose. It also contains mucilage and starch.

The tuberous roots are bitter, sweet, emollient, cooling, nervine tonic, constipating, opthalimic, diuretic, rejuvenating, carminative, appetizer, antispasmodic and tonic. They are used in nervous disorders, dyspepsia, diarrhoea, dysentery, tumors, inflammations, burning sensations, hyperdipsia, nephropathy, hepatopathy, throat-infections, tuberculosis, cough, bronchitis, gonorrhoea, leucorrhoea, cardiac debility, hypertension, abortion and general debility.

8.19.15 Gangasiuli (Nyctanthes arbor-tristis):

The plant is popularly known as "Night jasmine" or "Coral jasmine". The plant is a hardy large shrub with grey or greenish white rough bark and sharply guadrangular strigose young branches. The leaves are simple, opposite, ovate, acute or acuminate, scabrous above with short bulbous hair. The flowers are small and white with bright orange corolla tubes. The fruits are like capsules, compressed, separating into two one-seeded segments. The propagation of the plant is generally by seeds and vegetative method. The parts usually used for medicinal purposes are leaves, flowers and seeds.

The flower contains d-mannitol, tannin and glucose. The oil consists of glycerides of linoleic, oleic, lignoceric, stearic, palmitic and probably myristic acids. The leaves of the plant contain tannic acid, methyl salicylate, an amorphous glycoside, mannitol, an amorphous resin and traces of volatile oil.

The leaves are bitter, acrid, thermogenic, antibacterial, anti-inflammatory, digestive, anthelmintic, febrifuge, expectorant, laxative and tonic. The flowers are bitter, astringent, ophthalmic, carminative and are useful in inflammations, flatulence, colic, dyspepsia, greyness of hair and baldness. The seeds are very useful in baldness, scurvy and affections of the scalp.

8.19.16 Dhatiki (Woodfordia fruticosa):

It is popularly known as fire-flame bush. The plant is a multi- branched, beautiful deciduous shrub attaining a height of about 3-7 meters with many long arching branches and reddish brown bark. The leaves are simple, opposite, entire,

ovate-lanceolate, acute, subcoriaceous with black grandular dots on the undersurface. The fruits are ellipsoid, and irregularly dehiscent capsules about 1 cm long. The seeds are obovoid, smooth and brown. It is found abundantly is degraded areas of the forest blocks. The propagation is usually by seeds and vegetative method.

The flowers of the plants have medicinal values. The extract of flowers possessed significant abortifiacient activity in mice. The chemical constituent of the flower contain ellagic acid, B-sitosterol polystachoside, octacosanol, cyaniding-3, S-diglucoside.

The flowers are astringent, acrid, refrigerant, stimulant, depurative, sedative, anthelmintic, constipating, and febrifuge. They are useful in vitiated conditions of Kapha and pitta, leprosy, skin deseases, burning sensation, haemorrhages, menorrhagia, leucorrhoea, hepatopathy and verminosis.

8.19.17 Bhalia (Semecarpus anacardium):

The plant is popularly known as marking nut tree and is found in plenty numbers in all most all the forest blocks of the Division. It is a medium sized tree with grey bark exfoliating in small irregular flakes. The leaves are simple, alternate, obovate-oblong, and rounded at the apex. The fruits are obliquely ovoid or obong drupes and usually black when ripe. It is profusely found in all most all the forest blocks of the Division. The propagation of the plant is usually by seeds.

The fruits of the plants have medicinal properties. The chemical constituents are anacardic acid, cardol, catechol, anacardol, and fixed oil, semicarpol, bhilawanol. The fruits are acrid, bitter, astringent, themogenic, digestive, carminative, anthelmintic, purgative, liver tonic, expectorant depurative, stimulant and tonic. They are useful in beriberi, cancer, sciatica, hepatopathy, constipation, flatulence, colic, leucoderma, tumours, ulcers and general debility.

8.20 Unsustainable harvesting & increasing vulnerability of women forest dwellers

8.20.1 As in Odisha 2000 NTFP policy, Forest Right Act 2006 and its Rule 2008 made categorically the forest is opened for all in NTFP collection, leading to immense unsustainable harvesting both 68 approved NTFP and good number of non-approved forest fruits, roots, leaves, nuts, seeds and barks. In result important species like

medicine and aromatic plants are extinct and some of them coming under red endanger. The Red list of threatened species, prepared by the International Union for Conservation of Nature (IUCN), has listed 60 species forest origin plants as Critically Endangered and 141 as Endangered (IUCN report 2012)

8.20.2 In Phulbani context prior 2001 one forest dwelling women is getting enough stuff for her family nutritional food, able to meet daily two square meal of the family and also generate good income for clothing and other needs including health and social festivals. It seen the thrust on maximum extraction on behest of traders rather than sustainable harvesting has been a major reason for the dwindling resource base of production/collection particularly NTFP after 2001. As noted earlier, this is an important reason for low incomes from NTFP consequent upon on practice of unsustainable harvesting.

8.20.3 Practicing unsustainable harvesting which made without conservation &regeneration strategy that directly affect production/collection of tan stuffs like immature harvesting of myrabolam Harida, Tamarind yield low return to gatherer high branch cutting collection of medicinal product Amala, food stuff Char delaying next fruiting by 3 to 4 years from same tree. Apart from that further production /reduction of tree borne oil seeds like karanja, kusum Neem also from char and Polanga etc increased vulnerability of women. Since they are living with age practice of NTFP collection miserably failed to worked as a casual labour being cope up with changed/upgraded agriculture practice that reduced income from NTFP and almost zero returns from agriculture ultimately suffered a lot under starvation, malnutrition high and on want of medicine high IMR and IMMR and make the forest dwellers women more vulnerable to sustain their livelihood and food security.

8.20.4 Part wise destructive harvesting Practice that increases vulnerability of the Women forest gatherers.

8.21 Flower Fruits and Seed harvest

8.21.1 There are several stages along with the life cycle of an individual plant as it progresses from seed to adult. An adult plant produces flowers which need to be pollinated to produce fruits with seeds. Only some seeds germinate when they are dispersed (or fall under the parent plant) and make it to the sapling stage; likewise, only a few saplings make it to the adult stage of a mature plant. Only a fraction of the seeds in nature actually survive to become adult plants a growing demand for the fruit

of amla (Phyllanthus emblica) is common across India. When the volume to be supplied is high (the fruits also spoil easily after they are plucked), branches of the tree are lopped for quick harvest of large quantities of fruit. When the fruit can be dried and stored for trade, sustainable harvest of trees has been observed. In many places, this results in stressed wild populations and severe fluctuations in yields Destructive harvest by cutting branches not by shaking greatly affected Bhalia - Marking nut (Semecarpus anacardium), Kochile- Nux vomica (Strychnus nux vomica), Kataka - Cleaning nut / Nirmala- water purifier (Strychnos potatorium), Soap nut Ritha Fala- sampoo fruit (Hydrophila aunculata) starts fruiting after 3 years by that time wood mafia clean it from the forest as firewood.

8.21.2 In case of Dhatuki flowers (Woodfordia floribunda) which produce a chemical extracts for treatment of blood pressure many gynecological disorder and stomach ulcer and kidney blockage harvesting of all flowers without leaving a flower for fruiting and cutting shrub climber leads to total extiction of whole plant.

Impact

8.21.3 Removal of the reproductive parts like flower, fruit and seed may directly affect the regeneration, survival and life cycle of the plant. Populations that are subject to overexploitation of flowers, seeds or fruits could have lowered rates of regeneration. This can have a negative effect on the long term continuity of the species ultimately affect availability of food and income potential to women.

8.22Harvesting of Leaf

Like other parts of India the Keonjhar is highly prone to commercial leaf harvests in India. Sal (Shorea robusta) leaf, both for subsistence and commercial use, is extensively collected in tribal pockets The multi crore business of kendu (Diospyros melanoxylon) leaves, used for rolling bidis in the same region, also exists, with well determined markets, collection and post harvest management. Siali (Bahunia vahlii) is also collected destructively by cutting climber instead of plucking the leaf in adjacent areas for leaf plate making, a thriving industry in the region.

Impact

Harvesting of leaves may impact the growth, reproduction and survival of individual plants. Removal of leaves means removing some of the capacity of the plant to obtain energy (photosynthesize) and therefore may decrease the growth and reproduction of the harvested plants. For the same reason, over time it may also lead to the production of smaller frond or leaf sizes. Alterations to the growth, reproduction and survival of harvested plants can lead to changes in population structure and

persistence. Leaves collection selling either processed or unprocessed or value added as plate and Dana/chauti are most convenient sources of daily bread and butter of women would be affected as explained poor quality immature growth leading loss of heavy wages. The heavy losses of income due to low production under quality directly affect their food security and compel them live in the state of starvation and malnutrition.

8.23Gums and resins

In Keonjhar there is plenty of Dhaura Gum, bahada Gum, palasa Gum and good quantity of Genduligum whose value of Rs6000 to 10000 and to resin –lac specially Kusumi lac provide Rs4000 per quintal and a Kusum tree provide annually 2 quintals of lac. These gums and resin are have many industrial uses like varnish and lacquer, paints and pharmaceuticals wood-work, waterproofing, ceramics, inks, coating, textiles, adhesives and more. In food and drinks they are used for their thickening and stabilizing properties. The industrial use of many gums and resins has declined due to availability of cheaper and synthetic alternatives. Some indigenous communities also use gums and resins for religious ceremonies.

8.23.1Impacts

Resins are to be found in canals in the bark and wood which, when damaged cause the resins to flow out. Therefore, the impacts of unsustainable harvest of resins and gums are most evident whose yields decrease over time. It has also been observed that termites attack trees at the points where incisions have been made. These trees will have higher mortality rates. One can see many sal and Gum trees are largely affected by termites Apart from increasing vulnerability to pest attack, removal of bark also causes loss of nutrients and moisture. The higher price paying NTFP gum and resin have heavy physiological impact when unsustainable harvesting, heavy tapping resythesized, rates of growth, flowering and fruiting may also decrease production trend & early mortality of the tree. This ultimately leads to a loss of regular high income.

8.24 Barks

8.24.1 The Terminalia spp like Arjuna (Termilnaia arjuna sap), Lodha medha ((Litsea sebifera), Khandakhai, Sunari (Cassia fistula) Phana phana (Oroxylon indicum), siali lai (Bahunia vhalli) is the bark of the climber) are bark harvested for medicinal and

chemical processes. The presence of tannins in bark is a reason for their extensive collection. Indiscriminate collection of the bark has led to a depletion of the tree in all over keonjhar. Over the years, large scale planting of Terminalia arjuna took place in these belts and now, can also be seen along reserve forest area of the Keonjhar.

8.24.2 The tree is severely lopped and bark removed from the branches. The remaining wood is used as firewood another extensively used bark is Lodha medha (Litsea sebifera) for incense sticks, leading to an endangered status of the tree in most parts of India(International Journal of Humanities and Social Science Research)

The bark also protects the plant against fires, fungal and insect attacks; it is often rich in chemical compounds that increase the protective capacity and play a role in medicine and dyes.

Impact

8.24.3 Removal of bark is likely to have a negative impact on the growth, reproduction and survival of individual plants. Bark removal has negative impact on the reproduction and survival of harvested plants, bark removal can lead to changes in population structure and threaten population persistence. It will affect both income and livelihood of the tribal traditional healers; local baidyas as well as women meet their health need and income.

8.25 Roots, Tubers, Bulbs, Corms, Rhizomes

The ground parts of plants are frequently used for food, medicine, fiber and dyes. A large category of medicinal plants fall into this category and they have been the ones which have on account of destructive harvesting process become rare and endangered Shatavari (Asparagus recemosus) and Arow.roots – patal garuda) are some of them in this category. Due to high demand and diminishing stocks in the wild, many of them are used as adulterants or substitutes. A study done by the Forest Department shows that 51% of the NTFPs collected for medicine are roots, tubers, bulbs, corms and rhizomes.

8.25.1 Impact

Alterations to the growth, reproduction and survival of harvested plants can lead to changes in population root harvest has a negative impact. It may lead to decline in population size and threaten the persistence of populations. Root harvest may also alter patterns of vegetative reproduction within the population. Many of the indigenous communities depend on the tubers of the Dioscorea spp desi alu groups and various rhizome and corms, for food. In many parts of Keonjar it is the only food

source during famine. But destructive harvests without leaving a root, bulb, rhizome for regeneration make entire plant vanished or extinct – increased women's hunger days. The situation is very acute at the time of drought. After 2002 the situation is very grave. Though government lunched very soft scheme on food security for BPL but at the time of drought / famine 35% other group bound to suffer as forest has little availability of Roots, Tubers, Bulbs, Corms, and Rhizomes

8.26 Whole plant harvest

Whole plant harvest here refers to the practice of harvesting whole plants including herbs, shrubs and herbaceous climbers. Whole plants are harvested for their use as wild foods and for medicinal purposes to extract the chemical components in the leaves and stems.

In cases Bhuin neem (Andrographis paniculata), whole plants are uprooted to collect only the tubers, roots, seeds or other parts, while the aerial parts are discarded. However, for some species the whole plant & all its parts are used. Most plants, for which underground parts are used, lose their whole plant. Harvesting of the whole plant results usually ends with in the death of the individual plant. If the plant is harvested before it sets fruit and disperses its seeds, the plant will not have had the no chance to reproduce and contribute to future generations.

8.26.1 Impact

Overharvesting of the Putrani(Roxburghl), Rasna root(Vanda taselleleta), Baibidanga seed (Embelia ribes) can lead to declines in population size and persistence. Unsustainable harvest has the potential to wipe out plant populations, particularly when plants are harvested before setting seed. Plants that are monocarpic – i.e. that reproduce only once in their lives or those that takes a long time to reach reproductive maturity are particularly vulnerable to overharvest when harvest occurs before reproduction. Monocarpic plants are those that flower, set seeds and then die.

8.27Thumb Rules for sustainable harvesting practice

Many forest conservation specialist after a good deal of research in field for years to-gether and trialed with local indigenous knowledge has prescribed some Thumb Rules for sustainable harvesting practice. IIFM- Bhopal, Forest Research Institute, P.O. New Forest, Dehradun researchers with practical trial at different climatic condition has suggested Sustainable harvesting protocols are to be practiced in

NTFPs ensuring food security of poor tribal women forest dwellers. Some of thumb rules are indicated below:

8.27.1. Fruit, flower, and buds

1. In case of Flowers or buds are harvested, care can be taken to leave a percentage on the plant or leave a percentage of plants or an area unharnessed. This can also be the rule for harvest of young immature fruits.
2. In case of fruits are harvested, maturity of the fruit, size, colour and touch may be the indicator and should be adhered to. This can also be the rule for harvest of seeds.
3. When the harvest of fruit requires lopping of branches, tools can be designed to avoid this or decisions can be taken on the size of the branches that are permitted for lopping.

8.27.2 Leaf

1. Always leave some leaves on the plant so that growth and reproduction are not negatively affected.
2. When possible, harvest leaves only after seeds have been produced and when leaf production is highest.
3. Harvest less or postpone when environmental conditions are stressful.
4. Decrease harvest rates if leaf size, seed production or plant size is decreasing as this may indicate stress.
5. Decrease harvest if there is heavy pressure from grazing, fire or other events that may negatively affect the plants.
6. 'Spare' plants – leave some desirable plants and some areas unharvested to allow populations to recuperate and to be available for other organisms that may depend on them. Rotate the spared areas over years.
7. Observe whether leaves are short lived or long-lived; if they are long-lived, harvest sparingly and look for ways to increase the number of plants (planting, transplanting, etc). Thick leaves may be indicators of a long leaf life-span.
8. Leaves may have a natural fall time, make a note of this. Leaf fall maybe replaced by leaf exchange

8.27.3 Gums and resins

1. Avoid harvesting from young trees.
2. Avoid use of unmanaged fires while harvesting.
   (International Journal of Humanities and Social Science Research)
3. Use sharp tools when making incisions in bark and make the incisions longitudinal.
4. Do not harvest resins and gums too frequently, the sites should be altered.
5. Think about tree physiology and seasonal factors. The best time to harvest from the perspective of the harvester is often based on use values or ease of bark removal, rather than sustainable harvest. For example, avoid harvesting before or during leaf flushing and flowering. In areas when seasons are distinct, avoid harvesting in spring or fall.
6. Leave some resin or gum-producing trees un-harvested so that they can produce good quality seeds for regeneration.

8.27.4 Bark

1. Develop adaptive management plans that keep bark harvest intensity and frequency at a low level.
2. Avoid bark damage if you can. Harvesting only the outer flakes of bark are more sustainable than cutting into the bark deeply, or girdling the tree.
3. Retain adult trees which produce seed. This is especially important for trees that reproduce mainly from seed rather than from re sprouting.
4. Determine the appropriate rotation time. Rotation times vary with tree reproductive strategy, growth rates and the type of bark product required.
5. Think about tree physiology and seasonal factors.
6. Think about tree reproductive strategies. Trees that are able to re sprout vigorously may be more resilient to bark harvest than those that re sprout weakly or not at all.
7. Size class selection and thinning can be good management tools. Thinning of trees may increase bark yield.
8. Using banana leaves, moss or other material to wrap the trunk immediately following harvest may help prevent moisture loss and fungal attack.

8.27.5 Roots, tubers, bulbs & rhizomes:

1. Think about the type of roots harvested. Removal of the lateral roots of trees and shrubs often has less of an impact than removal of tap roots.
2. Minimize the impacts of harvest on individual plants. If possible, avoid uprooting entire plants. If whole plants must be uprooted, encourage replanting as some plants are able to survive and re-grow if they are replanted. Minimize the proportion of the roots removed from a single plant. Plants need belowground parts to obtain water and nutrients, to store energy and provide anchorage. The whole plant will not survive if too much of its roots are damaged.
3. Determine the appropriate rotation time, the frequency with which an area can be returned to for harvest. Rotation times will vary with the plant's resilience to root harvest and its reproductive strategy. Slow-growing re-sprouting that rarely produce seed are particularly vulnerable to overharvest.
4. Think about reproductive strategies. Trees that are able to re seed or re sprout well following root damage may be more resilient to root harvest than those that re-seed or re-sprout weakly or not at all.
5. Think about timing and seasonality. Delaying harvest until after a plant has reproduced may permit the continued persistence of the population even when harvest increases the mortality of individual plants.
6. Retain un-harvested adult plants which produce seed.

8.27.6 Whole plant

1. When possible, harvest plants after they have had a chance to set fruit and disperse their seeds.
2. Leave some healthy plants and some areas un-harvested to allow the populations to recuperate and to be available for other organisms that may depend on them. Rotate the spared areas over years.
3. Try to determine what proportion of plants should be left un-harvested as seed plants for the next generation. Because plants have different life histories, producing different numbers of seeds with different germination rates, this proportion will vary for different species under different conditions.
4. Decrease harvest if plant sizes or other desirable traits are decreasing within the population.

5. Decrease harvest if there is heavy pressure from grazing, fire or other events that may negatively affect the plants.
6. Try to determine what kinds of conditions (light, soils etc) the plant grows best in and manage populations to optimize these conditions

The non-destructive practice of NTFP harvesting will strengthen present earning capacity of forests dwellers to three fold &it will facilitate to play central role in house hold economies apart from that NTFPs will also offer great promise for women producers in the informal economy. Although official production and trade statistics and research have somewhat neglected the sector, there is a sizeable and growing international market for NTFPs. These include essential oils, medicinal plants, gum Arabic, rattan, bamboo, natural honey, brazil (trikona phal)and other edible nuts, mushrooms, various types of fibre and other types of wild nuts and seeds used in cooking, skin care and for other purposes. In all, there are now 150 NTFPs of major significance in international trade.

Adaptation of sustainable harvesting practice, It will open new platform of income and employment to NTFP gatherers. Even NTFPs may be gathered in the wild or from trees outside forests or produced in forest plantations and agro forestry schemes. The poor tribal household can safely rely on NTFPs for subsistence or income use them for health and nutritional needs as NTFPs provide a wide scope of entrepreneurships and wide employment scope include production value addition, and packaging transportation marketing, food additives (edible nuts, mushrooms, honey, fruits, herbs, spices and condiments, aromatic plants, game); fibres (used in construction, furniture, clothing or utensils); resins and gums; and plant and animal products (used for medicinal, cosmetic or cultural purposes) which can be done by Forests dwellers locally.

8.28Strategy for Development of NTFPs:

8.28.1 The following strategies for development of NTFPs available in the forest blocks of the Division are suggested:

1. Item wise resource inventory survey, planning and formulation of projects.
2. A conservation programme for the Division including protection, management and propagation of NTFPs.

3. A systematic harvesting/collection programme under the JFM approach involving the V.S.S. and soliciting their active participation.
4. Species selection (elite trees/plants) provenance trial, micro and macro propagation, regeneration and plantation of NTFPs.
5. Cultivation of NTFPs in community forests, agro-forestry etc.
6. Sustainable management of natural habitat and protection from pests, diseases and biotic pressures.
7. Action research on NTFP collection/extraction, drying, storage and further processing and marketing.
8. Organisation for procurement, storage, marketing and trading of NTFPs.
9. Socio-economic studies for improving the economy and social status of people by improved utilization, marketing and value addition.
10. Training and awareness creation for scientific collection, storage, processing and marketing of NTFPs. People should know appropriate collection time for maintaining quality of the product.
11. Feasibility studies on important NTFP products viable for commercial exploitation to attract investment in this sector for poverty alleviation.
12. A strong database needs to be created on different aspects of NTFPs for their sustainable development. The ethnobotanical knowledge of the tribals can be a useful source of information. There is an urgent need to identify and channelise them.
13. To intensify research on NTFPs providing subsistence to the tribal and raw material for local industries. The export potential of various NTFPs need to be assessed.
14. The cost effective plantation technology need to be developed for large scale plantation programmes.
15. Existing acts, rules and regulations and executive orders to be examined and necessary modifications to be suggested to enable people for growing forest produce and derive socio-economic benefits from NTFP resources. Incentives for planting NTFP trees to be provided to create awareness.
16. Rights and concessions conceded to the people to be listed, reviewed and constraints in implementing the National Forest Policy, 1988 to be identified and eliminated as far as practicable in accordance with the provision of law.

Above all, the scope of NTFP is so wide and fruitful that if properly managed can generate employment to all forest dwellers and alleviate poverty.

8.29Miscellaneous Regulations:

1. Artificial regeneration sites including gap filling in sites to be rehabilitated should be planted preferentially with site specie NTFP species. Similarly in the Rehabilitation Working Circle areas, care should be taken during cleaning operation to retain the miscellaneous species which includes important NTFPs.
2. The DFO should organize regular trainings on collection, exploitation, and utilization of NTFP on accordance with the relevant Government policies in force from time to time. The main objectives of such trainings should be to ensure that collection, exploitation and utilization of desired NTFP shall be regulated in such a manner that composition, regeneration and sustenance of forests are not adversely affected.
3. The Divisional field staffs may work in close co-operation with the local people who may be motivated not to collect entire seed from forest floors and to allow some seed to remain on ground for regeneration purposes. Similarly, local people may also be encouraged to adopt more forest friendly techniques to collect barks, branches, leaves and roots so that forests are not adversely affected.
4. The DFO should maintain a proper account of NTFP items, their quantities collected, areas/forest blocks from which collected and period during which collected. An annual assessment of potential availability of various NTFP shall also be made in the beginning of each calendar year. Even, the impact of transfer of NTFPs to Gram Panchayats and the problems of primary collectors namely tribals should be meticulously studies and submit annual reports suggesting any changes/modification if required.
5. All out efforts should be taken to protect the forests against forest fire, unregulated grazing and illicit felling. Effective measures should be taken to curb shifting cultivation and encroachment which is very much in practice in the Division resulting to massive deforestation and fragmentation of forest cover.

8.30Bio-diesel Plantation:

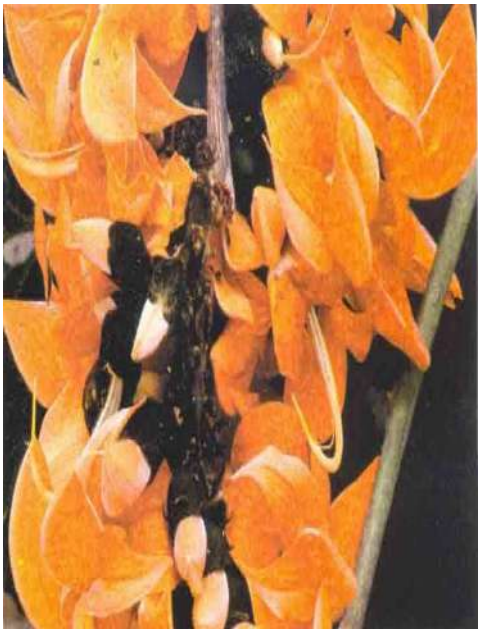
The rapid depletion of world's petroleum reserves and uncertainty in petroleum supply, as well as the sharp search for other alternatives to petroleum-based fuels, considering that there is a need to explore new alternatives, which are likely to reduce our dependency on oil imports, bio-diesel emerges as one of the most energy-efficient options. In the past 15 years, bio-diesel has progressed from the research stage to a

full-production scale in many developed countries. The Indian scenario is different from these developed nations where refined vegetable oils and waste frying oils are used to produce bio-diesel. In India, non-edible oils are emerging as preferred feedstock, and several trials have been made using non-edible oil species for the production of bio-diesel. Many traditional seed oils like *Pongamia glabra, Jatropha (jatropha curcas), Mallotus Philippines, Garcinia indica,* and *Madhuca indica* are available in the country, which can be exploited for this purpose. *Jatropha* is one of the most preferred feedstock for bio-diesel when compared to other species as it is known to be a drought-hardy perennial shrub, suitable to tropical and sub-tropical climate, and can thrive best in low-rainfall regions and degraded lands.

PLATE- VI-A

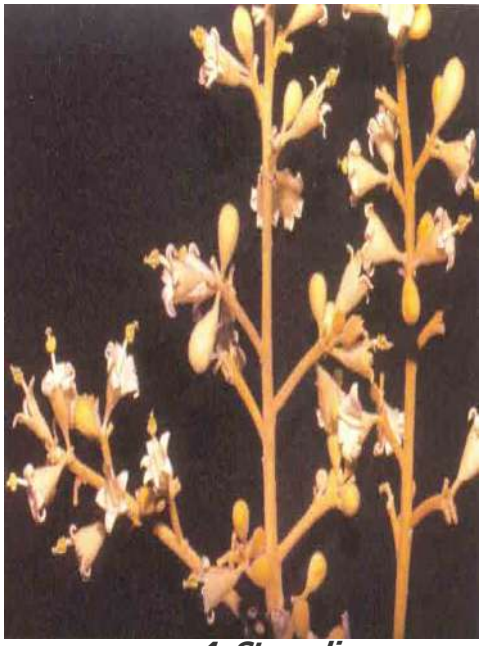
Photographs of Major NTFPs under Threat in Phulbani Forest Division

1.Buchanania lanzan



2. Butea monosperma

3. Azadrichta indica



4. Sterculia urens

5. Shorea robusta

6. Tamarindus indica

7. Thysanolaena maxima

8. Diospyros embryopteris

9. Madhuca indica

10. Bauhinia vahlii

PLATE-VI-B
Photographs of Major Medicinal Plants under Threat in Phulbani Forest Division

1. Terminalia bellirica

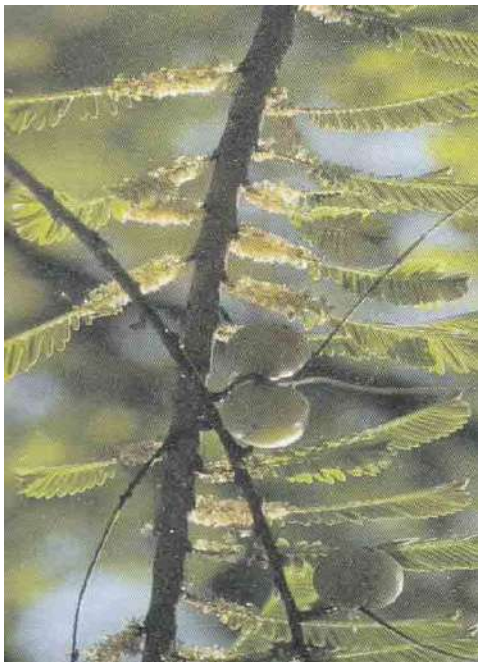
2. Andrographis paniculata

3. Nyctanthes arbor-tristis

4. Rauvolfia serpentina

5. Semecarpus anacardium

6. Mallotus philippinenisis



7. Emblica offcinalis

8. Terminalia chebula

9. Woodfordia fruticosa antidysenterica

10. Holarrhena

8.31 Importance of NTFP

NTFP has assumed great importance in Kandhamal District during present days. The tribal population, particularly the primary collectors living in and around the forest areas of the Division, largely depend on NTFP items for their sustenance during lean periods of food scarcity. Over exploitation of NTFP species in an unscientific manner without value addition at the time of collection and storage period has resulted in gradual decline of NTFP species, which need to be supplemented by effective protection and profuse artificial regeneration in suitable sites of the Division.

The NTFP availability and their distribution in respective forest blocks of Phulbani Forest Division have been arrived by analysis of sample inventory points supplied by NRSA, Hyderabad. The analysis is based on 12 important NTFP species only out of 68 nos. which are of primary importance in shaping the livelihood enhancement of the poor tribals living in and around the forest area of the Division.

8.32 Subsidiary silvicultural operations cleaning and thinning

Not applicable to this circle.

8.33 Regeneration

Not applicable to this circle.

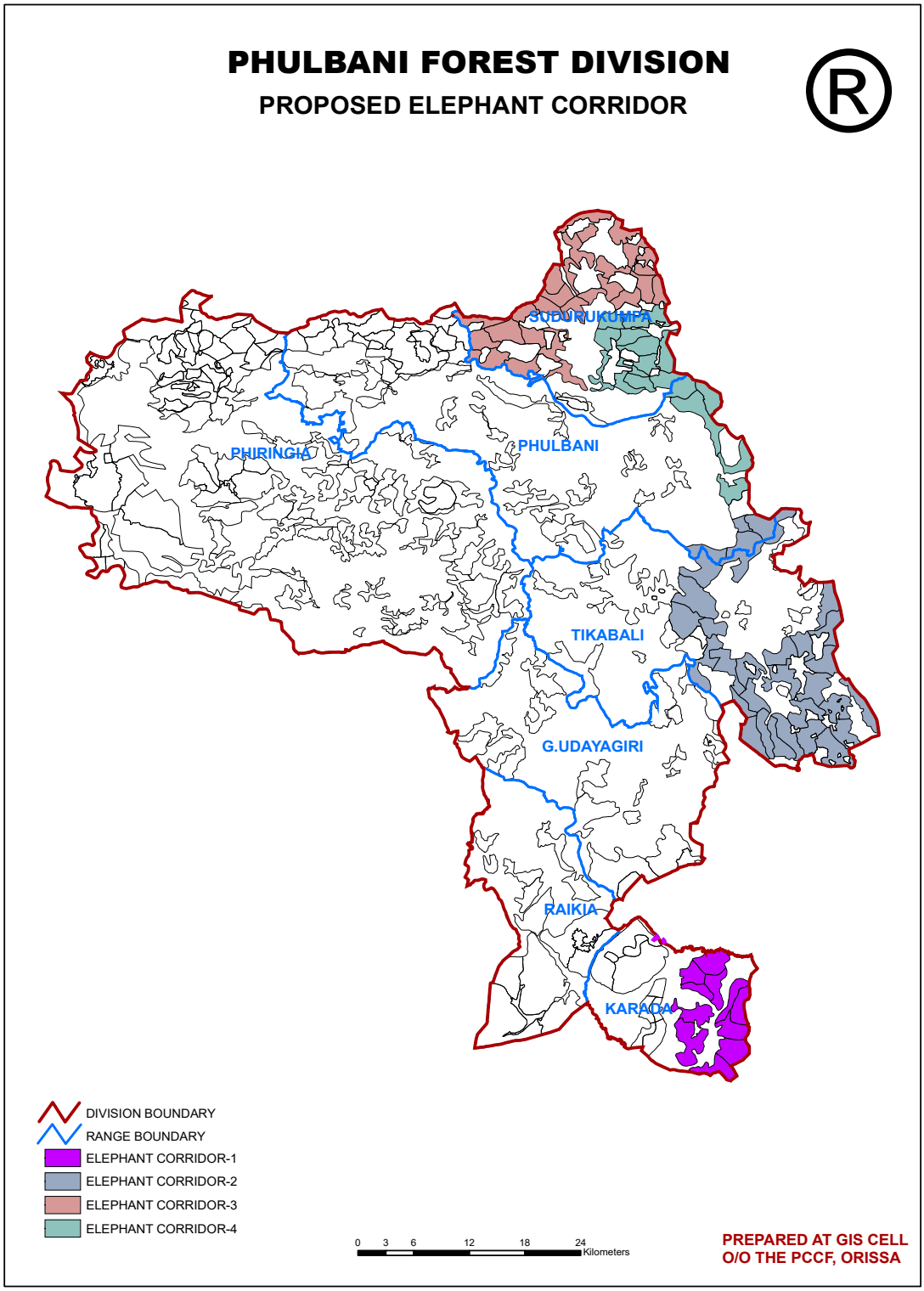
8.34 Associated regulations and measures

Not applicable to this circle.

CHAPTER-9

THE WILDLIFE (OVERLAPPING)WORKING CIRCLE

9.1



9.2 General Constitution of Working Circle:-

Wildlife Overlapping Working Circle constitutes the entire area of working plan. Phulbani Forest Division has extensive forest areas strewn with lofty hills, undulating ridges, perennial rivers, streamlets as well as varieties of wild life and is remarkable for its natural beauties. Wild life embraces all forms that are wild, and is therefore any plant or animal which is neither domesticated nor reared/cultivated; and inhabits a wild landscape which may include even land, wetlands and sea. The colourful and magnificent wildlife bestowed upon human being by the nature had made tremendous contribution towards our culture, religion, courage and discipline, customs and tradition, education and economy, entertainment and aesthetic sense, maintaining balance of nature; and overall making life on this planet full of joy and enjoyment, peace and prosperity. Mahatma Gandhi rightfully said-"It is an arrogant assumption to say that we are lords and masters of the lower creation; on contrary, being endowed with greater things in life, we are trustees of the lower animal kingdom".

The positive values of wild life are reflected below:-

(1) Ethical value
(2) Cultural heritage
(3) Ecological value
(4) Scientific value
(5) Aesthetic value
(6) Commercial or Economic value
(7) Game value

9.2.2 When human civilization was in its earlier stages of manifestation, the relationship between wild animals and humans was harmonious, complementary and both joyfully enjoyed and benefited from each other. Wild animals lived inside the forests, their natural habitat, and man maintained a balance between its necessities and the use of natural resources. But gradually with the advent of industrial revolution, technological innovation and scientific advancement, the traditional lifestyle witnessed a thorough change in the district and human being began to exploit the natural resources with accelerated speed and pace for meeting the demands of new materialistic life. Acute poverty over-population, illiteracy coupled with primitive attitude of trials including rural mass have directly affected the habitat of wild animals and with it started the wanton cutting down of trees for growing more agricultural crops by pernicious practice of shifting cultivation for feeding the ever increasing population. The ruthless killing of wild animals continued unabated in the past for hunting and on other flimsy grounds, ultimately threatened the ecological balance of the forest area of the Division. The crux of all these activities had fallen on forests and

the present surviving wildlife in different forest blocks of the Division driving them further towards despair and darkness.

9.2.3 Wild life is an integral part of the forests and performs important functions in the eco-system. The protected areas which usually cover sanctuary, national park, biosphere reserve etc are totally non-existent in Phulbani Forest Division. All the forest blocks both reserved and unreserved, lie outside the protective mantle offered by the protected area network and therefore, it is imperative that steps for conservation and protection of wild life is taken up in all the forest blocks and nothing is done to endanger the available precious wild life. The list of wild fauna available has already been reflected in Part-I [Chapter-II (B)]. While revising this working plan, conscious attempt has been made to incorporate elements of conservation ethics. Wild fauna and flora in their beautiful and varied forms are an irreplaceable part of natural system of earth which must be protected for this and generation to come. Therefore, this overlapping working circle extends to all the forest areas of the Division and has been constituted with basic objectives as detailed below:-

1) Protection of existing wild life and improvement of their habitat.
2) Eco-development planning and conservation of bio-diversity
3) Simple, (in-situ and ex-situ conservation dynamics) pragmatic and practical approach involving people coupled with consistency and dedication.

9.3General Characteristics of vegetation:-

9.3.1: The indiscriminate human interference has caused wide spread degradation and destruction of forests resulting in shrinkage of forest cover. Large number of rural and tribal population are depending on trees available in adjoining forest areas as a main source of fuel wood and charcoal for bonafide use as well as commercial one from livelihood aspect. The relentless biotic pressure has adversely affected the biodiversity of flora and fauna of the Division due to considerable degradation of the forests over the years. No systematic biodiversity survey has been conducted in this Division in the past. For the first time during the revision of this plan, Forest and Ecology Division of NRSA in association with ORSAC has been entrusted with the supply of data and digital maps e.g. forest density, forest type, site quality, contours, soil map, Encroachments, volume data, fire affected area, villages, boundaries, plantation, etc. by use of GIS and GPS technology and significant analysis and inferences can be drawn from the above data and maps stored in the computer in form of layers.

9.3.2: The flora and fauna available in Phulbani Forest Division has already been reflected in Chapter-II, Part-I of this Plan. The different wild animals present in this Division are given Chapter 2B basing on field study and data supplied by Zoological Survey of India. The Division also has rich biodiversity in flora and fauna in some patches of respective forest blocks inspite of witnessing the scenario of severe biotic interference and rapid shrinkage of forest cover.

9.4 Felling Series, Cutting sections and JFM areas:-

Not applicable to this working circle

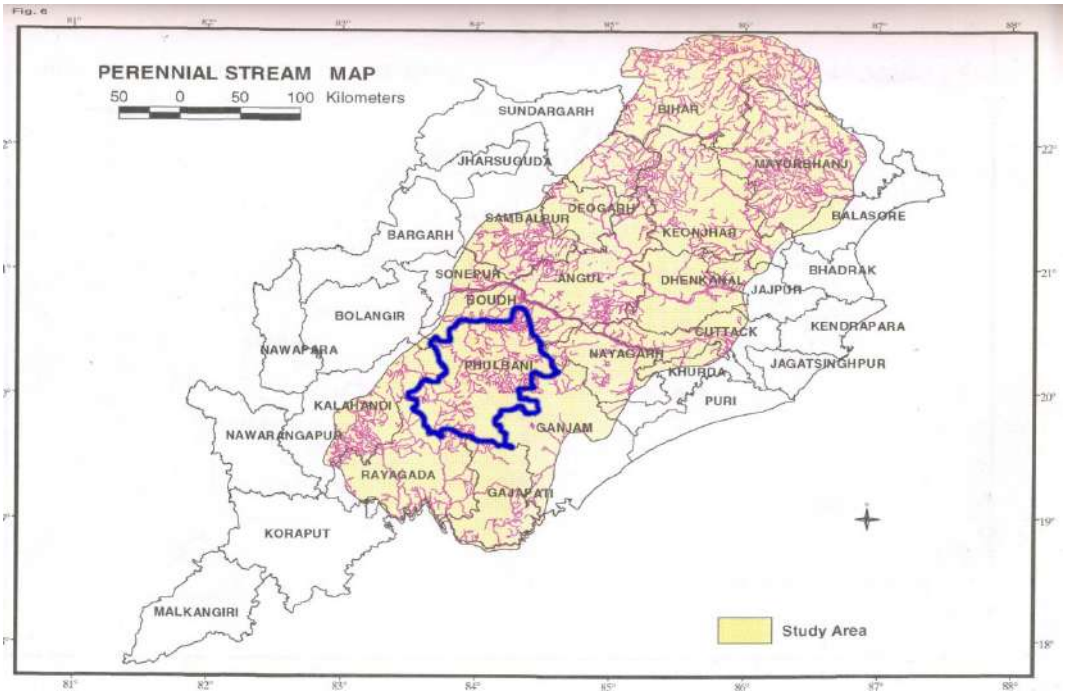
9.5 Blocks, Compartments

This is an overlapping circle covering almost the entire working plan area of the Division. However, special management prescriptions are provided for some forest blocks, where there is adequate concentration of wild life. During this plan period it is proposed to identify and maintain special wildlife habitats, unique wildlife habitat and also critical wildlife habitats which have been neglected in the past. Steps will be taken to prevent wildlife crimes and wildlife depredation by appropriate protection measures with peoples' participation in detection and disposal of cases.

All the forest blocks included in the plan have been allotted to this overlapping working circle. This circle covers the entire geographical area of the Division as far as protection of wild life is concerned. Since this working circle overlaps the entire plan area, the details of area allotment to this circle has not been furnished here.

9.5.1Wild life habitat: Major portion of Phulbani Forest Division is terrestrial. The forest tract is well drained by a number of small nalas, which drain into the river Salki and the river Baghnadi. These two perennial rivers flow from the South towards North and forms main tributaries of the River Mahanadi. The hill streams originating from the forest of Karada Range fromKaradaNala and flow into Ganjam district and runs as a tributary of river Rushikulya. Number of other seasonal and perennial streams criss-cross the entire Division providing water sources for the wild life. The perennial stream map pertaining to Kandhamal district is reflected as **Fig WL-1.** Sub-terrestrial habitat consists of burrows and natural crevices found in forest areas. Many burrows are even dug by the locals in the process of removal of roots and tubers. Besides, accumulated rock pieces at the foothills and cracks in the rocky patches on steep slopes also serve as a shelter for many replies like snakes, lizards et cetera.

Fig-WL-1



9.5.2 The tract of Phulbani Forest Division is formed of a network of hills, valleys, and nalas. Composition of the forest crop is heterogeneous in nature. Sal regeneration is good in lower and gentle hill slopes and the site quality of Sal are class III and Class IV as observed during field study in Ranipathar, Donga, Sudrukumpa, Burtang South, Chakapad, Gochhapada, Ladapadar, Palchi, Kalabagh, Baghnadi, Khajuripada and Burtang North etc. Bamboo clumps are observed in the up hills of Machhaghat, Karada and Baraba forest blocks.

9.5.3:Special habitat: Special habitats of wild life are biological in origin and provide habitat functions, which otherwise not served by succession stages, are also available in the forests of Phulbani Forest Division having luxuriant tree cover. 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 needs to be maintained from wild life management point of view and utmost care should be taken to retain them during the course of execution of silvicultural operations in the forest blocks of the division.

9.6 Special objectives of management

Wild life management is the judicious use of wild life resources towards attainment of scientific, ecological, economical, ethical, aesthetic and recreational

objectives for the benefit of human beings and for the improvement of nature, upon which all the components of ecosystem depend. It includes planning and studying of habitat and behaviour of the wild animal's population. The special objectives of management set for this working circle are within the general objective of management and are enumerated below:-

1) To conserve, protect and improve wild life habitat with special emphasis on unique, special, macro habitat and riparian Zones of the Division.

2) To promote wild life in general and endangered species in particular by appropriate site specific and realistic management techniques.

3) To create awareness among the local people to have compassion for wild life with required justification for their important role and conservation of their habitat.

4) To conserve and develop ecotourism sites.

5) Eco-development planning for biodiversity conservation and increase in population of wild life by providing enabling (conducive) environment in respective forest blocks.

6) Eco-Administrative unit approach for management of wild life.

7) Prevention of wild life related crimes and enforcement of existing laws by following systematic procedure in accordance with the provisions of law.

8) Study and analysis of Conservation-Development linkages.

9) Feasibility analysis of livelihood strategies of village communities living in and around the forest areas.

10) Conflict management, problem analysis and objective setting to achieve desired output in a sustainable manner.

9.7 Method of Execution

9.7.1 Development of habitat: The people living in and around the forest areas are generally poor and mostly belong to various tribal communities who had all along been living almost entirely on the forests and its renewable resources. These people had been "Ecosystem people" and their living was more or less compatible to the ecological processes underway. But the present situation is no longer so simple in the division. Firstly, the benefits accrued from the usufructs are also being siphoned off by adjacent rural/urban users through indirect linkages, which often remain unnoticed. But, the combined effect is devastating on the natural ecosystems of the division. Therefore, habitat should be developed with the co-operation and active participation of the local people coupled with sound silvicultural techniques. The main objective is

to provide more food, water and shelter to the wildlife and also to reduce man-animal conflict.

9.7.2 Improving the forest cover: There is no shade of doubt that preservation of the available wildlife resources and their natural habitat has become imperative for the human species for their future survival. Even if other considerations may be waived off to accommodate spiralling demand on such resources by an ever increasing population of the Homo sapiens. Uncontrolled biotic interference had tilted balance immeasurably in many areas, so much so, that the future of conservation at the moment itself seems to be under the cloud of doubts.

Providing adequate forest cover to different wild animals within their habitat is necessary for their shelter and protection from weather, predators and enemies. Keeping in view this aspect, it has been prescribed in Selection Working Circle not to fell those matured trees, which create a lasting gap in the canopy. It is also prescribed not to fell trees near water holes, wallows, precipitous slope areas and salt licks to maintain cover. In case of Rehabilitation Working Circle, it has been prescribed to go for indigenous, site-specific mixed plantation for creation of ground flora and middle storey. Severe degradation sites devoid of established vegetation should be tackled by appropriate silvicultural and soil-conservation practices based on watershed approach with the co-operation of the local community. Tree cover around the stream, waterholes, rivers and salt licks shall also be maintained and improved from time to time.

9.7.3 Improving availability of food: The availability of food for different categories of wildlife is directly proportional to the crop composition and quality of their habitat. Further, the adequacy of food in a particular wildlife habitat depends upon the quality and quantity of food produced and the animal population living therein. Keeping this wildlife management aspect in view, general availability of food and its further improvement shall always be taken into consideration while carrying out subsidiary silvicultural operation like opening of canopy, thinning of congested patches etc. in a forest block/compartment. The NTFP species supplementing the requirement of wildlife particularly herbivores should be retained in their territory as far as practicable and steps should be taken to curb over-exploitation by biotic interference with a firm hand.

The following measures warrant immediate and timely execution in forest blocks having availability of wildlife:-

(1) Food availability in a habitat change with seasons. Herbivores depend on plant materials like leaves, barks, twigs, flowers, fruits and seeds of species like *Mallotus philippinenesis, Dendrocalamus strictus, Haldina cordifolia, Albizzia lebbek, Aegle marmelos, Cassia fistula, Ficus bengalensis, Ougeinia Oojeinensis, Shorea robusta, Syzygium cumini, Terminaliat omentosa, Terminalia belerica, Zizyphus mauritiana, Zizyphus oienplea, Bombax ceiba* etc. Plantation/retention of the above species should be carried out in specific sites where it is actually needed for wildlife.

(2) Deer, Monkey, Langur, Rats and Hare feed on wild fruits of plants like Ficus species, *Terminalia belerica, Buchananial anzan, Aegle marmelos, Syzygium cumini, Emblica officinalis, Zizyphus mauritiana, Diospyros melanoxylon* etc. These animals help in fruit and seed dispersal in the forests. Plantation/retention of the above species is required in specific sites of forest blocks.

(3) Among the plant materials, grasses constitute major portion of the herbivores food. Grasses which are highly preferred and consumed by herbivores are *Axonopus compresses, Eragrostis pilosa, Saccharum bengalensis* etc. These grasses, if not available, should be raised in the wildlife concentration areas to meet the fodder requirement of herbivores.

9.7.4 Water availability:

Water is the most crucial factor for all kinds of living organisms and biomass production in the rain fed areas, particularly in the tropical / subtropical climate. Phulbani is well-known for its undulating topography and rainfall is limited to 3 to 4 months followed by 8 to 9 months of dry winter and summer months. The problem is how to conserve the rain water so as to utilise it during scarcity phase. The solution to this problem lies in the "Indigenous rain water conservation technology" which has evolved in tune with the geo-hydrological environment as detailed below:

(1) Clearance of drainage congestion by deepening water bodies and creating a network of ponds.

(2) Stabilisation of nala banks primarily with vegetative measures.

(3) Conservation of dug-out structures and series of small run-off management structures. Vegetative checks, brushwood checks, loose boulder checks on or along the drainage lines in the upper and middle reaches, bank stabilisation.

(4) Contour vegetative hedges/contour furrows to conserve moisture and digging out of percolation tanks in degraded sites.

9.7.5Corridor development: Ecologically viable habitats of wildlife have been greatly reduced due to biotic and abiotic interferences during recent years. There is loss of traditional/natural corridor areas too. These along with other factors have resulted in man-animal conflict. The situation like this requires immediate, but proper handling of public support for conservation of wildlife and their habitat. Along with strengthening protection measures for wildlife, corridor linking forest blocks with adjoining forest divisions should be given priority. The boundary of proposed corridors should be planted with species like Jatropha curcas/Agave sissalana which will provides a clear barrier with a differentiation of wildlife habitat. The proposed corridor plan pertaining to this division and interlinked with adjacent division are listed below is a systematic manner in following table

Plan of proposed corridor

1	Ghumsar North – Karada
2	Ghumsar South – Karada
3	Nayagarh – Chakapad – Ghumar North
4	Boudh – Sudurkumpa – Phulbani
5	Chakapad – Sudurkumpa – Phulbani
6	Sindrigaon – Chingidikhol via Khadaga River

9.7.6 Maintaining Unique Habitats: Wildlife habitats are invariably identified only with the vegetation communities, but there are some habitats where vegetation association is not present.Thesehabitats are represented by geomorphic features with special functions not provided in plant communities or their succession stages, and are called "Unique Habitats". These habitats do not occur as frequently as vegetative habitats, but nonetheless add to the diversity of the environment, which otherwise is largely dominated by plant communities. Little or no attention has generally been paid to these lesser known and lesser occurring habitats, their usefulness in management and their role in enriching the wildlife diversity of the area. These features show a much clumped distribution and are restricted only to certain areas as their formation depends solely on geomorphology of the area. Only two kinds of unique habitats have been identified in respective forest blocks of the division as detailed below in table no.WLWC-1

Table No: WLWC-1		
Sl. No.	**Name of forest blocks**	**Kinds of unique habitat found**
1	Bandhagarh 'A' PRF, Bandhagarh 'B' R.F, Gochhapada R.F., Katrigia PRF, Balandapada North and South PRF, Baghanadi R.F., Nuapada R.F., Gerupada R.F., Ranipathar R.F., Donga R.F., Sudrukumpa R.F., Khajuripada R.F., Ganjuguda PRF, Burtang R.F., Chakapad R.F., Burtang South R.F., Archangi 'A' & 'B' R.F., Lionpada R.F., Kurumingia R.F., Sujeli R.F., Godingia R.F., Karada PRF.	Caves and Dens
Source: Field study		

9.7.7.Maintenance of special 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 and generally found in the areas coming under the Selection working Circle.

9.7.7.1 Snags: As a thumb rule, maintain at least the 7 tallest and largest diameter snags per hectare, in a well distributed design in all silvicultural treatments. Retained snags need to be maintained 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.

9.7.7.2 Snag recruits: Likewise maintain 7 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.

9.7.7.3 Down wood: In the course of felling as well as illegal removal of timber, it is noticed that irregular shaped hollow logs are left behind with lops and tops. Being uneconomical, they usually remain at the 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 micro-habitat for several species. The largest size hollow logs, or rejects for any reason need to be maintained at the rate of at least five logs per hectare, and evenly distributed as far as practical. This needs to be reflected in the compartment history.

9.8 Trees with fluting boles and buttresses and holes at the base:

They provide significant micro-habitat functions for small mammals like mouse deer and reptiles. At least one such largest possible tree need to be retained per hectare and entered in the marking list.

9.8.1 Lianas and tangled climbers: Climber cutting operation is a standard practice of silviculture operation. However, lianas provide significant habitat functions supporting 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 at least two old, spaced apart, climbers per hectare be retained and reflected in compartment histories.

9.8.2 Fruit bearing trees and shrubs: The forest blocks having good no. of fruit bearing trees and shrubs need to be maintained for the benefit of wildlife. Sufficient precautionary measure should be taken to avoid over exploitation beyond the carrying capacity.

9.8.3 Roosting/Nesting trees: All trees which are known to support nesting colonies of water birds or roosting congregations of raptors/other birds need to be retained.

9.9 Maintenance of Critical Macro Habitats:

9.9.1 Riparian Zones: The critical macro habitat of the division mainly comprises of following riparian zones are reflected in Table No.WLWC-2

Table No:WLWC-2

Sl. No.	Name of forest block	Compartment No.
1	Sudrukumpa R.F.	C/7,8,3
2	Donga R.F.	C/1,2,3,4,5,7,8,9

3	Ranipathar R.F.	C/3,4,5,6,7,10
4	Khajuripada R.F.	C/1,2,3
5	Ganjuguda PRF	C/2
6	Burtang North R.F.	All compartments
7	Baghanadi R.F.	C/1,2,6,7,8,12,13,4,3
8	Palchi R.F.	C/2,3,4
9	Kerandibali (W) R.F.	C/1,7,6,5
10	Sadingia R.F.	C/1
11	Kalabagh R.F.	C/5,4,3,2,1,9
12	Gochhapada R.F.	C/5,7,8
13	Kerandibali 'E' R.F.	C/3,5
14	Bandhagarh 'A' PRF	C/3
Source: Field study		

The riparian forests provide thermal cover in winter and summer which is important for all wild animals. The lofty trees and unbroken canopy is of great significance to arboreal mammals and reptiles and the tall trees provide nesting cover to raptors. These systems are equally attractive to domestic cattle. Often scenic values are associated with riparian zones and hence they are fascinating to people. Riparian zones are linear and most vulnerable to change due to great pressures. The following prescriptions should be meticulously followed for maintenance of riparian zones of the division:

(i) Extraction path alignment needs to be avoided along the riparian forests.

(ii) Roads already existing but not in regular use need to be closed for traffic.

(iii) There should be no plantation activity in riparian forests.

(iv) As a thumb rule, on either side of the stream, an area of a width equal to thrice the average top height of trees in riparian forests should be prescribed as a "No felling and Activity Zone" to filter out effects of an edge in the interior of riparian forests and to maintain their ecological processes and functions.

(v) Labour camps should be located outside the no felling zone.

(vi) New road alignment should be located outside the no felling zone.

(vii) No burrow pits should be located within the riparian zone.

(viii) When there is natural tree fall from the bank into the streambed, in water or otherwise, then as far as possible at least four such trees per running kilometer, equally spaced, needs to be retained.

(ix) Recreation sites within the riparian zones should be minimum and strictly monitored and controlled. They should not be located on the sites that are ecologically critical and there should be no quarrying operations within riparian zones.

(x) No cattle camps shall be allowed nor any infrastructure development.

(xi) Use of poison (natural or synthetic) or explosives must be strictly prohibited.

(xii) NTFP and MFP collection in the riparian zone should be strictly prohibited as it supplements the food requirement of herbivores.

9.9.2 Maintenance of water sources and wetlands:

The hilly tracts of Phulbani are laden with several streams and perennial rivers in a criss-cross manner. The water sources need to be protected from silting, poisoning, and drain off. As the Dist. of Kandhamal is worst affected by the pernicious practice of shifting cultivation, appropriate soil and moisture conservation measures, both in degraded and barren sites, in the form of percolation tanks and appropriate technique to tap and preserve rain water, should be carried out in specific sites which ultimately provides water source for the available wildlife population in the habitat.

9.9.3 Maintaining the cultural landscape:

The sites of pilgrimage from different aspects like cultural, archeological as well as unique scenic point of view pertaining to the division are listed below:

(1) Balaskumpa is a village in south-east at Kandhamal (Phulbani) Sub-division situated 20° 25′ N latitude and 84° 21′N longitude at the confluence of two hill streams which combine to form PillaSalki River. In this village a shrine called **Baraldevi**, the presiding deity of Kandhamal is situated. The goddess is worshipped every year in the bright fortnight of Aswina (Sep-Oct). It is 15kms from Phulbani district Headquarters and is connected by a good motor able road.

(2) Dungi is about 45kms from Phulbani and situated on Phulbani-Berhampur road in G.Udaigiri tahsil. This is the only archeological site in Kandhamal district. There was one Buddha Vihar of 11th century and after it was ruined, Shiv temple has come up on the site. Some of the ancient sculptures have also been excavated during the construction of new temple.

(3) Pakadajhar is about 30kms from Phulbani town near village Sudrukumpa. It is situated on Phulbani-Boudh road in Phulbani tahsil. There is one waterfall of about 60 ft. height in natural forest background. One good road from Sudrukumpa is leading to the site. With the recent development of the destination, sizable tourists visit the place for picnic from early November to end of February.

(4)Putudi is 18kms from Phulbani town with a waterfall of about 100 ft. height situated in dense forest. The roaring sound of waterfall with dense forests all around creates a thrilling sensation and is enchanting to visitors. One good road is leading to the site and the water fall is on the river Salunki and is a marvelous scenic spot.

(5)Chakapad has mythological background and is famous for its natural beauty. It is also a sacred spot of Hindus especially for the **Lord "Shiva"** locally named as **"Birupakshya"** and the temple is popularly known as **"Lankeshwar Shiv Mandir".** Host of people from different parts of the State visit this holy place to worship the Lord on different sacred occasions all year round.

Rubbish dumping, illegal cutting, setting fire on forest floor and opportunistic poaching in the above mentioned sites should be properly guarded and monitored at regular intervals. From the time pilgrims enter the forest area to the time they exist, their movements and activities need to be regulated and extra protection efforts need to be invested. There should be absolute ban on cooking food and carrying and littering plastic garbage in the form of bags and bottles etc.

9.9.4Other Prescriptions:

(1) Human population is part of the eco-system and their activities in and around wilderness cannot be totally eliminated. At the same time, we cannot also deny the impact of human activities which has led to excessive destruction of flora, fauna and ecosystem as a whole. "Integrated Management Plans" and "Site specific microplans" based on holistic approach by taking into consideration the "Eco-system" as a whole are the need of the hour. No doubt, management of wildlife is essentially multi-disciplinary and success of conservation planning lies in ensuring multidisciplinary inputs to the extent needed. The piece meal and adhoc management practices must be avoided. The distribution of wildlife in different forest blocks should be studied scientifically and their occurrence in different habitats in different seasons should be estimated and recorded. Census of wildlife should be done annually to assess the prey-predator base which will ultimately help in improving the management prescriptions.

(2) Wildlife habitats of endangered species should be identified specifically in located pockets and suitably mapped. Though in situ conservation is the most ideal form

of conservation but the species which are threatened or particularly endangered can be preserved in suitable locations outside their actual habitat.

(3) The relationship between livelihood and other issues concerning the people living in the subsidised eco-systems in close proximity of forests and the survival needs of the component biodiversity elements of the natural ecosystems cannot be sustained unless their facilitation is harmonised with the ecological imperatives of natural resource conservation. For this reason, the wildlife management plans needs to identify the extent of land over which the issues of human interest can be addressed. The overall ecologically sensitive zone may be considered in the form of a strip extending 1½ km. outwards and 3kms inside from the edge of the forest. This ecological limit act as an ecological buffer where maximum amount of stress generated by people and wildlife along the forest fringes are absorbed, the ecological buffer that falls outside the administrative boundaries of the forest block taken together with the administrative boundary of the forest block represent the concept of the **unit** that should be subjected to the management planning exercise with ecosystem approach for management of natural resources. The width is variable on site specific-basis. In order to accommodate the principle of sustainable use of forest based on renewable natural resources by human populations living in and around the natural ecosystems for ensuring forest and wildlife conservation of the division, the above concept of **Eco-Administrative Unit** may be adopted in the field for management of areas situated in and around the forests and wildlife habitats.

(4) Biodiversity conservation should be taken up at landscape level in a mosaic of forests, agriculture fields, and wetlands instead of being confined to one particular aspect only. Long term ecological monitoring needs periodic evaluation for effective implementation based on C&I (Criteria and indicators) analysis in different forest blocks which are suitable for wildlife, so that genetic variations are identified and conserved, known species thrive, no further species reach threatened list, and all those in the list bounce back.

(5) Migration routes for wild animals should be identified and proper preventive measures should be taken to protect and improve the corridors including natural one and riparian vegetation zones. Those areas which are prone to poaching should be protected from all sorts of biotic interference.

(6) There should be a strict vigil on the cattle population of the adjoining habitations in and around the forest area depending on the carrying capacity of the forest. All possible measures should be taken to arrest over-exploitation of the forest cover beyond its carrying capacity by suitable provisions of fodder enhancement measures.

(7) In recent years tourism in natural areas has taken a different orientation and thus the concept of "Eco-tourism" which is "Ecologically viable tourism" has evolved. Two potential sites namely Urmagarh, Katramal from ecotourism perspective have been presently considered for development by the division. The place is 17kms from Phulbani town on Phulbani-Gochhapada road in Phulbani Tahasil. The waterfall is of 50' height and is situated in a dense forest with luxuriant growth of trees. One fair-weather road is leading to the site. It is undeniable that tourism has enormous potential for the environmental conservation. However, it must be borne in mind that the balance between tourism and the environment is very fragile. The following major issues need to be addressed**:-**

(i) Identification and analysis of various impacts of tourism on environment in the target area.

(ii) Assessmentof the contribution of tourism in the observed or expected environmental modifications in the destination area.

(iii) Estimation of the demand for resources and the amount of residuals disposed to the regional environment.

(iv) Analysis of the environmental impacts of tourism on the local communities.

(8) To safeguard the natural habitat of the division with its immensely rich biodiversity, people in general and the younger generation in particular, is to be made aware of the status, problems and conservation concerning wildlife and its habitat. We have to conserve the habitat and enlist the active participation of the local people through JFM/PFM concept. Local villagers are the treasure of information which can be of immense help even in tracking down the poacher's vis-à-vis control of wildlife crime.

9.9.5 Wildlife Protection Measures:

(1) The Govt. of India brought out a comprehensive legislation, the Wildlife (Protection) Act, 1972 (WPA). WPA provides the basic framework to ensure the

safety and wellbeing of wild animals and plants. The primary Act was amended time to time, as and when the need arose to accommodate provisions for better implementation. Sections 48, 48A and 51A (g) of the constitution of India also emphasizes that the responsibility and obligation to protect and save our country's national heritage is with the people of India and the Govt. Besides WPA, Indian Penal Code, 1960; Code of Criminal Procedure, 1974; Customs Act, 1962; Indian Forest Act, 1927 (with various amendments); Orissa Forest Act, 1972; Forest (conservation) Act, 1981 (with amendments); CITES 1975 (its resolutions and notifications); Environment (Protection) Act, 1986; Prevention of cruelty to Animals Act, 1960; Arms Act, 1959 etc. are some more legal instruments available to the enforcement agencies to check and control wildlife offences, including trade.

(2) Despite all these laws and policies, the illegal trade in wildlife continues to flourish. Just as mere laws do not bring down the incidence of heinous crimes in society, poaching of animals, uprooting of plants and smuggling of timber and their subsequent trade has to be dealt in the field. The time has come to recognise the gravity of the situation and try to arrest the cataclysmic decline of species. The enforcement personnel of the division should be properly sensitised to curb the wildlife offences with a firm hand.

9.9.6 The following enforcement technique may be followed in the field to reduce incidences of wildlife crime:

9.9.6.1 Planning and collection of information: The first and foremost step is to collect and tabulate all available spatio-temporal information about incidences of wildlife crime including identity and modus operandi of the criminals. The second step is to analyse the information and prepare a strategy and action plan. The 3rd step is to carryout enforcement.

9.9.6.2 Anti-poaching strategy:

The following basic questions, as far as practicable under the prevailing conditions, should be addressed in order to put an anti-poaching plan into operation.

a) Do you have enough men to effectively patrol the area?

b) Is the motivation level high enough for maximum effectiveness?

c) Are the staffs trained in all aspects of anti-poaching and follow-up action?

d) Are the staffs well-armed?

e) Is the existing communication system like VHF sets adequate?

f) Are vehicle numbers sufficient?

g) Are staffs acquainted with the terrain?

h) Is an intelligent network in place?

i) Is the area regularly patrolled?

j) Is the flow of funds to the lowest level smooth and timely?

k) Are the villagers being used in anti-poaching?

l) Is the media on your side?

m) Are the local police stations, customs unit if any, helping you?

n) Are the local magistrates and courts sympathetic?

o) Do you have good links with NGO'?

9.9.6.3 Patrolling:

Thereafter comes patrolling, which is the most effective physical deterrent to poaching. Patrolling must be done in conjunction with intelligence gathering to achieve best results. Further, patrolling party must be well acquainted with the entire terrain. Patrolling paths should be planned out in advance and such paths should not always follow the beaten tracks but should be varied on random choice or based on specific information. Proper dialogue and understanding with the local villagers during a patrol is important to gain vital information and also to gain their trust. The patrol party must always try to obtain information that can be used to prevent further poaching in the area. Patrolling should ideally be done on foot or bicycles as it is a silent method and covers all sorts of terrain.

9.9.6.4 Informants:

The use of informants is a key component of any intelligence system. If used well, informants can determine the final result of an investigation. Developing an informant, using his information and keeping the informant over a number of years is a vital skill. Informants are used not only to help solve a crime but also to gain intelligence that can prevent it. The following three pertinent questions as regards to informants should neatly be addressed to.

(i) Who can be an informant?

(ii) When to use an informant?

(iii) How does one develop an informer?

The ideal solution/procedures to the above question are laid down in a systematic manner:

(i) **a)** Any person can be a potential source of information.

b) The informant should be law enforcement personnel outside your agency.

c) The informant may be an associate of the suspect, present or past.

(ii) **a)** To conduct surveillance in areas where a law enforcement person cannot go undetected.

b) To gather information from sources not readily available to law enforcement officers.

c) To testify for the Govt. at legal proceedings.

(iii) **a)** Treat each and every person as a potential informant.

b) Understand the motivating factor for the informant and fulfill it.

c) Reassure the informant of the amount of protection that can be given. Do not make promise difficult to keep. Be honest.

d) Meet informant frequently at safe places. Maintain good rapport and trust.

e) Corroborate information given by informant and assign a credibility rating to the informant.

f) Be truthful and fair in all dealings with informant.

g) Ensure protection of you informant. A person will give information only if he feels safe.

9.9.6.5 Intelligence network:

Setting up a system of information gathering, analysis and evaluation is the most important facet in anti-poaching or anti-smuggling.

9.9.7The procedure for setting up an intelligence network is as follows:

(a) Collection

(b) Evaluation

(c) Collation

(d) Analysis

(e) Reporting

(f) Dissemination

(g) Re-evaluation

9.9.8The following points should be kept in mind while running an intelligence network:

(a) Location

(b) Staff

(c) Training

(d) Security

(e) Potential sources of information.

9.9.9Undercover operation and surveillance:

An undercover operation is legal, covert investigative work which involves deception of and association with the suspect. This is often the only technique that can be used against well-organised criminal elements. Surveillance, covert or overt, may be used to obtain intelligence or evidence in a crime for a possible cause for arrest or search warrant, or to provide protection to undercover operators. Surveillants must be alert, natural, patient, resourceful and having good endurance skills.

9.10Collection of Evidence, criminal investigation and interrogation techniques etc. by staffs:

The staff of the division deployed for anti-poaching operations should be extremely alert, in good health, agile with high motivation. They should be trained to handle arms and ammunition properly and be properly armed and provided with VHF sets for communication. Proper maintenance of fixed and mobile VHF sets is a pre-requisite for efficient operation. The staffs involved in the entire operation should also be conversant with certain **basics** as listed below:

(a) Crime scene search for evidence.

(b) Collection of evidence from the spot.

(c) Proper conducting of criminal investigation in accordance with the law.

(d) Interrogation techniques for a suspect.

(e) Identification of wildlife species and their parts.

(f) Differentiating wounds in carcasses.

(g) Conversant with relevant rules and sections of WPA, 1972, and other related acts.

(h) Meticulous preparation of case records on the spot and subsequent court procedure.

9.11Improvisation of legal policies:

In criminology, three basic factors make deterrence:

(i) Certainty.
(ii) Time taken for punishment to be awarded.
(iii) The actual weight of the punishment.

Out of the above the most important one is the certainty of punishment. It is a well-known fact that the conviction rate for serious crimes committed by offenders is very low and in wildlife crimes related cases it is still poorer. The second most important factor that constitutes deterrence is the time taken for awarding the punishment. Wildlife offence cases take a long time even more than 4 to 5 years before a judgment is delivered. So a criminal knows that he probably won't get caught and if he gets caught, there is only a poor chance of getting convicted and that too 4 to 5 years down the road. So, even if WPA prescribes a stringent punishment, the penalty becomes counterproductive and the offender might go to the extreme. Unless legal and wildlife experts sit together and plug the loopholes in the above three aspects, the WPA will remain a paper tiger. Moreover, prosecution report shall be thoroughly scrutinized by the D.F.O. before being filed in the court.

9.12Establishment of anti-poaching camps:

Anti-poaching camp should be set up in vulnerable pockets where there is greater concentration of wildlife. During the fire season these forest blocks should be given priority in protection from fire.

9.13Inventory of Gun Licenses:

There shall be inventory prepared of all the gun licenses within 10kms. Radius of forest blocks rich in wildlife. This will help in better control over the poaching activities.

9.14 Participation of the rural and tribal community:

Protection of wildlife is not possible by the Government machinery alone. Active co-operation of the local people; committed, active and educated Non-Government Organisations (NGO's) and individuals are essential ingredients for successful wildlife protection and there should be a more participatory approach to wildlife conservation. There should be a complete change in the vocabulary of conservation, a total rupture with the past mode of thinking and a radical shift in

mental attitude. The founding categories of past discourse need to be reconfigured; 'separation' and 'exclusion' ought to be replaced with 'integration' and 'inclusion'. Every individual must remember that all species were created equal and man has no right to arrogate to himself the power to cause their extinction. We have inherited a remarkably rich heritage not only from cultural and historical point of view but also a treasure of wildlife, unique on the natural habitat of the division. We must not loose these treasures in the mad race towards urbanisation by following the footsteps of western cultures.

9.15 Miscellaneous Regulations:

9.15.1 The two basic objectives of Wild life management are:

(i) To reverse the trend of habitat fragmentation and loss, and

(ii) To generate stake-holding and participation of the local population involving various sections of society, mainly tribal masses, in wildlife conservation programmes.

9.15.2 The Wildlife awareness may be created through the following programmes in the division:-

(a) Celebration of wildlife week.

(b) Competition and debate among school and college students with distribution of prizes for encouragement in the wildlife arena.

(c) Wide publicity and distribution of printed materials in the habitations adjacent to forest area of each forest blocks.

(d) Audio-visual programmes and wildlife conservation explained through electronic media.

(e) Arrangement of exposure visits to successful sites.

(f) Well conversant with the legal provisions under the wildlife (Protection) Act, 1972 and extent of the compassionate amount for wildlife depredation.

9.15.3 To sum up, conservation and sustainable use of resources is the need of the hour. It is our moral duty to conserve biodiversity and live in harmony with nature. The message is to be spread right from the general public, especially school going children, university students, policy makers, technocrats and managers before the last chance is lost.

9.15.4 Resource survey, inventory of flora and fauna documentation, updating of maps and creation of database at periodic intervals give sufficient inputs for Resource

management on long term basis in a sustainable manner. This aspect, particularly in wildlife perspective, is in a much neglected state. Forestry information system is very weak, unreliable and inconsistent. In the absence of reliable statistics, decision-making becomes very difficult. To assess the progress towards sustainable management, sizeable data base and information needs to be generated. A strong network of institutions has to be developed to ensure uninterrupted flow of information at the Division level.

9.15.5 Recently, with the advent of technology like G.I.S., GPS etc. through remote sensing, lot of data can be stored and analysed. National Remote Sensing Agency, Hyderabad (NRSA) and ORSAC have been engaged by the State Government to supply important information and digitised maps required in connection with the working plan preparation of the Division. In addition to it, a regular data base should be maintained at Division level comprising of details like schedule species found in the area, pictorial directory of all identified poachers and its circulation, timely and proper documentation of all the incidences of man-animal conflicts including poaching and smuggling prone migratory routes etc.

9.15.6 Further, the DFO shall also submit half yearly report to the authorities concerned with regard to steps taken by him to protect wildlife and to improve their habitat. He shall also report constraints faced by him in implementing the prescriptions of this working circle.

9.16 Wildlife Depredation:

9.16.1 The man-animal interface has escalated in recent years particularly in respect of wild elephants and bear. Ecologically viable habitats of wildlife have been greatly reduced due to biotic and abiotic interferences during recent years. There is a loss of traditional/natural corridor areas too. The main reasons for increased man-animal confrontations are:

(a) Illegal grazing of cattle inside forest leading to shortage of food for the herbivorous wild animals.

(b) Illegal collection of firewood, leaves and twigs leading to removal of essential cover for wildlife both in ground as well as in under storey.

(c) Illegal and wanton fodder collection for domestic cattle leading to dearth of fodder availability for the wild animals.

(d) Movement of people anywhere and everywhere in the forests in the name of passage, collection of tubers, collection of water, bathing etc. leading to disturbance in the erstwhile safe abode of wild animals.

9.16.2 The problem of depredation has two major aspects:

(a) Loss of human life.

(b) Loss of property.

The loss of property can be viewed in three main types:

(b)1. Loss of food crops

(b)2. Loss of cash crops by trampling.

(b)3. Damage to homes or other structures.

9.16.3 Various types of measures have been taken to prevent, control and handle situations arising out of man-wildlife conflict. The following immediate measures need to be implemented in the field for amelioration of the situation:-

(1) Protection of crucial habitat of elephant by stoppage of felling, illegal grazing, and fodder collection etc. in such areas of the respective forest blocks of the division.

(2) Habitat improvement programmes through planting of grass and trees, fodder species in the existing block and open areas.

(3) Creation of waterholes in elephant habitat which dry up in winter and summer months.

(4) Preservation of natural elephant corridor and to ensure that no new obstructions come up on the way in form of barriers.

(5) Distribution of leaflets regarding do's and do not's to be observed by the local people in the areas prone to elephant depredation.

(6) Large scale extension work through T.V., Radio, Newspaper and by organising meetings, seminars, group discussion, film shows, exhibition, postering etc. for developing of public awareness regarding conservation of wildlife.

(7) It is proposed to launch a scheme to organise anti-depredation watch committees in the line of village Forest Protection Committees. These committees are expected to keep track of problem animals or animal groups and inform the villagers and the Forest department in case of approaching emergencies. Further, anti-depredation squad should operate from Division

headquarters. The services of V.S.S. and FDA committees should also be properly utilised to mitigate the menace of depredation by wildlife population.

(8) Measures taken to ward-off the problem causing animals from the site include the one of high intensity focus light, crackers, drums, fire-torches; elephant proof trenches, rubble-wall and energized fences etc. which fits well to the specific sites.

9.16.4 Apart from the above, compassionate payments have also been made to victims sustaining severe losses of various kinds. The rate of compassionate payment in Orissa as per guidelines issued by the PCCF (wildlife) has been reflected in table no.WLWC-3

TABLE NO: WLWC-3
Compassionate Payment on wildlife aspect in Orissa

Type of loss		**Present Rate of Compassionate amount**
Human Kill		4,00,000
Permanent Injury		1,00,000
Temporary Injury		Free Treatment in Govt. Hospital + Rs.5,000
Cattle kill	Cow/Bullock	5000/-
	Buffalo	5000/-
	Calf	2500/-
	Sheep and Goat	2000/-
	Lamb	750/-
Crop damage		10000/- per Acre
		12000/- per Acre for cash crop
House damage	Fully damaged	BijuPuccaGhar
	Partly damaged	10,000/-
Source: O/o PCCF, Wild Life (Wild Orissa)		

9.17 Fire protection measures:

9.17.1 Fire has been the major cause of degradation/destruction of luxuriant micro-ecosystem. The frequency of forest fires is annual and is generally occurring during the months from March to June. It is observed that the frequency of fires is more in the Southern aspect than in the Northern aspect and is due to lower density of growing stock in the Southern aspect. Because of the slopes and valleys, the wind velocity in dry seasons is high which ultimately spread the fire rapidly engulfing precious flora and fauna. The spreading is observed to be rapid if the fire is travelling from the foot hills to the top of the slopes and these fires are mostly of high intensity

due to burning of dry grasses and leaves. This is a major constraint in the control of fire as reaching close to the fire by the fire controllers, is often impossible due to intense convection heat and impenetrable thorny bushes.

The strategy to control fires involves:-

(i) Identification of fire prone areas.

(ii) Fire prevention measures in the identified areas.

(iii) Monitoring of fire accidents and fire control operations.

9.17.2 Preventive measures:

(1) Fire lines: The perimeter of the entire forest block should be "Fire-lined" with a 15 mtr. width and should be maintained every year. The entire area should be divided into sections and these sections fire lines should be laid in the field with 10 mtr. width. In addition, fire lines with 5 mtr. width should be laid around vulnerable areas and plantations. Fire lines should be cleared and maintained regularly between December and January.

(2) Rock walls: Fire control rock wall barriers should be constructed to protect the forest from fire.

(3) Education: As most of the forest fires are man-made, it can be prevented to a large extent by motivating and educating the local people about its devastating effects.

9.18 Analysis and valuation:-

The annual census of wild life namely Elephant, Tiger, Leopard, aquatic and migrating birds has been carried out in all the Territorial/Wild Life Divisions of the state. Proper analysis and valuation of this data is yet to be carried out at the Division level. The annual elephant census data pertaining to Phulbani Forest Division for the period from 2015is reflected in a tabular format as detailed below in table nos. WLWC-4.

FORM:C

(**Analysed Result)**

ELEPHANT CENSUS-2015

Consolidated Statement for all Pas/Divisions within the Elephant Reserve

NAME OF THE RESERVE_____ AREA_____ Sq. Km. DATE OF CENSUS 25th April, 2015

Table: wlwc-4

Name of Division	Adult Bulls (>240cm)			Adult Cows (>210 cm)	Adult US			Sub-Adult Bulls (151-240 cm)			Sub-Adult Cows (151-210 cm)	Sub-Adult US			Juvenile (121-150cm)	Calf (≤120 cm)	Grand Total
	T	Mk	Total	Total	(>240 cm)	(211-240 cm)	Total	T	Mk	Total	Total	(211-240 cm)	(151-210 cm)	Total	Total	Total	
A																	
Phulbani Division	0	0	0	4	0	0	0	01	0	0	0	0	0	0	01	02	08
Total for ER																	

P.A = Protected Area (Sanctuary / National Park) A.B.C = Names of Divisions / Pas: T= Tusker: Mk = Makna (Tusk less Bull)
US = Sex Unknown

(Source: DFO, Phulbani)

Over the years, wanton destruction of the wild life habitat by reckless cutting of trees and use of forest land for other purpose and their ruthless killing had threatened the ecological balance of the locality. Main causes leading to habitat destruction and loss of wild life are:-

1) Pernicious practice of shifting cultivation for agriculture purpose including turmeric cultivation and increasing incidences of encroachment.
2) Over exploitation of the adjoining forest blocks for fuel wood, timber, fodder and other NTFP beyond their carrying capacity.
3) Poaching for sport, meat and trade.
4) Inadequacy of forest staff to combat poaching in proper manner and enforcement of laws in force to prevent wild life crimes.
5) Lack of awareness amongst the people.
6) Less focus on management and improvement of wild life habitat.
7) Wild life habitat destruction and fragmentation of forest cover resulting in progressive decline in their population.
8) Uncontrolled grazing and intentional forest fire.

9.19Sivicultural system

Not applicable to this Working circle.

9.20 Rotation period

Not applicable to this Working circle.

9.21 Harvestable diameters

Not applicable to this Working circle.

9.22 Reducing factors and reduced areas

Not applicable to this Working circle.

9.23 Felling cycle

Not applicable to this Working circle.

9.24 Division into periods and allotment to periodic blocks (PB)

Not applicable to this Working circle.

9.25 Calculation of the yield

Not applicable to this Working circle.

9.26 Table of felling

- Not applicable to this Working circle.

9.27 method of executing the felling

- Not applicable to this Working circle.

9.28Subsidiarysilvicultural operations cleaning and thinning

- Not applicable to this Working circle.

9.29 Regeneration

- Not applicable to this Working circle.

9.30 Associated regulations and measures

- Not applicable to this Working circle.

CHAPTER-10

BIODIVERSITY CONSERVATION & DEVELOPMENT IN PHULBANI DIVISION

10.1 The Biological Diversity Act 2002 was promulgated on 5th February 2003 in order to conserve biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected therewith or incidental thereto**.**

10.2 In exercise of powers conferred by subsection (1) & (2) of Section 63 of the Biological Diversity Act 2002, the State Govt has framed Odisha Biological Diversity Rules 2012 vide Notification No. 10F(TR) 52/2012-22461/F& E Dated. 03.12.2012 of the Govt.OfOdisha. Biological Diversity Rules 2012 speaks.

10.3 Establishment & Management of Biodiversity heritage Site

(1) The Board shall in consultation with the local bodies and other key stakeholders take necessar6y steps to facilitate setting up of areas of significant biodiversity values as heritage sites.

(2) The Board shall frame guidelines on the selection, management and other aspects of Biodiversity Heritage sites.

Phulbani Forest Division is as rich store house of Biodiversity. Different types of flora and fauna have coexistence in different forests of this Division. Basing on the variety of Biodiversity Odisha Biodiversity Board has declared "Mandasaru"As Biodiversity Heritage site. This site is a unique gorge ecosystem in the eastern part of Kandhamal district named after two narrow rocks surrounded by dense tropical moist deciduous forests. Considered the "Silent valley of Odisha due to its frequent weather changes from limpid clean sky to foggy and abrupt rain, Mandasaru is one of the rich biodiversity site of Odisha. This site is located in Gumamaha G.P of Raikia Block of Raikia Range of this Division. It is 12 KM away from Raikia Block headquarters.

10.4 History of conservation initiatives on Mandasaru

Mandasaru is a rare example of community led biodiversity conservation where the local villagers after realizing that their forest had been severely denuded by timber smuggling and other negative biotic interference took up initiatives to protect the life in Gorge. Their belief that anyone cutting trees from the gorge will die from a curse of the local goddess has helped them to nourish their initiative. As per literally meaning

"manda" means rock and "Saru" means thin. Mandasaru- the gorge is named following two big rocks that abut suddenly from the gorge which isbroad at the base and tapers towards the top. To keep the villagers safe from the curse of Mandasaru, both the rocks are worshiped by villagers in the month of March-April (Chaitra) where one lithophytic medicinal fern, *Drynaria quercifolia* (locally called Patharagirdini) is paid homage.

10.5 Ecological features of gorge.

The gorge is located between Latitude & Longitude N19 .98351 and E84.25126 to N 19.97385 & E 84.26356 covering a total area of 5.28 sq km(528 ha.) Most areas of the gorge fall under Lendrikia Reserve Forest which is surrounded by Karada PRF in the south and Sikabadi PRF in the north. The gorge is around 250 m deep from the main land later which is 750 mt.above MSL. There are 22 hills positioned one after another at a stretch like a ladder inside the gorge stretching around 15 km. Each hill has a unique name as per its character and "Saashimaha Manda"(1000 mt form MSL) is the tallest. The gorge is also a repository of six waterfalls- Beingumaha, Pirisibrunda, Kaadigdapa, Keragaadu comes down the gorge and joins to form a perennial stream at Naputimaha which flows through the gorge to the nearest RFs finally meeting one of the tributaries of Rusikulya.

10.6 Vegetation in Mandasaru Gorge

The vegetation of the gorge can be classified under three categories.

10.6.1 Tropical semi evergreen forests :-These types of forests mostly confined to the lower riparian and permanently moist valleys in the gorge characterised by many climbers, epiphytes, orchids, ferms and fern allies and liverworts and mosses. *Mangifera indica, Diospyros malabarica, Neolitsea cassia, Litse alaeta, Polyalthia simiarum, Celtis tetrandra, Ficussp, Michelia champaca, Dimorphocalyx glabellus and Caralliabrachiata* are the prominent tree species.

10.6.2 Tropical moist Deciduous forests

These forest are characterized by Sal (*Shorea robusta)* and its associates like *Terminali asp, Ptrecarpus marsupium, Xyliaxylocarpa, Haldina cordifolia, Bridelia retusa, Dillenia pentagyna, Lagerstoemia parviflora, Bombax ceiba, Grewia tiliaefolia, Careya arborea, Kydia calycina, Mitagyna parviflora.*

10.6.3 Tropical Dry Deciduous forests

The top plateaus of the gorge are dominated by deciduous species. Besides Sal, Terminalia species. *Cochlospermum religiosum, Sterculia urens, Oroxylum indicum, Protium serratum, Dalbergia spp, Cleistanthus collinus, Hymenodictylon orixense, Firmiana colorata, Semecarpus anacardium, Cassia fistula, Buchanania lanzan, Lannea coromandelica, Albizia spp, Phyllanthus emblica, Chloroxylon swietenia, Dendrocalamus strictus* are the associated species.

10.7 Plant Diversity

The flora of the gorge is represented with 831 species of higher plants. This includes 52 species of grasses, 36 species of orchids, 59 species of pteridophytes and one species of gymnosperm. Lower group of plants includes 70 species of bryophytes and 72 species of lichens. In addition to this 130 species of fungi including 34 species of edible mushroom are available in this biodiversity heritage site. The higher plants include 772 species of angiosperms under 112 families and 501 genera. This include 359 species of herbs, 129 species of shrubs, 175 species of trees, 109 species of climbers. Out of the above, 30 species are epiphytes, 10 are lithophytes, 12 species are parasites and 52 species are grasses.

Some important species of each category is mentioned below:-

10.7.1 Shrubs:-

Resantia indica, Milisua velutina, Ochna obtusata, Ixora brachiata, Grewia serrulata, Canthium parviflorum, Leea indica, Polyalthia cerassoides, Helicteres isora, Ziziphus rugosa etc.

10.7.2 Herbs:

Dipteraanthus prostratus, Begonia picta, Typhonium trilobatus, Kalanchoe pinnata, Strobilanthus scaber, Amorphophallus bulbifer.

10.7.3 Climbers

Ipomoea obscura, Stephania japonia, Aristolochia indica, Rhaphidophora decursiva, Pergularia daemia, Hemidesmus indicus, Sarcostemma acidum, Abrus precatorius, Combretum albidum,Argeyria daltonii, Vitis trifolia.

10.7.4 Orchids

Vanda tesellata, Micropora pallida, Dendrobium transprens, Luisia zeylanica, Cymbidium bicolor, Aerides odorata, Luisia trichorhizia, Acampe rigida, Staurochilus ramosus, Aerides multiflora.

10.7.5 Pteridophytes

Ampeliopteris perfoliata, Lycopodium cernum, Adiantum philppense, Pteris biaurita, Christella parasitica, Adiantum lunulatum, Cyclosorus parasiticus, Nephrolepis cordifolia, Dicranopteris linearis, Lygodium flexuosum.

10.8 Threatened& Endemic plant

Endemism pertains to the restricted distribution of the flora and fauna in a particular geographic location over a certain period of time. The Mandasaru gorge and its surrounding areas are critical habitat for 23 species of threatened plants and 2 species of endemic plants. This includes one lithophytic orchid *Cirrhopetalum panigrahianum* and one gymnosperm, *Cycas orixensis. Saraca asoca, Balanophora polyandra, Polyalthia simiarum, Dimorphocalyx gralbellus, Stemona tuberosa, Pueraria tuberosa, Lasiococca comberi*are some of the threatened plants of the gorge.

10.9 Animal Diversity

Mandasaru gorge harbours terrestrial, aquatic arboreal and cave dwelling fauna comprising 30 species of mammals, 150 species of birds, 30 species of reptiles, 14 species of amphibians and 12 species of fishes. The invertebrate faunal diversity is equally varies as compared to vertebrates. The gorge is home for 148 species of butterflies, 2 species of crabs, 20 identified species of spiders, 20 species of odonates and 4 species of beetles.

10.9.1 Mammals

Among terrestrial mammals, Grey wolf, Barking Deer, Mouse deer, Sambar, Wild Boar, Porcupine and Leopard the top predator are distributed in the landscape. Endangered mammals like royal bengal tiger and wild dogs earlier reports from this area are now considered locally extinct due to rampant poaching and habitat destruction in past. The gorge and its surroundings environ like the agricultural fields, mango orchards and bushes offer congenial habitat for jackals and foxes which are the common nocturnal visitors to the ecotourism complex.

Numerous caves and diversified fruit bearing trees offer amicable habitat for the lone aerial mammals- the bats seven species of Volant mammals are dwelling here which include Indian flying fox, Asiatic Greater Yellow House Bat, Greater Short nosed Fruit bat, Indian pygmy bat.

Close canopies and fruit bearing trees of the gorge created conducive environment for the arboreal mammals like Giant squirrels, monkeys and the tree shrew. Availability of jackfruit and mango trees in plenty inside the gorge and its vicinity offers feeding ground for these arboreal mammals.

10.9.2 Birds

The avifaunal diversity of the gorge is also fairly interesting. Majority of birds found in and around the gorge are resident and only few migratory one can be noticed here due to thick vegetation cover. In total 150 species of birds are recorded in the gorge and for familiar understanding they can be categorized into 7 categories- Frugivorous, insectivorous, Nectar feeders, Granivorous, Nocturnal, Predatory and piscivorous. Most of the birds observed in and around the gorge are insectivorous, frugivorous and granivorus. Availability of several species of figs, berries, drupes etc inside the gorge offers suitable habitat and ample feeding ground for frugivorous birds. Orange breasted green pigeon, Hornbills, Imperial Hill pegion, Barbets, Parakeets and Bulbuls are frugivorous. Nectar feeding birds contribute towards pollination of several indigenous plant species. Their presence boosts ecosystem productivity. Sun birds and flower peckers are the nectar feeders in Mandasaru.

Insectivorous birds consume harmful insects which could be vectors of diseases, thus play a key role in regulating the ecosystem health, Mandasaru is a heaven for insectivorous birds like fly catchers such as Grey headed canary flycatcher, Asian paradise flycatcher, Verditer flycatcher, Asia brown fly catcher and Taiga flycatchers.

Nocturnal birds are the most curious and cryptic among the avian fauna due to their behaviour and appearance. Owls, owlets, nightjars and night herons are the nocturnal birds found in india and all of them are residents or visitors of the gorge.

Due to availability of cultivated lands of local communities in and around gorge the granivorous birds population is also adequate in Mandasaru. Emerald Dove, Gray

Francolins, Ashy crowned sparrow lark and common quail are some of the granivorous birds of this locality.

Predatory birds guzzled crop pests like mice and rats from the nearest agricultural field in assisting biological best control. Among predatory birds, Black Baza, Black Eagle, Crested serpent Eagle, Short toed snake eagle etc are most enigmatic predatory birds spotted in and around the gorge.

10.9.3 Reptiles

Mandasaru hosts snakes, Lizards fresh water turtles and tortoises. Snakes like green keelback, white binocellate cobra, Common krait, Russel's viper and Bamboo pit vipers, rat snakes, ornate flying snakes vine snakes are found in the gorge areas. Plenty of rock crevices, caves, tree holes, snags and forest undergrowth generates amicable habitat for several species skinks and geckoes inside gorge.

10.9.4 Amphibians

The Semi evergreen forests and the stream beds of Mandasaru gorge provide an ideal habitat for frogs and toads. Monsoon and post winter months are best time to observe amphibians in this area. While Indian bull frog, India skittering frog and Cricket frogs are aquatic, toads, burrowing frogs and ornate frogs are terrestrial or fossorial.

10.10 BIODOVERSITY OF GORGE SUSTAINING LIVELIHOODS OF LOCAL PEOPLE

Mandasaru Gorge as an ecosystem provides wide Range of benefits to the local communities residing in and around its vicinity. The direct benefits include fruits, tubers, mushroom, beverages and medicinal plants, some of which are directly consumed by the communities and some are having commercial values which generate income for their sustenance.

The biodiversity of gorge contributes the following resources to the social lives of the communities.

10.10.1 Tubers

The gorge is a storehouse for genetic resources of wild tuberous plants which constitute a part of the diet of the communities. A total of 7 wild edible tubers- Bada

Nappa Kanda(*Xerocomus hypoxanthus*, Chhotanappa Kanda(*Dioscorea bellophylla*), Similikanda (*Dioscorea puber*), Bhata Kanda(*Dioscorea oppositifolia*) etc are consumed by the local inhabitants.

10.10.2 Fruits& Vegetables

40 species of wild edible fruits and 10 species of vegetables are collected & consumed by the local inhabitants of the gorge. Kendu, Chara, Bhalia, Jamun, Ambada, different tupes of bet, Mango, Jackfruit used as food for the local people, JangaliKankada,BanaKalara, leaves of Barada are use as vegetable by locals.

10.10.3 Edible Mushrooms

The gorge is one of the ideal habitats for the growth mushrooms as the locals used to collect around 20 species of wild edible mushrooms that constitute one of the preferred seasonal diet. *Tuber rufum*(Putukuli), *Russula breviceps* (RangaChhatu), *Termitomyces heimii* (Shrabana Chhatu), *Lentinus tuberregium* (Amba Chhatu), *Termitomyces microcarpus* (Hunka chhatu) are most favoured in the locality.

10.10.4 Beverages

The sap and juice extracted from wild trees have not only quenched the thirst of the local but also provides social and cultural offerings to the communities during festivals & rituals. The gorge is one of the fitting habitats of *Caryotaurens* (salapa)- the most preferred tree among the communities whose sap is extracted for consumption over 600 matured trees were observed in the gorge within and area of 528 ha. Apart from Salapa, Mahua, Khajuri trees in the gorge fulfil the beverage requirement of local people.

10.10.5 Medicinal plants

The rich plant diversity of the gorge offers enough scope for the traditional knowledge holders to collect and standardize several species of plants for primary health care. The leaves bark, root and whole plants have traditionally been collected to cure many fatal diseases. The widely available and used medicinal plants are *Terminalia chebula* (Harida), *Terminalia bellirica*(Bahada), *Emblica officinalis*(Amla), *Rauwolfia serpetina*(Patalgaruda), *Asparagus recemosus*(Satabari), *Cissus quadrangularis*(Hadabhanga), *Nyctanthes arbortristis* (Gangasiuli), *Drybaria quercifolia*(Pathargirdhini), *Alstonia scholaris*(Chatian). As per the knowledge holders, the use of bark of *Ailanthus excels*(Mahala) harvested from the gorge is usedto cure

sickle cell anaemia. This is only place in odisha where the wild plants of *Drynaria quercifoloa*(Pathargirdhini) is preserved by the communities. Traditional healers of 13 villages visit the gorge to collect this medicinal plant in a sustainable manner to treat several diseases.

10.11 As per Rule 21 of Odisha Biological Diversity Rules 2012, Biodiversity Management Committee is to be constituted at District, Panchayat Samiti and Gram Panchayat level as well as NAC, Municipality and Municipal corporation level. The committee shall have seven persons nominated by the local body in which adequate representation of women, SC, ST people will be there. The local body shall nominate six special invitees from any of the departments such as forest, agriculture, Horticulture, Health, Fisheries and Animal Resources Development Department.

10.12 The key mandate of the committee shall be to ensure conservation sustainable utilization and equitable sharing of benefits from the biodiversity. The committee shall facilitate preparation of people's Biodiversity Registers. The register shall contain comprehensive information on availability and knowledge of local biological resources, their medicinal values or any other use or any other traditional knowledge associated with them. In Kandhamal District there are 171 Gram Panchayat out of which 92 GP are coming within the jurisdiction of Phulbani Division and balance 79 GP are coming within the jurisdiction of Baliguda Division. Phulbani Municipality and G.Udayagiri NAC are also coming under the jurisdiction of Phulbani Forest Division. BMC has been formed in all GP, Blocks, Municipality and NAC. The District level BMC has been formedas per the guideline of Odisha Biodiversity Rules 2012.

CHAPTER-11

GENERAL FINANCIAL FORECAST & FINANCIAL PLAN OF OPERATION

11.1 The financial implication for implementation of Working Plan is based on the cost norm approved by the PCCF, Odisha, Bhubaneswar from time to time. However basing on the present cost norm the financial forecast is furnished in the table below.

Table 11.0 FINANCIAL FORECAST OF EXPENDITURE OF PHULBANI FOREST DIVISION FOR THE WORKING PLAN PERIOD 2021-22 TO 2030-31

Sl. No	Head of Expenditure	Amount in lakhs
1	Establishment cost	8019.73
2	Maintenance of Roads	140
3	Maintenance of Buildings	190
4	Selection Working Circle	839.91
5	Plantation (overlapping) Working Circle	44.676
6	Rehabilitation Working Circle	11661.144
7	Protection Working Circle	1600
8	Wildlife (Overlapping) Working Circle	285.38
9	Joint Forest Management Working Circle	410.79
10	Bamboo (Overlapping) Working Circle	1656.88
11	N.T.F.P. (Overlapping) Working Circle	0
12	Forest Consolidation	100
13	Boundary Maintenance 1000 KM @ 10 MD/KM	30
14	Forest Fire Management	235.5
TOTAL		**25214.01**

	FINANCIAL FORECAST OF REVENUE FOR THE PERIOD FROM 2021-22 TO 2030-31	**260 .0 Lakh**

Table No. 11.1 FINANCIAL FORECAST OF EXPENDITURE OF PHULBANI FOREST DIVISION FOR NEXT 10 YEARS PLAN PERIOD(Rs.in LAKH)											
Scheme	**2021-22**	**2022-23**	**2023-24**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**2029-30**	**2030-31**	**Total**
Salary & others through Treasury	507.61	558.37	616.67	678.33	746.16	820.78	902.85	993.14	1092.45	1103.37	**8019.73**
2059-Public Works	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	**100.00**
2406-F&Wl-Administrative Expenses	35.5	40.0	44.0	48.0	52.0	63.0	69.0	75.0	82.0	90.0	**598.45**
2406-F&Wl-Programme Expenses	60.0	66.0	70.0	77.0	77.0	85.0	93.0	102.0	112.0	120.0	**862.00**
2406-F&Wl-Programme Expenses-CSP	25.0	28.0	30.0	33.0	36.0	40.0	44.0	48.0	52.0	63.0	**399.00**
IGC State Plan	63.80	44.64	39.15	34.65	34.54	34.54	35.00	35.00	38.50	38.50	**398.32**
Green India Mission	155.20	47.06	28.76	12.51	0.00	0.00	0.00	0.00	0.00	0.00	**243.53**
CAMPA	1187.57	1076.30	656.05	656.09	648.71	673.54	693.00	721.48	799.66	762.97	**7875.365**
AJY(CAMPA)	420.39	123.30	63.96	16.80	0.00	0.00	0.00	0.00	0.00	0.00	**624.45**
NAP	55.17	20.73	27.83	31.17	12.07	7.94	19.94	11.46	10.08	30.39	**226.776**
MGNREGS	1059.18	591.32	443.48	413.32	518.98	608.92	390.83	628.03	620.92	591.41	**5866.39**
Total	**3579.37**	**2605.72**	**2029.90**	**2010.87**	**2135.46**	**2343.72**	**2257.62**	**2624.11**	**2817.61**	**2809.64**	**25214.01**

Table No. 11.2 FINANCIAL FORECAST OF REVENUE OF PHULBANI FOREST DIVISION FOR NEXT 10 YEARS PLAN PERIOD(Rs.in LAKH)											
Scheme	**2021-22**	**2022-23**	**2023-24**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**2029-30**	**2030-31**	Total
0406-F&WL-Revenue											
101-Sale of Timber & Other Forest Produce	15 .0	15	10	10	10	10	10	10	10	10	95
800-Other Receipts	15.0	15	15	15	15	15	15	15	15	15	150.0
Total	**30.0**	**30.0**	**25.0**	**25.0**	**25.0**	**25.0**	**25.0**	**25.0**	**25.0**	**25.0**	260.0

CHAPTER-12

MISCELLANEOUS REGULATION

12.1 PETTY FELLING & EXTRACTION

Petty felling and extraction for research and training needs should be allowed. 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.

12.1. 1. Irregular Exploitation

Generally any irregular felling should not be permitted. However, in emergencies or extraordinary circumstance (i.e natural calamities like fires, floods,cyclones,urgent departmental requirements and socio religious functions), requirement may be met from the current year selection coupes. Only such trees which are silviculturally available for removal and whose removal will not leave a permanent gap in canopy shall be marked for felling. Such markings shall be carried out by the concerned Range Officer and checked by at least the ACF. Felling shall be undertaken departmentally and timber shall be disposed off in the manner prescribed for the purpose. All such felling shall be recorded in the concerned compartment history files and the coupe register.

12.2 Rights & Concessions.

12.2.1 The VSS formed in different Ranges will have the right to obtain Minor Forest Produce from the assigned forest and they will be entitled to 50% of Sale value of the timber obtained from their assigned forest after final felling. The right of way and other rights wherever allowed to the villagers as per the RF notification and while allowing community Forest Rights will continue. All these rights & concession will be governed by the JFM Resolution, 2011 (Amended in 2015) and provision of community Forest Rights under ST & OTFD (RFR) Act, 2006.

12.2.2 The National Forest Policy, 1988 envisages certain prescribed stipulations for enjoyment and exercise of rights & concessions by the tenants for their legitimate bonafide use. It should be limited to the quantum of forest wealth, especially timber, bamboos, fuel wood & NTFPs available in a particular forest block, without jeopardising general wellbeing and health of forests & should be commensurate with

carrying capacity of the forests. The process of exploitation of forest products obtained in due exercise of right should not be detrimental to the forest wealth especially young natural regeneration & the plantations raised by departmental agency.

12.2.3 The Kondhs are the primitive tribe of Kandhamal district. In most of the forest blocks, the rights and concessions have been permitted to the Kondhs as well as other tribals& non-tribals who are the bonafide residents of Kandhamal district. During the British regime, the rights of the tenants have been recorded as per the standing circular order no. 338 dt.10-10-1940 of the then Agent & Deputy Commissioner, kandhamal.

12.2.4 Admitted rights provide all concessions to the Kondhs of this tract for free collection of M.F.P as per availability of quantity of materials in a forest block for their bonafide domestic use. Similarly, dry fuel wood can be procured free of cost @ 4 head loads per individual or 8 head loads per family per month in different forest blocks as specified in the notification. Concessions allowed for the collection of bamboos for repairing, thatching and construction of their houses are stipulated as 30 nos, 50 nos& 100 nos in different blocks. This is specified in different quantities in different forest blocks. Similar concession of timber and poles are allowed for domestic use only for their plough as well as other agricultural implements. This concession varies in different quantities for different forest blocks. Collection as well as removal of dry fuel wood, bamboo poles and timber is allowed free of cost.

12.2.5 In different forest blocks perennial rivers &nalas pass through the forests. Rights and concessions are allowed free of any charge for fishing in those water bodies inside RF/PRF for domestic purpose. Grazing restrictions have been imposed for goats & pigs in all forest blocks. Only cattle are allowed in summer. But grazing is restricted in the RF/PRF blocks especially in regeneration and plantation areas for five years or as specified in the notification.

12.2.6 Restrictions are imposed for hunting & shooting. But rights have been allowed for use of arms for self-defence and protection of the domestic animals which will not violate the restrictions imposed under any law in force. All the rights so allowed will pass on to their successors.

12.2.7 For the above rights so allowed, keeping an eye on the progressive increase in the population of the Kondhs, it needs certain restrictions to protect the available

forest growth; providing the allowable concessions as mentioned in the notifications. Due to such concessions and consequent rise in the population of the Kondhs, the forests are depleting day by day due to pressure of the local tribes for forest materials. To safeguard the interest of the state, exercise of rights and concessions by the tenants should be implemented as per the guidelines of the National Forest Policy 1988.

CHAPETER-13

SCIENCE AND RESEARCH

13.1 Kalinga Research Garden

Kalinga Research Garden, one of the oldest Research Garden of the Forest Department, was established in the year 1958 over an area of 37 Ha. In Kalinga block of G.Udayagiri Range of Phulbani Forest Division. The area is situated at 701 meters above mean sea level between Latitude 20^0 09′ 52″N and Longitude 84^0 25′ 05″ E.

13.2 Research Activities Undertaken:

To meet the demand of pulp wood and fuel wood; Government of India had sponsored for taking up experiments on introduction of fast-growing exotic species since 1960. The exotics such as different species of Tropical pines, Eucalyptus were planted to study their growth behavior and adaptability to this agro-climatic zone. Out of ten different species of Tropical pines and thirty different species of Eucalyptus, the following species like *pinuskesiya, Pinuscarribaea, Pinusoocarpa, Eucalyptus hybrid, Eucalyptus saligna and Eucalyptus citriodora* have been found suitable for the locality.

Besides the above, some other exotics such as *Callitrisglauca, C.Intertropica, Araucaria sps, Agathisrobusta, Simarubaglauca*have been tried successfully.

A large number of indigenous species with origin of different states of the country and also important species of Odisha were planted to study the growth behavior. Out of these, the following species are promising in this area.

Swetenia mahogany, Swteniamacrophylla, Chukrasiatabularis, Cinamomumcamphora, Mesuaferrea, Xyliaxylocarpa, Dalbergialatifolia, Albiziaprocera, Dendrocalamusgiganteous, Bambusanutans and a number of medicinal herbs.

13.3 Trial of intercropping of economically important species:

Experimental plantations were raised for growing coffee(Cofia Arabica), Black pepper(Piper nigrum) Dalchin(Cinamomumzeylanicum) under the existing forest trees. The planting technique of these cash crops has been standardized.

13.4Present status:

- Though the planting technique of Tropical pines has been standardized but the species could not be multiplied due to environmental point of view. However, the pine plantation can serve the purpose of seed production Area.
- This Research Garden with the planted exotics, important indigenous species and the natural flora can serve as an important gene bank to conserve the bio-diversity.
- This Research Garden also serves as a tourist centre due to its climatic condition and aesthetic value.

The Kalinga Research Range under Silviculture Division, Bhubaneswar is situated in Kandhamal District. The main purpose of the Range is to carry out the Forest Research Activities.

13.5 Previous Research Activities:

There are 43 nos. of experimental plots. Research have been carried out on planting of different species of different area origin. The details of the experimental plots are given below.

Sl No.	Diff. Exp. Plot	Year of Formation	Area in Ha.	Species	Origin	Spacing adopted to Mtr.	Degign	No.of Plants	Survival %	Present status
1	2	3	4	5	6	7	8	9	10	11
1	Field trial	1968	0.08	Xyliaxylocarpa	Kalinga	2.5 x 2.5	Row	128	25	Good
2	Field trial	1969	0.20	Pinuscaribaca	Bahama	2.5 x 2.5	Row	279	42	Good
3	Field trial	1972	0.004	Pinusmontana	Gautemala	2.5 x 2.5	Row	24	10	Almost damaged
4	Field trial	1977	0.36	Pinuskesiya	Assam	2.5 x 2.5	Block	566	50	Good
5	Field trial	1978	0.05	Callitrisintertropica	Kalinga	2.5 x 2.5	Row	84	70	Good
6	Field trial	1978	0.15	Pinuskesiya	FRI467	2.5 x 2.5	Row	250	47	Good
7	Field trial	1978	0.47	Pinuskesiya	FRI502	2.5 x 2.5	Row	271	28	Good
8	Field trial	1978	0.12	Pinuskesiya	Assam	2.5 x 2.5	Row	188	47	Good
9	Field trial	1978	0.016	Pinuscaribaca	F.R.I 649	2.5 x 2.5	Row	25	28	Good
10	Field trial	1978	0.114	Pinuscaribaca	F.R.I 487	2.5 x 2.5	Row	180	42	Good
11	Field trial	1978	0.046	Pinuscaribaca	F.R.I 484	2.5 x 2.5	Row	75	46	Good
12	Field trial	1979	0.025	Pinuscaribaca	F.R.I 612	2.5 x 2.5	Row	40	42	Good
13	Field trial	1979	0.40	Pinuscaribaca	F.R.I 649	3 x3	Row	25	45	Good
14	Field trial	1979	0.28	Pinuscaribaca	F.R.I 607	3 x 3	Row	32	47	Good
15	Field trial	1979	0.28	Pinuskesiya	FRI502	2.5 x 2.5	Row	25	48	Good
16	Field trial	1979	1.6	Pinusoocarpa	FRI604	2.5 x 2.5	Row	2590	38	Good
17	Field trial	1979	0.11	Pinusoocarpa	FRI624	2.5 x 2.5	Row	162	38	Good
18	Field trial	1979	0.12	Pinusoocarpa	FRI625	2.5 x 2.5	Row	192	33	Good
19	Field trial	1979	1.6	Pinusoocarpa	FRI650	2.5 x 2.5	Row	2590	38	Good
20	Field trial	1979	0.4	Pinusoocarpa	FRI608	2.5 x 2.5	Row	650	47	Good
21	Field trial	1980	0.06	Pinusoocarpa	FRI609	2.5 x 2.5	Row	650	29	Good
22	Field trial	1980	0.48	Pinuscaribaca	F.R.I 649	2.5 x 2.5	Row	75	28	Good
23	Field trial	1980	0.02	Pinuskesiya	Assam	3 x 3	Row	25	28	Good
24	Field trial	1982	0.7	Swieteniamacrophylla	Kalinga	2.5 x 2.5	Row	50	25	Good
25	Field trial	1983	0.02	Dendrocalamusgiganteus	Kalinga	5 x 5	Row	11	50	Good
26	Field trial	1983	0.25	Samaniasaman	Puri	2.5 x 2.5	Row	350	10	Damaged
27	Field trial	1984	0.05	Albiziastipulata	Kalinga	2.5x2.5	Row	80	20	Good
28	Field trial	1986	0.18	Callitrisglauca	Kanbagedi	2.5x2.5	Row	300	70	Good

29	Field trial	1986	0.06	Simaroubaglauca	Kanbagedi	2.5x2.5	Row	100	50	Good
30	Field trial	1987	0.05	Simaroubaglauca	Kanbagedi	1x1	Row	540	50	Good
31	Field trial	1987	0.03	Sesbania Formosa	Cuttack	1x1	Row	360	20	Good
32	Field trial	1987	12.0	Coffee Arabica	Coffee board	6x6	Row	58000	30	Good
33	Field trial	1989	0.03	Syncarpiahillii	Australia	2.5x2.5	Row	49	20	Good
34	Field trial	1990	0.031	Cordiaalliodora	San Francisco	2.5x2.5	Row	148	20	Good
35	Field trial	1993	0.4	Cinnamomumzeylanicum	Kalinga	2x2	Row	861	30	Good
36	Field trial	1995	0.25	Cinnamomumaeylanicum	Kalinga	2.5x2.5	Row	485	70	Good
37	Field trial	1995	0.05	Swieteniamacrophylla	Kalinga	2.5x2.5	Row	50	20	Good
38	Inter planting	2003	1.0	Piper nigrum	Kalinga	2.5x2.5	Row	1600	50	Good
39	Inter planting	2003	2.2	Cinnamomumzeylanicum	Kalinga	2.5x2.5	Row	3600	30	Good
40	Inter planting	2003	0.75	Coffee Arabica	Kalinga	2.5x2.5	Row	1200	20	Good
41	Seedling seed Orchard	2003	0.25	Lemon grass	Kalinga	1x1	Row	970	70	Good
42	Seedling seed Orchard	2004	0.5	Mesuaferrea	Kalinga	5x5	Row	200	70	Good
43	Seedling seed Orchard	2006	0.25	Embeliaribes	Kalinga	5x5	Row	100	70	Good

13.6 Research Activities of 2018-19

1. Trial of Hill broom 1.0 Ha
2. Maintenance of Research Stations
3. Collection of Black pepper and Cinnamon.

13.7 Research activities at Mandasaru:

The research work at Mandasaru Valley was taken up by the scientist of Odisha Bio-diversity Board. The flora of the gorge is represented with 831 species of higher plants. This includes 52 species of grasses, 36 species of orchids, 59 species of pteridophytes and one species of gymnosperm. Lower group of plants includes 70 species of bryophytes and 72 species of lichens. In addition to this 130 species of fungi including 34 species of edible mushroom are available in this biodiversity heritage site. The higher plants include 772 species of angiosperms under 112 families and 501 genera. This include 359 species of herbs, 129 species of shrubs, 175 species of trees, 109 species of climbers. Out of the above, 30 species are epiphytes, 10 are lithophytes, 12 species are parasites and 52 species are grasses.

Mandasaru gorge harbours terrestrial, aquatic arboreal and cave dwelling fauna comprising 30 species of mammals, 150 species of birds, 30 species of reptiles, 14 species of amphibians and 12 species of fishes. The invertebrate faunal diversity is equally varies as compared to vertebrates. The gorge is home for 148 species of butterflies, 2 species of crabs, 20 identified species of spiders, 20 species of odonates and 4 species of beetles.

Lasiococcca comberi (family Euphorbiaceae)- an endangered tree, Cycas sphaerica(family Cycadaceae), an endemic gymnosperm of Eastern Ghat region have been introduced at Mandasaru by scientist of Odisha Biodoversity Board.

13.8 Preservation Plots

Sufficient number of preservation plots should be created and maintained for preserving representative patches of existing forest as far as possible in their present form and preserving such selected plots from all forms of disturbances so as to allow progression towards climax form and to study and correlate vegetation change matrix with the impact of climate variation.

13.9 Sample Plot

Similar to preservation plots, establishment of representative sample plots of all ages, all species in different site qualities along with revival of previous sample plots for growth studies and a set of separate sample plots for NTFP should be planned for more focused research aspects in this chapter. Even a time schedule for data collection should be provided so that sustainable management of forests can be prescribed on the basis of scientific analysis.

13.10 Regeneration Plot

Regeneration plots may be established to study the regeneration status of important species. Data should be collected on population dynamics of seedlings, saplings and young trees. By marking them and monitoring their status periodically, finding out the conditions in which a species regenerates best and creating those conditions can make the working plan effective with regards to forest sustainability. While monitoring the marked seedlings, causes of damage, effect of canopy gap, growth parameters, role of mycorrhizae and litter cover management should be considered.

13.11 NTFP Plot

Permanent plots of suitable sizes may be laid for development of safe harvesting protocol and the optimum limit of the harvest should be standardized for assured regeneration of the species. The following harvesting regimes may be experimented to work out safe harvesting limit:

100% harvest of the marketable parts (by removing the whole number)

75% harvest of the marketable parts (by leaving 25% of the whole number)

50% harvest of the marketable parts (by leaving 50% of the whole number)

25% harvest of the marketable parts (by leaving 75% of the whole number)

The plots should be laid in triplicate. The plots so treated shall be visited after a gap of one year to enumerate the number of new recruits and the effect of above removal shall be calculated using standard mathematical formulae.

13.12 Other research and experimental plot

Status of seed orchards, clonal seed orchards and improved nurseries to generate quality seeds/ seedlings and planting stock; other experimental plots for growing stock development data and silvicultural system, etc should be reflected in the compartment history file or respective registers.

CHAPTER-14

SUMMARY OF PRESCRIPTION

14.0 General Constitution:

The abstract of different facts, figures and prescriptions under different chapters of Part-II i.e. different Working Circles are given in this chapter to be used as a quick reference to all chapters.

Total Plan Area: 145746.8 Ha.

BASIS OF PROPOSAL

Headings	Particulars of Prescriptions	Para
General Consideration	• Guidelines under NFP 1894, 1952, 1988 and guidelines from Hon'ble Supreme Court of India. • Importance and Preparation of Working Plan based on the strategy of National Working Plan Code-2014. • Linkage between the District Plan and the Working Plans to support Working Plan Prescriptions in respect of land management in the District. • Restructuring of forestry in all dimensions in view of the changed environment due to recent scientific and technological advancements. •	.
General Objects of Management	• More emphasis on conservation of flora and fauna. • Classification of superior and inferior species should be abandoned as because Mother Nature has not created even weed to be removed ruthlessly. • Minimal intervention in the natural character and composition of forest crops to as to maintain sustainability. • The positive link between trees and soil fertility as well as water conservation should be expressly recognized for effective management of forests. • There should be more emphasis on integration of Agriculture, animal husbandry and Forestry for	

	optimum production and minimal land degradation. • To provide adequate and sustained supply of bamboo. • The forestry sector is confronted with several challenges as reflected below: **i)** Change in mind-set. **ii)** Inter-disciplinary partnership approach. **iii)** Defending forests. **iv)** Conflict management. **v)** Re-conversion technologies. **vi)** Forest and wildlife protection. **vii)** A joint sector approach. • Proper demarcation of boundaries of RF/PRF/DPF and eviction of encroachments. • Proper enforcement of Forest conservation Act, 1980. • To systematically discourage the pernicious practice of shifting cultivation through education, peoples participation and providing alternate employment avenues in developmental activities to uplift their socio-economic and literacy condition. • Adequate attention need to be provided for management of NTFPs and monitor its collection, treatment and marketing with proper rate basically in the interest of primary collectors depending on adjoining forests.	
Constitution of Working Circles.	• To achieve the above objective and in consistence with the provisions of National Working Plan code 2014 as well as approval of the Working Plans' Committee the following Working Circles have been constituted: 1. The Selection Working Circle. 2. The Rehabilitation Working Circle. 3. The Plantation (Overlapping) Working Circle. 4. The J.F.M. (Overlapping) Working Circle.	

	5. The Forest Protection (Overlapping) Working Circle. 6. The Bamboo (Overlapping) Working Circle. 7. The N.T.F.P. (Overlapping) Working Circle. 8. The Wildlife (Overlapping) Working Circle.	
Allocation of Area	• Total Area – 145746.8 Ha. • SWC Area- 45943.04 Ha. • RWC Area- 91946.806 Ha. • BWC Area- 99937.682 Ha. • Pr.WC area- 4680.13 Ha. • Pl.WC Area- 3176.8 ha.	
Period of Working	• This Working Plan has been prescribed for a period of 10 years i.e. from **2021-22 to 2030-31**	

SELECTION WORKING CIRCLE

General Constitution	• The forest blocks and compartments with high crop density, good stocking, adequate natural regeneration with mature trees and a good number of trees in approach class and all girth classes are included in this Working Circle. This Working Circle comprises of Moist Peninsular Sal, Moist Mixed Deciduous, Northern Tropical Dry Deciduous and Dry Mixed Deciduous Forests. 14 Reserved Forest blocks and 6 proposed Reserved Forests have been allotted to the Selection Working Circle. The total area allotted to Working Circle is **45943.04** Ha. It constitutes 31.5 % of the total Working Plan area of the Division. All these blocks have dense forest growth, with the average density of 0.4-0.8. The vegetation consists of mainly Sal and associated species like Piasal, AsanDhaura, Kurum, Kasi, Bandhan, Kusum. Bamboo is present in pure brakes as well as in varying densities when found along with other tree species. The forests allotted to this circle are subjected to various biotic pressures like grazing, fires and some illicit felling.	

<table>
<tr><td>Special objective of Management</td><td>• To improve the density of the forest crop as well as stand structure by silvicultural operations.
• To help natural regeneration for establishment of various species.
• To remove mature and silviculturally available trees before they become unsound.
• To remove unsound, diseased and dead trees already existing.
• To carry out subsidiary silvicultural operations, so that suitable situation is created for better growth of existing crop and natural regeneration.</td><td></td></tr>
<tr><td>Blocks and Compartments</td><td>• Total area allotted to this Working Circle is 45943.04Ha. which comprises of 14 RFs and 6 PRFs block.</td><td></td></tr>
<tr><td>Felling Series</td><td>• Total area coming under Selection Working Circle is divided into 10 felling series and each felling series divided into 10 equi productive coupes.</td><td></td></tr>
<tr><td>Analysis and valuation of crop</td><td>• The average density of the crop in this Working Circle is 0.5 though it varies from 0.4 to above 0.8. The entire forest area of the division was stratified on the basis of the Forest type layer prepared from multi-spectral IRS LISS-III data and Forest canopy density developed from panchromatic IRS PAN data. Stand and Stock tables prepared for the whole Block has been prepared by NRSA, Hyderabad.</td><td></td></tr>
<tr><td>Silvicultural System</td><td>• The Selection system will be adopted with emphasis on sustainable production and stability of the eco-system.</td><td></td></tr>
<tr><td>Choice of species</td><td>• All species will be given equal importance for conservation of species bio-diversity and development of forests. The fruit bearing and important NTFP species will be retained.</td><td></td></tr>
<tr><td>Exploitable girth classes</td><td><table><tr><th>Sl. No.</th><th>Local Name</th><th>Botanical Name</th><th>Exploitable girth in cms.</th></tr><tr><td>01</td><td>Sal</td><td>Shorea robusta</td><td>150</td></tr></table></td><td></td></tr>
</table>

	02	Piasal	*Pterocarpus marsupium*	150	
	03	Bandhan	*Ougeinia oojeinensis*	120	
	04	Asan	*Terminalia tomentosa*	140	
	05	Dhaura	*Anogeissus latifolia*	145	
	06	Kurum	*Haldina cordifolia*	150	
	07	Mitkunia	*Mitragyna parviflora*	135	
	08	Mai	*Lannea caromandelica*	135	
	09	Sidha	*Lagerstroemia parviflora*	135	
	10	Kasi	*Bridelia retusa*	135	
Felling cycle	• Felling cycle has been fixed at 10 years which synchronizes with the plan period.				
Calculation of yield	• The yield will be regulated by area with a percentage check on the removal of the exploitable trees as calculated in Smythies' Safe guarding formula. The yield has been calculated by NRSA, Hyderabad.				
Sequence of Felling	• Each felling series divided into 10 annual coupes so that the entire area is covered during plan period. The work will commence from 2021-22 from coupe No.1 and serially go on.				
Method of Execution of felling	• Demarcation of annual coupes: Demarcation will be done during the preceding year winter season by a Forest Officer not below the Rank of Forest Ranger and checked by A.C.F.				
Marking Rules	• The quantum of illicitly felled trees will be reduced from number of trees prescribed to be marked. • All dead, dying, seriously diseased, uprooted and fallen trees shall be marked for felling. • The trees available for exploitation after calculation of yield is Sal 0.4 trees/Ha and non Sal 0.5 trees per Ha. • Marking shall not be done within 50 mtr from road side and either side of Nallaha Bank and key habitat of Wild animals.				

	• There should be no permanent gap in the Canopy. All fruit bearing and oil seeds to be retained.	
Execution of Marking and Felling	• Marking shall be done by a Forest Officer, not below the Rank of Range Officer. Felling should be done through OFDC, Ltd.	
Subsidiary SilviculturalOperation	• Subsidiary Silvicultural Operation shall be done in the year following the main felling. **i)** All left out marked trees to be felled, damaged trees during main felling to be removed. **ii)** All high stumps should be cut flush to ground.	
Control	• Compartment histories, control forms and other records should be maintained for each selection coupe/compartment and felling series in accordance with the Working Plan Code.	
Misc. Regulation	Grazing: The coupes shall be closed for grazing for five years including the year of working. Fire Protection: The coupes shall be protected for 5 years after the completion of main felling. Rights and Concessions: Rights and concessions shall be regulated as per the provisions of the Orissa Forest Act and Rules 1972 made there under and relevant Government policies in force. Sample Plots: At least one 0.1 Ha. Sample plot to be maintained in each annual coupe for monitoring the success of implementation.	
Cost of Working	• Total cost of working was estimated to be Rs.839.91 Lakhs	
Intermediate Revision	• If necessary prescriptions may be reviewed after 5 years jointly by R.C.C.F, Territorial, Berhampur and C.F. Working Plan.	

THE PLANTATION WORKING CIRCLE

General	This working circle includes all those blocks that have permanent	

Constitution	blanks and barren land, which are devoid of root stock and natural regeneration. Also included under this Overlapping Working Circle are the old existing plantations raised during and/or prior to the outgoing plan period. In Phulbani Forest Division the plantation working circle mainly overlaps the Rehabilitation Working Circle and a small portion of Selection Working Circle. Broadly three categories of lands are covered under this Working Circle as detailed below: **1.** The first is that of blank areas which require artificial regeneration/plantation. **2.** The second covers old teak/ misc. plantation areas which need only protection and tending/thinning operations. Both the above categories constitute a total area of **3176.8** Ha.	
General Character of Vegetation	The areas included in this Working Circle have existing plantations raised during the period of previous plans. Large no. of plantations have been raised by different planting agencies in and outside the Working Circle area during the outgoing plan period. Social forestry organization has also raised plantations during the outgoing plan period outside the Working Plan area. These plantations have been subjected to grazing, illicit felling and removal. The areas included in this Working Circle have hardly any forest growth except these blocks where plantation have been raised and survived. The forests are mostly scrubby having mixed miscellaneous species composition and invasion of obnoxious weeds like *Lantana camara* and *Eupatorium odoratum*.	
Special Objectives of Management	The special objectives of the management of this Working Circle are within the scope of general objectives of the management for the entire division. They are reflected below: **1.** Regeneration and eco-development of degraded forests and adjoining areas on watershed basis. **2.** Augmentation of availability of fuel wood, fodder and grasses from the regenerated areas. **3.** To restock the barren and permanent blanks, besides	

	enclosed areas by raising plantation of suitable species through artificial regeneration. **4.** To maintain existing old plantations by appropriate tending operations. **5.** To harvest mature plantations to meet the requirement of both the industry and the local people by following necessary replanting as per the silvicultural requirements. **6.** To concentrate more on such choice of species which have proved successful for their locality. **7.** To implement measures to conserve soil and moisture thereby enhancing the land productivity. **8.** Securing people's participation in planning and regeneration efforts to ensure sustainability and equitable distribution of forest products from the regenerated lands and to promote partnership concept in the management and administration of forests and common property resources. **9.** Promote agro-forestry and development of common property resources. **10.** Promotion of fuel saving devices to encourage efficient use of fuelwood and to reduce the drudgery of rural/tribal women involved in collection of wood as also to improve environment. **11.** To encourage and improve the plantation of NTFP species like bamboo, cane and medicinal plants. **12.** To develop water resources through plantation and water harvesting programme. **13.** Development and extension of improved technologies such as clonal propagation and use of root trainers for raising seedlings, mycorrhizal inoculation etc. **14.** Rehabilitation of special problem lands like saline/alkaline soil, ravines, etc. **15.** Employment generation for the disadvantages sections of society, particularly women, scheduled castes/scheduled tribes and landless rural labourers, inhabiting the forests	

	and adjoining areas.	
Area allotment and planting series	The total area allotted to this Working Circle is**3176.8** Ha. It comprises of plantable area as well as existing plantations.	
Analysis and valuation of the crop	The areas included in this circle are mostly blank patches with no appreciable natural forest crop. Since these areas are mostly devoid of vegetation cover, the detailed analysis and valuation of the crop have not been undertaken. The existing plantations show mixture of species like Teak, Bamboo, Gambhar, Piasal, Sisso, Tamarind and other fruit bearing and fuelwood species. However, pure teak plantations are raised in blocks like Ranipathar, Baraba, Chakapad, Burtang (S) and Gochhapada. Analyzing the species planted in those areas, it is observed that fast growing and fuelwood species are given less importance. The above plantations are thinly populated and the main cause for it is relentless biotic interference. These plantations were also neglected to a great extent after the maintenance work period of 3 years is over. Hence, all the plantations enumerated above require complete protection measures coupled with tending operations to boost their growth.	
Silvicultural System	The silvicultural system to be adopted for raising plantation is filling up of existing gaps by artificial regeneration with appropriate site specific species. Effort should be made to use propagules of superior genetic stock and only quality planting material should be used in all plantations. Proper post planting care with the involvement of local villagers in JFM mode should be taken for the success of plantation programme. For existing plantations, tending operations should be taken up which should comprise of both gap plantation as well as thinning and thinning operations coupled with strict protection from biotic interference. Appropriate soil and moisture conservation measures should also be undertaken at appropriate sites to check accelerated soil erosion, particularly on steep and precipitous slopes.	
Choice of	Before selecting species for afforestation and defining their	

Species	composition per hectare, careful consideration should be given to various aspects of ecosystem management. The emphasis should be focused on the fact that afforestation programme, should not in any way afterwards, disturb or change the existing composition of forests but to protect, maintain and restore the biodiversity of the areas along with the other objectives of afforestation. Due consideration should be given to the productivity, minor forest produce and wildlife utility aspects, if any, of the afforestation programme. The efforts should be made to keep the species and their composition more or less same as they exist in the surrounding forests.	
Plantation Cycle	The plantation cycle of 10 year should be adopted	
Constitution of Plantation Series	The plantable area of 543 Ha. under this Working Circle has been divided into four planting series as detailed below: 1. Raikia planting series – 100 Ha. 2. Karada planting series – 165 Ha. 3. G.Udayagiri planting series – 136 Ha. 4. Bandhagarh planting series – 142 Ha. Total-543 Ha.	
Method Execution of Planting Observations	For all plantation activities, in addition to the following stated guidelines, the guidelines prescribed in the Plantation Manual 1977 and other executive instructions issued from time to time should be meticulously followed. It is needless to emphasize that success of the plantation depends largely on good planting stock and timely planting operations in the field. **Demarcation of Annual Plantation Coupes:** Each planting series has been divided into 10 (ten) annual coupes. The said sequence of planting series is shown in management maps. The annual plantation areas should be demarcated in Winter season (October to December) The plantation site will be properly surveyed and demarcated by December. Plantation journal and other records as envisaged in the Orissa Plantation manual shall be maintained timely and	

	meticulously. The plantation site shall be cleared of undesired weeds, and shall be burnt. No trees or poles will be clear felled. These operations shall be completed by December-January of the year zero.	
Treatment for Existing Plantation	The existingplantations have been taken to constitute the Tending Series (TS). Twosuch series have been made, one exclusively for teak plantations and another for the miscellaneous plantations as per Table no: 3.5 and 3.6 respectively. However, growth in these plantations is not uniform. In some cases, plantations have been adversely affected by biotic interference where as in a few cases; the plantations have been protected. Moreover, the exact age of these plantations is also not made available nor any authenticated records to this effect are provided. In most of the cases the compartment numbers are not mentioned in which plantations are raised and in the absence of this information it is difficult to trace out the years of formation of the plantations in the field. Further, these plantations have yet not reached the harvesting stage. Hence, uniform treatment for all the plantations is not possible.	
Operation in Tending Series	Since the teak plantations are varying in age, these are in need of appropriate silvicultural operations to further boost the growth. They require operations like pruning, thinning and climber cutting. Since the exact age of these teak plantations could not be ascertained, the detailed thinning regime has not been prescribed here. Wherever prominent gaps of at least half an acre exist, these shall be planted with teak intermixed with few Gambhar and Sisoo. Growth in the miscellaneous plantations tends to become bushy and branchy for want of pruning and thinning. Weeding and regular pruning shall be done till the 8th year of plantation. All climbers shall be cut. All dead trees shall be removed departmentally. Thinning shall be done in the congested crop on the lines of 'A' grade and 'B' grade thinning only.	

	Gap plantation shall be done where ever required.	
Control	The Nursery Journal, the Plantation Journal and other records shall be maintained separately for each plantation in accordance with the provisions of 'The Orissa Forest Plantation Manual, 1977' indicating the physical and financial achievements. Necessary entries with regard to plantation activities undertaken shall be entered in the compartment histories. All the plantations done shall invariably be shown on the topo maps of 1: 25,000. Records of tending operation carried out shall be maintained in an appropriate register at the Divisional and Range level.	
Watershed approach in rainfed afforestation:	In the Division most of the afforestation programmes are rainfed. In order to make the successful afforestation in degraded forest it is important to treat the area on the basis of watershed unit. Instead of carrying out afforestation of isolated patches, it is suggested to treat whole watershed depending of the type of the area, soil status, slope and water retention capacity. During the rainy season the vegetation suffers from water deficit situation at upper part and due to prolonged wet condition on lower parts of the topo sequence at a time. Suitable conservation and storage structures, at appropriate locations in micro-watershed, lead to recharge of ground water and increase of water table. Activities of RWC and Plantation (overlapping) WC should be taken up in a micro watershed together to have maximum benefit to the ecosystem.	
Rights and concessions	Only such rights and concessions shall be admitted as have been described in Chapter-1. Additional usufructuary rights may be allowed in accordance with the provisions of the current policies and programmes of the Govt. with regard to Joint Forest Management. No other rights and concessions shall be admitted in this Working Circle.	
Annual Costs of Operations and Working Norm:	Plantations will be raised as per the norms approved by the competent authority. The costs are discussed in the 'Financial Forecast and Cost of the Plan'.	

Interim Revision:	No major change in the prescription is anticipated. However, prescriptions may be reviewed after 5 years jointly by the Conservator of Forests, Berhampur Circle and the Conservator, Working Plans. Any deviation suggested shall be subjected to the sanction of the competent authority.	

THE REHABILITATION WORKING CIRCLE

General Constitution	• The forest blocks allotted to this Working Circle are those whose forest crops are in various stages of degradation. The total area allotted to this Working Circle is **91946.806** Ha. The forest blocks are subjected to multifarious demands.	
General Character of vegetation	• The forests are mainly of two types: 1. 3C/C2 moist peninsular Sal. 2. Moist Mixed deciduous forest. • The vegetation is mostly open with sufficient root stock and some natural regeneration. These blocks are found in close proximity to human habitation and hence involvement of the forest fringe dwellers through JFM is of paramount importance in this circle.	
Special Objectives of Management	• To rehabilitate and restock the degraded forests for environmental stability in the locality. • To provide protection to the degraded forests with participation of villagers of the adjoining villages through Joint Forest Management. (J.F.M.). • To improve site quality through soil and moisture conservation measures. • To improve/restore the micro-climate and micro-edaphic conditions. • To increase the biodiversity in the forest crop by encouraging natural regeneration. • To tend and improve the existing growing stock through suitable silvicultural measures in order to get better growth. • To meet the need of local people with regard to firewood and small timber to the extent possible, depending on the productivity, to ensure people's participation in protection of forests.	
Area Allotment and Treatment Series	• The area allotted to this Working Circle is **91946.806** Ha. 44 nos. of Treatment Series have been constituted in all the Ranges. Care has been taken to restrict the series as far as	

	possible within the Range jurisdiction to which a particular block belongs. Each Treatment Series is divided into 10 coupes to synchronize the plan period of 10 years.	
Treatment Type	• The areas included in this Working Circle has been divided into six categories (category 'A' to 'F') as follows: Category 'A' – Previously worked under coppice system having good Sal and other principal species. Category 'B' – Sal rooted waste areas which require tending operation. Category 'C' – Areas completely devoid of vegetation or with scanty forest growth, where soil conservation and planting operation are mainly required. Category 'D' – Areas in hill slopes completely devoid of vegetation or with scanty forest growth which can be restocked with fast growing species. Category 'E' – It includes areas already planted up, but plantations are in bad condition and require tending operation. Category 'F' – It includes Teak plantations, which have been neglected without any silvicultural operation since long and require tending and re-planting.	
Analysis and Valuation of Crop	• Detailed assessment of growing stock, bio-diversity and regeneration study were carried out in all these blocks. There exists variation in the crop condition in the various blocks included in this circle. These blocks require treatment to promote natural regeneration and also artificial regeneration in areas where there are permanent blanks. All the village woodlots created by Ex-social Forestry Project was included in this circle.	
Silvicultural Systems	• The prime objective is to restock these forest blocks and to reduce the biotic pressure due to which these blocks have become degraded. No formal silvicultural system is prescribed. However, to achieve major objectives, operations like regeneration cleaning, soil and moisture conservation, gap planting, block planting along with tending will be carried out.	

Rotation and Conversion period	• As timber production is not a consideration in this Working Circle, no rotation period or conversion period is prescribed.	
Rehabilitation Treatment	• The proposed treatment for different category of areas have been suggested. A site specific micro-plan has to be developed before any treatment is taken up. The concerned Range Officer should prepare an annual treatment plan which should include all vital information like: • Site identification i.e. Forest block/ Compartment. No. • Area and Treatment Map. • Site category (i.e. Category I, II). • Site characteristics (terrain, slope, drainage, soil type and depth). • Vegetation and extent of regeneration. • Extent of degradation of site/vegetation. • Year of operations (including maintenance, if any). • Major operations to be undertaken. • Cost norms and a calendar of operations. • The treatment plan should be based on watershed approach which should take into account the following into consideration: 1. Conserving soil and moisture as well as harvesting entire rain water for recharging water. 2. Protecting catchment area from biotic interference and facilitating the process of regeneration and growth of available coppice crop. 3. Planting the seedlings of suitable species for creating forest with rich biodiversity similar to natural forests that existed in the area. <u>Artificial Regeneration</u>: Depending upon the locality factors particularly soil condition, the species to be artificially raised should be carefully selected for gap plantation and block plantation. Grass planting is the preferred treatment for exposed soil in eroded areas.	

	Silvicultural Treatment: The silvicultural treatments that has to be carried out are reflected below: ➢ High stumps will be cut flush to the ground to encourage coppice shoots. ➢ Singling out of multiple coppice shoots to retain the most promising ones ➢ Removal of congestion by cleaning operations aimed at encouraging the growth of locally desirable species. ➢ Adoption of few seedlings per ha of locally important and desirable species from the available natural regeneration by giving these species preferentially treatment. ➢ Removal of invasive weeds Soil and Moisture Conservation Measures: Soil and Moisture Conservation measure should form the main component of rehabilitation measures since most of these areas have steep slopes and are affected by erosion. Water harvesting technique should be adopted to assist soil and water conservation In-situ as well as through traditional methods.	
Rehabilitation Cycle	• The cycle has been fixed to 10 years which synchronizes with the plan period.	
Division into Annual Treatment	• Each rehabilitation treatment series has been divided into 10 annual treatment areas or coupes basing on micro-watershed basis.	
Treatment Series	• There are 44 treatment series on Division in all 7 Ranges.	
Method of Execution of operation	• The site specific treatment plan will be prepared by the Range Officer in the year preceding the year in which the work is to be executed. This eco-restoration work will be done with a watershed approach preferably with the active participation of the local people. • Demarcation of Annual Rehabilitation Coupes: The annual treatment areas will be demarcated on the ground in the preceding season of treatment with small stone cairns of	

	the half-meter height erected at visible distance. • Rehabilitation Operation: The treatment will be carried out as per approved treatment plan on JFM mode.	
Record Keeping	• The journal and other records will be maintained for each coupe in accordance with the provisions of the 'Orissa Forest Plantation Manual, 1947.	
Miscellaneous Regulation	• Grazing: The strategy to adopted for control of grazing in forest areas alongwith legal provision of grazing has been discussed. • Forest Fire: The main causes of forest fire and the methodology adopted by application of G.I.S. technology for identification of fire prone areas of the Division has been discussed. • Shifting cultivation: The strategies to rehabilitate shifting cultivation areas by Sloppy Area Land Technology (SALT) has been suggested. • Peoples participation: Involvement of local people in protection and management through JFM approach which is acceptable to the people of the locality has been discussed.	
Rights and Concessions	• Rights and concessions in this Working Circle shall be regulated in accordance with the provisions of the relevant gazette notifications of the respective forest blocks and the Govt. of Orissa policy with regard to JFM.	
Interim Revision and cost of norm	No major changes in the prescriptions of this Working Circle are anticipated. However, it may be reviewed if necessary, after five years jointly by the Conservator of Forests, Berhampur Circle and Conservator of Forests, Working Plan. Any deviations suggested shall be subjected to the sanction of competent authority.	

BAMBOO OVERLAPPING WORKING CIRCLE

General Constitution	Bamboo, "the poor man's timber" is one of the most	

	important forestry species distributed throughout the Division and has major contribution to rural economy. This Working Circle generally overlaps areas of Selection Working Circle and Rehabilitation Working Circle. In Phulbani forest Division bamboo occurs in all most all the Forest blocks as shown in Table No. 5.1. Further, good quality of Salia bamboo clumps are seen in Archangi 'A' and 'B' blocks, Chakapad R.F., Burtang 'S' R.F., Ranipathar R.F., Donga R.F. and PRF blocks namely Sikabadi, Badegarh, Nandini. The total area allotted to this Overlapping Working Circle is **99937.682** Ha.	
General character and vegetation	There are commonly two species of Bamboo seen in this Division. ***Dendrocalamusstrictus*** (Salia Bamboo) occurs very commonly in different Forest Blocks of this Division. The other species namely ***Bambusaarundinacea*** (kanta bamboo) occurs in a very few restricted patches of this Division. This kanta bamboo is noticed in some parts of Chakapad RF &Burtang South RF along the nallah banks, streams and valleys. But this bamboo occurs very much sporadically along the nallah banks of Ranipathar, Donga &Archangi RF Blocks. On the other hand, Salia Bamboo occurs quite extensively on the hill slopes of different forest blocks on the eastern parts of this division and its composition became thinner as we move gradually from east towards western parts of the Division. Hence, Archangi 'A' RF, Archangi 'B' RF, Chakapad RF, Burtang South, Khajuripada RF, Ranipathar RF, Ganjuguda 'B' PRF, Donga RF, contain good quality of Bamboo clumps. Salia Bamboo occurs in scattered patches of variable extent in plains and valleys as an understorey in all forest types which are available in this Division.	
Special objectives of management	The special objectives of management in this Working Circle are: **1.** To improve the growing stock of Bamboo by	

	appropriate silvicultural operations. **2.** To obtain maximum possible yield of Bamboo to meet the bonafide requirement of both the local community including artisans as well as pulp industries in perpetuity. **3.** To enforce scientific cutting rules to ensure maximum yield on sustainable basis so as not to effect the future yield. **4.** To rehabilitate the exhausted bamboo bearing areas through appropriate measures like tending, soil working, plantation etc. **5.** To generate employment for the local poor people.	
Allotment to Working Circle	The total area allotted to this Working is **99937.682**Ha. which comprises of **77477.05** Ha. R.F. area and **22460.63** Ha. PRF area.	
Silvicultural System	The silvicultural system prescribed is "culm selection-cum-clump-improvement" in consonance with the rules of the Government of India in the Ministry of Environment and Forests as amended from time to time combined with simultaneous cleaning and cultural operation for Salia Bamboos. In case of Daba Bamboos, "clump improvement" combined with simultaneous cleaning and cultural operations are prescribed.	
Felling Cycle	A felling cycle of 4 years is adopted both for Salia as well as Daba bamboos as per availability. Each cutting series has been divided into four Annual Coupes (A, B, C & D).	
Analysis and Valuation of the Crop	Bamboo yield was calculated entirely by area. The bamboo felling rules communicated vide letter No. 13 FCWP/OS Gen dtd. 24th December, 1999 of Govt. of India. All bamboos of 1st Year / Karadies, 2nd year Kasi will not be cut under any circumstances. All bamboos of 4th year and above are allowed to be cut and enumeration and extra number in 3rd year bamboo i.e. more than the number of karadies are allowed to fell and accordingly yield was calculated.	

Regulation of yield	The total estimated yield from constituted bamboo coupes comes to 26496.95 SU.	
Constitution of Cutting Series and Annual Series	The blocks allotted to this Working Circle have been constituted into 22 nos. of cutting series and the Baraba cutting series in the last plan and scheme has been recognized into Badegarh and Karada cutting series on account of recent re-organisation of Ranges. The above cutting series have been constituted on administrative consideration and distribution of Bamboo taking into account the local demand and the economic exploitation as per availability of Bamboo.	
Stock Maps	Stock maps have been prepared. Occurrence of bamboo has been denoted by symbols.	
Enumeration	Enumeration of the bamboo bearing areas has been done along with the timber enumeration in all the blocks allotted to selection Working Circle and non-selection Working Circle. For this enumeration, the NRSA has provided the sample points in different forest blocks indicating the latitude and longitude of the sample point. The area of the sample point delineated by navigating in GPS in the field is 0.1 Ha. and detailed stock of bamboo clumps enumerated along with timber. No special enumeration for bamboo has been undertaken for variable intensities of occurrences of bamboo clumps with wide variation in quality.	
Method of Execution of Operation	The coupes will be divided into 4 sections running along the contour. The Section from uphill side will be worked out first.	
Working of Bamboo	Bamboo shall be worked by a definite set of rules that has been prescribed by the CCF (Central) Eastern Regional Office, Ministry of Environment and Forests, Government of India, Bhubaneswar as per his letter No. 13/FCWP/US-GeN.dt.24/12/90 and communicated vide PCCF, Orissa's memo No. 26951 (40) dt. 28.12.1990. After demarcation	

	of bamboo coupes a treatment map will be prepared by lessee showing separate areas for Treatment type A: With healthy and will stocked bamboo clumps. Treatment type B: Will stocked, but degraded, damaged, congested and fire burnt bamboo clumps. Treatment type C: Areas where bamboo clumps are sparse and scattered.	
Simultaneous Silvicultural Operation	**1.** All cutting debris shall be removed and the clump shall be left cleaned. **2.** If any clump has not been cleaned at the time of felling, such clumps shall also be attended to through pruning in addition to the climber cutting. If any high stumps have left those shall be rectified as far as practicable. **3.** The exposed rhizomes shall be covered with soil scrapped from surrounding plain areas as per availability and preferably from uphill side of a hilly undulating terrain. In some steep slope hilly areas, stone walls may be given on down hill side to stabilize the soil covered to the rhizome from erosion by making a shape half-mound trench. **4.** During this process, it should be taken to ensure that no damage is caused to the rhizomes and rootstock.	
Treatment of gregariously flowered areas	**i)** Bamboo seedlings at a spacement of about 4m x 4m are to be adopted and retained and the rest are to be thinned out. **ii)** Cleaning, soil working and seedling is to be done around the adopted bamboo seedlings upto a radius of 50m. **iii)** To maintain the continuity, planting up of bamboo rhizomes is also to be resorted to especially in big gaps.	

	iv) All the flowered clumps are to be worked up following the prescriptions of the working plan. **v)** The area shall be closed for grazing. **vi)** Elaborate fire protection measures shall be taken.	
Main Threats to Management of Bamboo Forests	**1.** Indiscriminate cutting of bamboos by tenants and artisans. **2.** Annual forest fire. **3.** Excessive grazing. **4.** Clear felling of daba bamboos. **5.** Over felling and improper working of coupes by Agents.	
Remedial Measures	**1.** Clearing of bamboo should be restored to in the 3rd, 5th and 7th year and thereafter fellings should be done in 10th year. Subsequent fellings at 4 years cutting cycle must be ensured without fail to get rid off the congestion problems. **2.** Clumps should be cut stump height and should never be cut at a height more than this. **3.** After cutting, the piling of earth around and over clumps should be done essentially in the same year. Loosening of earth around the clumps at least 15cm deep and 30cm in width should be done. The present faulty practice of piling the earth, on stumps making a dome shaped structure, should be stopped. **4.** In case of "flower based" clumps, where exploitation of utilizable bamboo has become impossible, should be cut at 1 meter height, in a way that the green culms remain evenly distributed all over the periphery to act as support to new clumps. In case where still greater congestion is found the only solution is to clear fell the entire clumps at stump height in order to remove the whole congested mass. In such converted clumps	

	clearing should be done in 1st and 2nd year. The regular felling should be taken up in 3rd year.	
Strategies for Value Addition	**1.** Exploring the export potential for semi-processed bamboo items like high density pulp, mats, chops etc. to other parts of the Division where there are provisions of pulp and paper industry. **2.** Forming clusters comprising 5-10 closely situated villages and providing them with know-how, hand tools, machine tools and marketing avenues for promoting cottage industries requiring minimum investment, like units manufacturing "*agarbati*" sticks, tooth picks, bamboo mats etc. **3.** Exploring the possibility of using muli bamboo fruits/seeds, rich in protein context for animal feed and oil extraction. **4.** Exploring possibility of formation of plywood units by using appropriate techniques for conversion of bamboo into high value construction material.	
Maintenance of Records	Compartment history files and control forms besides other records shall be maintained for each coupe/compartment and felling series in accordance with the National Working Plan Code-2014.	
Intermediate Revision	No intermediate Revision is anticipated. However, the results of prescriptions can be reviewed after 5 years and if found necessary, the concerned Conservator of Forests (Territorial) in consultation with the Conservator of Forests (Working Plan) may recommend for intermediate Revision of the same, to the competent authority, whose decision shall be final.	

NON-TIMBER FOREST PRODUCE (OVERLAPPING) WORKING CIRCLE.

General Constitution	The forests of Phulbani Forest Division have tremendous potential for NTFPs such as Kendu leaf, Mohua flower, Mohua seeds, Sal seeds, Sialifibre, Siali leaves, Char seeds, Kusum seeds,	

	Myrabolans, Banatulasi, Lodha, Medha, Phenphena and Satabarietc. It covers all the forest blocks of Phulbani i.e. **145746.8** Ha. The huge demand for a few varieties of NTFPs is resulting in unstainable and destructive exploitation of these resources by the primary collectors which is abetted by traders and middlemen. Under the present scenario special efforts are required to strike a balance between the protection of the interests of the primary gathers thereby enhancing their subsistence and making the forests sustainable.	
Special Objectives of Management	1. To assess the potentiality of the various NTFP produces of the Division. 2. To regulate the collection of various NTFPs and to develop the area for increased and sustainable production. 3. To meet the bonafide needs of the local people. 4. To create maximum rural employment in the interior and remote areas during the lean season. 5. To explore the scientific utility of many NTFPs, which are not collected at present by the primary collectors, even though abundant in the forests. 6. To regulate and optimize extraction and utilization of various NTFPs in confirmity with Government policy with a view to promote sustainable management of forests. 7. To enhance the value of forests by way of developing new NTFPs, creating additional opportunities for further value addition in the existing NTFPs and strengthening the marketing network. 8. To develop and extend skills to the local people, including the tribal, for sustainable collection, extraction and utilization of various NTFPs so as to distract them from shifting cultivation. 9. To encourage small cottage industries, which can run on non-timber forest produces available in the nearby areas, instead of exporting them to outside. 10. Special emphasis on planting of species, which are known for their NTFP values during artificial regeneration in the forest areas.	

Area Allotment	All the forest blocks included in the Plan have been allotted to this Overlapping Working Circle. The total area included in this Working Circle is 145746.8 Ha.	
Analysis and Valuation of Crop	No systematic study has been done in the past in the division to assess the potential production of various NTFPs and to ascertain impact of collection etc. of such NTFPs on sustainability of the forest. An assessment done by NRSA Hyderabad relating to NTFP species and their availability in different forest blocks derived from the Sample Point Inventory data. There is substantial fluctuations both in quantity collected and royalty realized. This is because the outturn depends on various factors like weather and the market price. The figures do not indicate the actual outturn or potential of NTFP items as many of them are consumed locally and only surplus is sold if it fetches good price.	
Method of Execution	The primary collectors should be properly guided to collect the NTFPs in a non-destructive way. Latest techniques of collection, drying and storage should be imparted to them. Value addition to collected NTFPs locally will enhance their earnings, thereby augmenting their livelihood status during lean period.	
Policy on Procurement and Trade of NTFPs	Various forest Acts and laws have been formulated and implemented from time to time and also a number of institutions have been established to do away with exploitative interests of middle men, traders and businessmen. The regulation of trade of NTFPs and MFPs in accordance with the Govt. instruction has been discussed in detail with the active participation of V.S.S. and Gram Panchayat in the matter of collection, disposal and marketing of MFPs of respective forest areas.	
Techniques for scientific and sustainable extraction of 15 major NTFP including medicinal	Elaborate discussion regarding scientific and sustainable extraction of NTFP and medicinal plants which are found commonly in the forest area of the Division.	

plants		
Strategy for Development of NTFP	**1.** Item wise resource inventory survey, planning and formulation of projects. **2.** A conservation programme for the Division including protection, management and propagation of NTFPs. **3.** A systematic harvesting/collection programme under the JFM approach involving the V.S.S. and soliciting their active participation. **4.** Species selection (elite trees/plants) provenance trial, micro and macro propagation, regeneration and plantation of NTFPs. **5.** Cultivation of NTFPs in community forests, agro-forestry etc. **6.** Sustainable management of natural habitat and protection from pests, diseases and biotic pressures. **7.** Action research on NTFP collection/extraction, drying, storage and further processing and marketing. **8.** Organization for procurement, storage, marketing and trading of NTFPs. **9.** Socio-economic studies for improving the economy and social status of people by improved utilization, marketing and value addition. **10.** Training and awareness creation for scientific collection, storage, processing and marketing of NTFPs. People should know appropriate collection time for maintaining quality of the product. **11.** Feasibility studies on important NTFP products viable for commercial exploitation to attract investment in this sector for poverty alleviation. **12.** A strong database needs to be created on different aspects of NTFPs for their sustainable development. The ethnobotanical knowledge of the tribals can be a useful source of information. There is an urgent need to identify and channelise them. **13.** To intensify research on NTFPs providing subsistence to the tribal and raw material for local industries. The export	

<table>
<tr><td></td><td>potential of various NTFPs need to be assessed.
14. The cost effective plantation technology need to be developed for large scale plantation programmes.
15. Existing acts, rules and regulations and executive orders to be examined and necessary modifications to be suggested to enable people for growing forest produce and derive socio-economic benefits from NTFP resources. Incentives for planting NTFP trees to be provided to create awareness.
16. Rights and concessions conceded to the people to be listed, reviewed and constraints in implementing the National Forest Policy, 1988 to be identified and eliminated as far as practicable in accordance with the provision of law.</td><td></td></tr>
<tr><td>Miscellaneous Regulation</td><td>In the areas of the Division where artificial regeneration through block plantation is to be taken preference in species selection should be given to species which yield NTFPs or having medicinal value. The V.S.S. and Grampanchayat should be given information about the marketing prospects of various NTFPs.</td><td></td></tr>
<tr><td>Rights and Concessions</td><td>Rights and concessions of local people shall be regulated in accordance with the provisions of the Orissa Forest Act and relevant rules in force besides the Govt. Policy in Vogue.</td><td></td></tr>
<tr><td>Intermediate Revision</td><td>The intermediate revision of the prescription is not expected during this Working Plan period. But if necessary the Conservator of Forests (WP) would send necessary proposal for approval of Competant Authority.</td><td></td></tr>
<tr><td>Field Study Scenario</td><td>The range wise/Forest block wise distribution and availability of various NTFPs have been reflected on the basis of the criteria as detailed below:
Table: 6.3 Criteria for NTFP availability status
<table>
<tr><th>S.N</th><th>Plants/ha.</th><th>Availability Status</th></tr>
<tr><td>1.</td><td>More than 625 plants per Hectare</td><td>Abundant</td></tr>
<tr><td>2.</td><td>Between 400 to 625 plants</td><td>Good</td></tr>
</table></td><td></td></tr>
</table>

			per Hectare		
		3.	Less than 400 plants per Hectare	Sparse	
		4.	No NTFP plants available	Nil	

THE WILDLIFE OVERLAPPING WORKING CIRCLE

General Constitution	The list of wild fauna available has already been reflected in Part-I, Chapter-III. While revising this working plan, conscious attempt has been made to incorporate elements of conservation ethics. Wild fauna and flora in their beautiful and varied forms are an irreplaceable part of natural system of earth which must be protected for this and generation to come. Therefore, this overlapping working circle extends to all the forest areas of the Division and has been constituted with basic objectives as detailed below:- **1)** Protection of existing wild life and improvement of their habitat. **2)** Eco-development planning and conservation of bio-diversity Simple, (in-situ and ex-situ conservation dynamics) pragmatic and practical approach involving people coupled with consistency and dedication.	
General Character of Vegetation	The flora and fauna available in Phulbani Forest Division has already been reflected in Part-I of this Plan. The different wild animals present in this Division are given Chapter -III basing on field study and data supplied by Zoological Survey of India. The Division also has rich biodiversity in flora and fauna in some patches of respective forest blocks inspite of witnessing the scenario of severe biotic interference and rapid shrinkage of forest cover. In addition to the above formal floral diversity surveys have been taken up for the first time during the revision of this plan and by the Forest and Ecology Division of NRSA, Hyderabad.	
Special	The special objectives of management set for this working circle	

Objectives of Management	are within the general objective of management and are enumerated below:- **1)** To conserve, protect and improve wild life habitat with special emphasis on unique, special, macro habitat and riparian Zones of the Division. **2)** To promote wild life in general and endangered species in particular by appropriate site specific and realistic management techniques. **3)** To create awareness among the local people to have compassion for wild life with required justification for their important role and conservation of their habitat. **4)** To conserve and develop ecotourism sites. **5)** Eco-development planning for biodiversity conservation and increase in population of wild life by providing enabling (conducive) environment in respective forest blocks. **6)** Eco-Administrative unit approach for management of wild life. **7)** Prevention of wild life related crimes and enforcement of existing laws by following systematic procedure in accordance with the provisions of law. **8)** Study and analysis of Conservation-Development linkages. **9)** Feasibility analysis of livelihood strategies of village communities living in and around the forest areas. Conflict management, problem analysis and objective setting to achieve desired output in a sustainable manner.	
Analysis and Valuation	The annual census of Wildlife namely Elephant, Tiger, Leopard, aquatic and migratory birds has been carried out in all the territorial Wildlife Divisions of the State. Proper analysis and valuation of census data is yet to be carried out at the Division level.	
Area and Allotment	All the forest blocks included in the plan have been allotted to this overlapping working circle. This circle covers the entire geographical area of the Division as far as protection of wild life is concerned. Since this working circle overlaps the entire plan area,	

	the details of area allotment to this circle has not been furnished here.	
Wildlife Habitat	Major portion of Phulbani Forest Division is terrestrial. The forest tract is well drained by a number of small nalas, which drain into the river Salki and the river Baghnadi. These two perennial rivers flow from the South towards North and forms main tributaries of the River Mahanadi. The hill streams originating from the forest of Karada Range formKaradaNala and flow into Ganjam district and runs as a tributary of river Rushikulya. Number of other seasonal and perennial streams criss-cross the entire Division providing water sources for the wild life.	
Species Structure	**Autotrophs**: The undulating physiographic condition of the Division have manifested in influencing the composition of the crop. Basing on the moisture regime of the soil and climatic condition, the crop composition varies. In most areas, main species are Sal, associated with Asan, Kurum, Piasal, Mahul, Semal, Mango and Kasi as top storey. The middle storey comprise of species like Anola, Sunari, Jamun, Karada and Kendu. The undergrowth constitutes Indigoferapulchella, Wood-fordiafruticosa, Helicteresisora and Clerodendronviscosum. The climbers found in common are Millettiaauricullata, Bauhinia vahili, Smilax macrophylla and Combraetumdecandrum. In the upper reaches of hills, occurrence of Sal is scarce and miscellaneous nature of the crop is represented. The associates of Sal are Asan, Kurum, Dhaura, Sidha, Kansa, Mahula and Siris. The undergrowth is Holarrhenaantidysenterica, Eupatorium odoratum and Banatulsi etc. The climbers are *Millettiaauriculata, Combraetumdecandrum and Buteasuperba.*Salia bamboo *(Dendrocalamusstrictus)* is found gregariously as under storey. Forest areas which are degraded due to severe biotic interference are mostly open and having scrubby growth of some of the above referred species with invasion of weeds like *Lantana camera and Eupatorium odoratum*. **7.7.2:Heterotrophes:** The forests of Phulbani Division were once very rich in wild fauna	

	but have gradually declined with the shrinkage of forest cover due to severe biotic interference. The detailed list of fauna found in Phulbani Forest Division has already been recorded in Chapter II (B) of part I. However, the faunal species structure of major communities is reflected below in table no. 7.3	
Poaching and Wildlife Crime	In the outgoing plan it has been mentioned that many tigers and elephants at Donga, Ranipathar, Chakapad and Khajuripada blocks were killed by "Crop Protection Guns" liberally licensed out to the people to protect their crop protection from wild animals. A Brief analysis of the wildlife cases booked from the year 1989 to 2005, year wise in a graphical manner, itself suggest that wildlife crimes are increasing in recent years which needs utmost care by suitable management practices and modification of enforcement techniques, otherwise the days are not far behind for the total extinction of the available fauna in the forest blocks of the Division. Poaching of herbivores, which is reportedly quite frequent, is mainly for meat and their trophy and includes deer, sambar, wild boar, mouse deer, hare etc. During summers, when natural streams get dried-up or when paddy or other crop has ripened, these animals stray into nearby human habitation and are trapped and killed by the villagers. Many cases of poaching go undetected for variety of reasons. In fact, most of the poaching of birds and herbivores goes either undetected or unreported.	
Development of Habitat	The people living in and around the forest areas are generally poor and mostly belong to various tribal communities who had all along been living almost entirely on the forests and its renewable resources. These people had been "Ecosystem people" and their living was more or less compatible to the ecological processes underway. But the present situation is no longer so simple in the division. Firstly, the benefits accrued from the usufructs are also being siphoned off by adjacent rural/urban users through indirect linkages, which often remain unnoticed. But, the combined effect is devastating on the natural ecosystems of the division. Therefore, habitat should be developed with the co-operation and active	

	participation of the local people coupled with sound silvicultural techniques. The main objective is to provide more food, water and shelter to the wildlife and also to reduce man-animal conflict.	
Method of Treatment	**Maintaining Unique Habitat:** Wildlife habitats are invariably identified only with the vegetation communities, but there are some habitats where vegetation association is not present. These habitats are represented by geomorphic features with special functions not provided in plant communities or their succession stages, and are called "Unique Habitats". These habitats do not occur as frequently as vegetative habitats, but nonetheless add to the diversity of the environment, which otherwise is largely dominated by plant communities. Little or no attention has generally been paid to these lesser known and lesser occurring habitats, their usefulness in management and their role in enriching the wildlife diversity of the area. These features show a much clumped distribution and are restricted only to certain areas as their formation depends solely on geomorphology of the area. Only two kinds of unique habitats have been identified in respective forest blocks of the division as detailed below in table no. 7.7	

Sl. No.	Name of forest blocks	Kinds of Unique habitat found
1	Bandhagarh 'A' PRF, Bandhagarh 'B' R.F, Gochhapada R.F., Katrigia PRF, Balandapada North and South PRF, Baghanadi R.F., Nuapada R.F., Gerupada R.F., Ranipathar R.F., Donga R.F., Sudrukumpa R.F., Khajuripada R.F., Ganjuguda PRF, Burtang R.F., Chakapad R.F., Burtang South R.F., Archangi 'A' & 'B' R.F., Lionpada R.F., Kurumingia R.F., Sujeli R.F., Godingia R.F., Karada PRF.	Caves and Dens

Maintenance of Special Habitat:

Special wildlife habitats which are biological in origin and provide habitat functions for small wild animals need to be protected and maintained. They include snags, sang recruits, den trees, downwood, isolated large old trees, trees with fluting boles, buttresses, lianas, some significant species of fruit bearing trees and shrubs.

All fruit bearing tree species are not to fell as they provide fruits to local human inhabitants and wildlife.

Maintenance of Critical Macro-habitats:

Riparian Zones: The critical macro habitat of the division mainly comprises of following riparian zones are reflected in Table No.7.8.

Table No: 7.8

Sl.No.	Name of forest block	Compartment No.
1	Sudrukumpa R.F.	C/7,8,3
2	Donga R.F.	C/1,2,3,4,5,7,8,9
3	Ranipathar R.F.	C/3,4,5,6,7,10
4	Khajuripada R.F.	C/1,2,3
5	Ganjuguda PRF	C/2
6	Burtang North R.F.	All compartments
7	Baghanadi R.F.	C/1,2,6,7,8,12,13,4,3
8	Palchi R.F.	C/2,3,4
9	Kerandibali (W) R.F.	C/1,7,6,5
10	Sadingia R.F.	C/1
11	Kalabagh R.F.	C/5,4,3,2,1,9
12	Gochhapada R.F.	C/5,7,8
13	Kerandibali 'E' R.F.	C/3,5
14	Bandhagarh 'A' PRF	C/3
Source: Field study		

The riparian forests provide thermal cover in winter and summer

which is important for all wild animals. The lofty trees and unbroken canopy is of great significance to arboreal mammals and reptiles and the tall trees provide nesting cover to raptors. These systems are equally attractive to domestic cattle. Often scenic values are associated with riparian zones and hence they are fascinating to people. Riparian zones are linear and most vulnerable to change due to great pressures.

Maintenance of Water Sources:

The hilly tracts of Phulbani are laden with several streams and perennial rivers in a criss-cross manner. The water sources need to be protected from silting, poisoning, and drain off. As the Dist. of Kandhamal is worst affected by the pernicious practice of shifting cultivation, appropriate soil and moisture conservation measures, both in degraded and barren sites, in the form of percolation tanks and appropriate technique to tap and preserve rain water, should be carried out in specific sites which ultimately provides water source for the available wildlife population in the habitat.

Maintenance of the Cultural Landscape:

The sites of pilgrimage from different aspects like cultural, archeological as well as unique scenic point of view pertaining to the division are listed below:

(1)Balaskumpa is a village in south-east at Kandhamal (Phulbani) Sub-division situated 20° 25′ N latitude and 84° 21′N longitude at the confluence of two hill streams which combine to form PillaSalki River. In this village a shrine called **Baraldevi**, the presiding deity of Kandhamal is situated. The goddess is worshipped every year in the bright fortnight of Aswina (Sep-Oct). It is 15kms from Phulbani district Headquarters and is connected by a good motor able road.

(2)Dungiis about 45kms from Phulbani and situated on Phulbani-Berhampur road in G.Udaigiritahsil. This is the only archeological site in Kandhamal district. There was one Buddha Vihar of 11th century and after it was ruined, Shiv

	temple has come up on the site. Some of the ancient sculptures have also been excavated during the construction of new temple. **(3)Pakadajhar** is about 30kms from Phulbani town near village Sudrukumpa. It is situated on Phulbani-Boudh road in Phulbanitahsil. There is one waterfall of about 60 ft. height in natural forest background. One good road from Sudrukumpa is leading to the site. With the recent development of the destination, sizable tourists visit the place for picnic from early November to end of February. **(4)Putudi** is 18kms from Phulbani town with a waterfall of about 100 ft. height situated in dense forest. The roaring sound of waterfall with dense forests all around creates a thrilling sensation and is enchanting to visitors. One good road is leading to the site and the water fall is on the river Salunki and is a marvelous scenic spot. **(5)Chakapad** has mythological background and is famous for its natural beauty. It is also a sacred spot of Hindus especially for the **Lord "Shiva"** locally named as **"Birupakshya"** and the temple is popularly known as **"Lankeshwar Shiv Mandir".** Host of people from different parts of the State visit this holy place to worship the Lord on different sacred occasions all year round.	
Other Prescriptions	Census of wildlife should be done every year with consultation with the Chief Wildlife Warden. Wildlife should be identified and mapped. Migration root of wildlife animals should be identified, protected and improved. The Eco-administrative unit may be adopted in the field for the management of areas situated in and around the natural eco-system and wildlife habitats. Two potential sites namely Urmagarh, Katramal from eco-tourism perspective have been presently considered for development by the Division.	
Wildlife Protection Measures	The enforcement technique and anti-poaching strategy may be followed in the field to reduce incidences of wildlife crime of the Division.	

Miscellaneous Regulations	To sum up, conservation and sustainable use of resources is the need of the hour. It is our moral duty to conserve biodiversity and live in harmony with nature. The message is to be spread right from the general public, especially school going children, university students, policy makers, technocrats and managers before the last chance is lost. Resource survey, inventory of flora and fauna documentation, updating of maps and creation of database at periodic intervals give sufficient inputs for Resource management on long term basis in a sustainable manner. This aspect, particularly in wildlife perspective, is in a much neglected state. Forestry information system is very weak, unreliable and inconsistent. In the absence of reliable statistics, decision-making becomes very difficult. To assess the progress towards sustainable management, sizeable data base and information needs to be generated. A strong network of institutions has to be developed to ensure uninterrupted flow of information at the Division level. Recently, with the advent of technology like G.I.S., GPS etc. through remote sensing, lot of data can be stored and analysed. National Remote Sensing Agency, Hyderabad (NRSA) and ORSAC have been engaged by the State Government to supply important informations and digitised maps required in connection with the working plan preparation of the Division. In addition to it, a regular data base should be maintained at Division level comprising of details like schedule species found in the area, pictorial directory of all identified poachers and its circulation, timely and proper documentation of all the incidences of man-animal conflicts including poaching and smuggling prone migratory routes etc. Further, the DFO shall also submit half yearly report to the authorities concerned with regard to steps taken by him to protect wildlife and to improve their habitat. He shall also report constraints faced by him in implementing the prescriptions of this working circle.	

Wildlife Depredation	Various types of measures have been taken to prevent, control and handle situations arising out of man-wildlife conflict. The following immediate measures need to be implemented in the field for amelioration of the situation:- **(1)** Protection of crucial habitat of elephant by stoppage of felling, illegal grazing, and fodder collection etc. in such areas of the respective forest blocks of the division. **(2)** Habitat improvement programmes through planting of grass and trees, fodder species in the existing block and open areas. **(3)** Creation of waterholes in elephant habitat which dry up in winter and summer months. **(4)** Preservation of natural elephant corridor and to ensure that no new obstructions come up on the way in form of barriers. **(5)** Distribution of leaflets regarding do's and do not's to be observed by the local people in the areas prone to elephant depredation. **(6)** Large scale extension work through T.V., Radio, Newspaper and by organising meetings, seminars, group discussion, film shows, exhibition, postering etc. for developing of public awareness regarding conservation of wildlife. **(7)** It is proposed to launch a scheme to organise anti-depredation watch committees in the line of village Forest Protection Committees. These committees are expected to keep track of problem animals or animal groups and inform the villagers and the Forest department in case of approaching emergencies. Further, anti-depredation squad should operate from Division headquarters. The services of V.S.S. and FDA committees should also be properly utilised to mitigate the menace of depredation by wildlife population. **(8)** Measures taken to ward-off the problem causing animals from the site include the one of high intensity focus light,	

	crackers, drums, fire-torches; elephant proof trenches, rubble-wall and energized fences etc. which fits well to the specific sites.	
Fire Protection Measures	**<u>Preventive measures:</u>** **(1) Fire lines:** The perimeter of the entire forest block should be "Fire-lined" with a 15 mtr. width and should be maintained every year. The entire area should be divided into sections and these sections fire lines should be laid in the field with 10 mtr. width. In addition, fire lines with 5 mtr. width should be laid around vulnerable areas and plantations. Fire lines should be cleared and maintained regularly between December and January. **(2) Rock walls:** Fire control rock wall barriers should be constructed to protect the forest from fire. **(3) Education:** As most of the forest fires are man-made, it can be prevented to a large extent by motivating and educating the local people about its devastating effects. **<u>Fire Fighting:</u>** Adequate field staffs, including formation of fire fighter squads from the existing V.S.S., should be stationed with necessary infrastructure in fire prone areas to control and suppress the fire menace during the summer season. Some financial assistance should be provided to V.S.S. for check and control of fire in adjoining forest blocks as well. Since the incidence of man-made fire occurs mostly on weekly market days of the localities, proper patrolling must be exercised at suspected routes leading to the market. To rejuvenate fire ravaged areas, it is suggested that instead of investing heavily in equipment or technology, local man power be utilized and formulate a strategy based on human resource with site specific needs and demands. It has been experienced on several occasions that intensive and continuous fire control measures are required to bring back the vegetative cover of the seriously degraded slopes.	

Control of Grazing	Unregulated and uncontrolled grazing beyond the carrying capacity of forest areas of the division had already caused enormous damage to micro flora and fauna. Therefore, wildlife rich areas should be closed to grazing. In addition to it, the cattle population in habitations adjoining to forest areas should be immunised at regular intervals so as to prevent spread of contagious diseases to wild animals with the active co-operation of V.S.S. members and veterinary personnel.	
Incentives and Rewards	Any commendable and notable achievement made by the staff and public, including informers, in detecting wildlife crimes and checking smuggling of wildlife trade, should be acknowledged with provisions for rewards and incentives Such encouragement tactics boost their courage, self-confidence and dedicated involvement in the detection of wild life crimes at an accelerated pace. Moreover, their deeds should also be given media publicity in the locality as well as recognisation on certain important occasions like **Wildlife Week and World Forestry Day.**	
Rights and Concessions	Rights and concessions under this Working Circle shall be regulated in accordance with the provisions of the Orissa Forest Act, 1972; the Wildlife (Protection) Act' 1972; Rules made there under besides the Government policies in force.	
Intermediate Revision and Working Cost	Under normal circumstances no intermediate revision is anticipated. However, if so required, the Conservator of Forests (Territorial), Berhampur in consultation with the Conservator of Forests (Working Plans), will send a proposal for amendment of prescriptions to the competent authority for necessary approval.	
Financial Forecast	The estimated cost for implementation of various prescriptions of this Working Circle comes to Rs. 1,35,70,000/- only.	

FOREST PROTECTION WORKING CIRCLE

General Constitution	This working circle covers all those forest blocks which need special protection measures from biotic interferences, besides the blocks and compartments existing in ecologically fragile areas. The total area of this Working Circle is 4680.131 ha. Which is 3.2% of the	

	total area. Due to intense biotic pressure from human and cattle, large number of forest blocks of the division is under various stages of degradation. Unless steps are taken to prevent fires, illicit felling, encroachment, poaching, shifting cultivation the process of degradation cannot be reversed. Further there is also need to visualize that forest on steep slopes which are quite prevalent in Phulbani areas and ecologically fragile areas are not disturbed and are completely protected from any sort of biotic interference. The conservation of forest requires checking further degradation as well as increased production to meet the demands of the local community.	
General Observation and Vegetation	Forest degradation has numerous agents and causes, many of which reinforce the process. In Phulbani Forest Division, human activities contributing to the degradation of natural forest vegetation, involve five primary processes: **1.** Removal of woody species at rates exceeding their renewability. **2.** Excessive grazing by livestock of grass and other herbaceous matter. **3.** Increased incidence of fire. **4.** Humus, top soil loss and soil compaction. **5.** A gradual decrease in water retention and recharge capacity; and **6.** Pernicious age old practice of shifting cultivation and encroachment. Majority of forest blocks included in this working circle are the ones which have been badly affected due to regular removal of biomass and some blocks are included which have valuable high forests, that are now becoming targets of timber smugglers in an organized way. Both these type of blocks need intensive protection measures so that pressure of biomass removal is reduced substantially so that silvicultural operation prescribed in the main working circle will yield the desired result. The type and classification of forests included in this circle has already been dealt in Chapter-III. The	

	main species in these forests are Sal and its associates like Piasal, Sisso, Asan, Dhaura, Kurum, Kasi, Kangada, Rai, Bandhan etc.	
Special Objectives of Management	The special objectives of Management set for this Working Circle are within the general objectives of management. These are as follows: **1.** To protect these forests from fire and grazing and also to provide strict vigil against illicit felling, encroachment, poaching and shifting cultivation. **2.** To increase the biodiversity in the forest crop by encouraging natural regeneration. **3.** To arrest further degradation and enhance the natural regeneration by adopting strong protection measures to minimize biotic interference. **4.** To keep delicate and eco-fragile areas ecologically intact by maintaining adequate vegetative cover. **5.** To rehabilitate and restock the degraded forests for environmental stability in the locality. **6.** To improve the site quality through soil and moisture conservation measures. **7.** To improve/restore the micro-climate and micro-edaphic conditions. **8.** To provide protection to the degraded forests with active participation of villagers of the adjoining villages through JFM. **9.** To tend and improve the existing growing stock through suitable silvicultural measures in order to get better growth. To meet the needs of local people with regard to firewood and small timber to the extent enjoyed depending on the productivity, to ensure peoples participation in protection of forests.	
Area and Allotment	The total area allotted to this Working Circle is 4680.131 Ha. which comprises of 6 nos. of protection units.	
Analysis and Valuation of the Crop	The growing stock and stem/canopy density map of all the forest blocks basing on the inputs supplied by field enumeration has been submitted by NRSA, Hyderabad. It is expected that with proper	

	protection and stoppage of illegal removal of biomass from these degraded forest blocks, these blocks will steadily regain its original state. Protection of high forest blocks will ensure that these blocks do not get degraded. Protection from grazing and fire will ensure that the regeneration status in all the forests of this Division will improve substantially. All these observations advocate strongly in favour of protection of these forests.	
Silvicultural System	For achieving the special objectives of this circle, the following operations/treatment are prescribed: **1.** The area should be rigidly protected from illegal biomass removal so as to keep it under nature's own care and nursing. **2.** Areas of forest blocks on steep precipitous slopes and eco-fragile areas would be specially protected to ensure there is no loss of vegetation or soil cover. **3.** Steps will be taken to prevent fire and grazing in the forests. **4.** Boundary, compartment and blocks should be maintained. **5.** Forest road network should be maintained. **6.** Communication network-VHF sets should be used effectively to check smuggling of forest produce. **7.** Special anti-smuggling squads and fire fighting squads should be created out of V.S.S. members for each protection unit. **8.** There should be plan for inter-cultivation of suitable need based crops. Provision for employment during lean period (November to March).	
Demarcation of Annual Coupes and Preparation of Annual Plan of Action	1. The annual coupes shall be demarcated in the preceding season of treatment. In case a coupe overlaps two or more compartments, each compartment shall be treated as a separate treatment area; this will even ensure proper maintenance of compartment histories. Signboards, showing the name of the forest block, Working Circle, Compartment no., area and year shall be displayed on	

	prominent and easily identifiable trees. 2. The DFO shall ensure preparation of an annual action plan with a calendar of operations before execution of works. The guiding factors for incorporation of different components shall be as per the activities stipulated in the above paragraph.	
Forest Protection Measures	All the forests of this Working Circle shall be strictly protected against illicit felling, forest fires and all sorts of biotic interferences. Anti-smuggling squads at vulnerable points in every protection unit should be created by deployment of manpower from other less important areas besides engagement of protection watchers. The information network should be made effective and properly directed to conduct raids at susceptible places of hoarding of timber and other forest produce. The DFO should evolve the modalities for its effective working.	
Shifting Cultivation Scenario and Strategies to Check Depletion of Forest Cover	The age-old practice has become unviable, leading to the degradation of forests and tribal economy, due mainly to the changes in socio-economic and agro-ecological parameters which sustained it. Land-based technologies such as labour-intensive agro-forestry systems, providing basic needs and employment, may be implemented by using surplus labour and wastelands in order to control shifting cultivation. Any rational strategy for the control of shifting cultivation must account for the above discussed socio-economic and ecological aspects. The employment and income generation measures based on land resources should be at the centre of any future strategy.	
Role Agro-Forestry	The major objective of agro-forestry which is pertinent to the Phulbani Forest Division is to optimize production and economic returns per unit area, while respecting the principle of sustainable development. In order to attain this objective, certain agro-forestry models have been evolved and standardized, combining optimum land-use system with tree-agriculture-livestock production system to give maximum economic returns, simultaneously or sequentially. However, the models have to be designed in such a manner so as	

	to make them technologically feasible, ecologically sustainable, economically viable, and socially acceptable.	
Fuel Wood Strategy	It is distinctly clear that the fuel energy consumption pattern, and so also the energy problem are area/region-specific and time-specific. The nature of problem varies from place to place (even in the same place) depending primarily on its availability and affordability of consumers (access to types of fuel) respectively. The problem arises not only owing to time-specific element in it, but also relating to its availability. Since, we notice marked variations in intra-regional and inter-regional situations a uniform energy plan strategy does not seem to be at all relevant. Instead, a decentralized micro approach (keeping in view the specific resource-base of the area, and specific needs of the people) should be the basic thrust of energy plan and strategy.	
Soil and Moisture Conservation Measures	Soil and water conservation measures such as contour trenching, vegetative bunding, and small check-dams can enhance soil moisture and the accumulation of topsoil, accelerating rehabilitation of the micro-environment. Such conservation measures are helpful in improving germination and growth rates of seedlings. Enrichment planting of desirable local and exotic tree species in degraded forest gaps can generate additional forest products and improve forest density and composition. Cleaning degraded forest lands of dead brush, cleaning stumps, and cutting excessive coppice shoot growth can also facilitate regeneration and promote healthy growth. More extensive enrichment planting is suitable for locations with no coppice or low coppice potential and with moderate levels of soil degradation.	
Forest Road Network	The existing forest as roads of Phulbani Forest Division which has already been reflected in Chapter-VII, Part-I are not properly maintained due to paucity of funds. These forest roads are major communication networks for transportation of forest produce, for supervision of forestry operations and to check smuggling, illicit felling and poaching. Forest fringe dwellers also use these forest	

	roads. Therefore these roads require to be properly maintained. The footpaths and stoney patches on perennial streams need to be properly protected by patrolling in short intervals.	
Forest Fire Protection	**1.** The forest blocks coming under Protection Working Circle should be protected from fire. The Orissa Forest Fire Protection Rule, 1980 and provisions of Chapter XVII of Orissa Forest Department Code should be strictly reinforced in the field to preserve the precious micro-flora and fauna from further deterioration. **2.** The extent of fire and fire prone areas of the Division in respective blocks has already been in explained in Part-I. However, protection against fire requires concerted effort of the field staff and the forest fringe dwellers during the period February to May. **3.** Fire continues to be the major threat to forest regeneration and establishment. Fire Watcher system needs to be strengthened in the identified vulnerable areas. Depending upon requirement and availability of funds fire watchers will be provided to every Protection unit. **4.** The VSS should be involved in containing forest fires. Incidence of annual fire should be entered in the compartment history. Fire prone areas should be identified and precautionary measures taken in time. Every year fire maps need to be prepared block wise. Fire protection incentive schemes may be developed. **5.** Annual fire line clearance of 1 to 2-chain width in fire sensitive areas, coupled with controlled burning shall be done under the personal supervision of the Forester/Range Officer. Moreover, old fire lines, forest roads, boundary lines, village ring shall be kept clean by taking up control burning in 1-chain strip on both sides of it. **6.** Modern fire fighting methods should be adopted to prevent ground fire and crown fire. **7.** Awareness on the damage caused by fire to be created	

	amongst the people with provision of incentives so that the V.S.S. members will be encouraged to carry out the work in a devoted manner.	
Communication System and Mobility	**1.** The VHF system in vulnerable pockets of the Division needs to be strengthened. Fixed sets, mobile sets and hand set should be made available. Each Protection should be provided at least one fixed set and one hand set. **2.** Since fast communication is vital for transmitting information and also for deployment as well as re-enforcement in an emergency case, there shall be VHF system with fixed stations at the Divisional office and all the Range HQs and in every Protection Unit. Besides, all the four wheel vehicles shall also be installed with mobile VHF sets. **3.** Attempt shall be made to provide every Protection unit with a jeep/van **4.** Record in registers of communication through VHF and on daily patrolling done by the staff in Protection and mobile units should be properly maintained. **5.** A jeep to each range should be provided to carry out gang patrolling with staffs in suspected places and routes so as to check smuggling of forest produce to a great extent.	
Miscellaneous Regulation	**Grazing Control:** The annual protection areas shall remain closed for grazing for at least next five years. Grazing may be controlled in forests outside the protection series areas. Steps shall also be taken, in consultation with local people, to develop fodder resources for the use of affected local people who will be encouraged to cut grasses/collect fodder for stall-feeding of their cattle/livestock. However, the Orissa Forest (Grazing of Cattle) Rules, 1980 shall be followed meticulously. **Peoples' Participation:** Through development of a co-operative partnership between forest	

	departments and community user groups, joint forest management strategies can facilitate natural regeneration and improve management of natural forest lands. As biomass-dependent communities organize themselves around the protection and management of degraded forest lands, impressive gains in revegetation will be visible in many locations.	
Rights and Concessions	Rightsand concessions under this Working Circle shall be regulated in accordance with the provisions of the Orissa Forest Act, 1972; Rules made there under besides the Government policies in force.	
Control	All the entries regarding further encroachments, encroachment evictions, consolidation, illicit felling, poaching etc needs to be entered in the compartment histories. All the works undertaken must be entered in the compartment histories. The checking of compartment histories should form a part of the office inspections by the Conservator and the DFO.	
Scope of Intermediate Revision and Cost Norm	No major changes in the prescriptions of this Working Circle are anticipated. However, it may be reviewed if necessary, after five years jointly by the Conservator of Forests and Conservator of Forests, Working Plan. Any deviations suggested shall be subjected to the sanction of competent authority. The cost norm for implementation of prescription and the total estimated cost of working under this Working Circle is discussed in Financial Forecast and Cost of the Plan Chapter.	

JOINT FOREST MANAGEMENT (OVERLAPPING) WORKING CIRCLE

General Constitution	Amongst contemporary forest management strategies, JFM is both a positive and bold initiative. This programme, besides holding promise to enhance sustainability and productivity of the forest ecosystem could, to an extent, lead to fulfillment of the following long term social objectives: **1.** Enabling and empowering local communities (women and men) in sharing the management of the forest, thus enhancing their sense of ownership and commitment to the forest. This will also help the communities to gain more in confidence and self esteem.	

	2. Building of communities' institutions for enhancing grass root level management capabilities for local resource management. **3.** Relieving pressure of the Forest Department personnel from day to day management / repetitive protection duties so that their time could be utilized in other aspects of forest management which otherwise get neglected. Bringing in more transparency in working of the Forest Department. History of JFM in Orissa: Having realized that the forests cannot be protected or managed properly without achieve involvement of the local communities, the State Government of Orissa has taken the following steps: 1. The Orissa Village Forest Rules, 1985. 2. Government Resolution dt.1/8/1988. 3. Government Resolution dt.13/10/1988. 4. Government Resolution dt.11/12/90. 5. Government Resolution dt.3/7/93. 6. Government Resolution dt.30/9/96. 7. Government of India guidelines dt.21/2/2000. The important forest blocks included in this Working Circle are: **1.** Donga R.F. **2.** Kalamuri R.F. **3.** Sudrukumpa R.F. **4.** Ranaba R.F. **5.** Baraba R.F. **6.** Sikabadi P.R.F. **7.** Gochhapada R.F. **8.** Nuapadar R.F. **9.** Gerupada R.F. **10.** Chakapad R.F. **11.** Padangi R.F. **12.** Burtang (S) R.F. **13.** Kerandibali R.F.	

	14. Khaumunda R.F. **15.** Dakapalla R.F. **16.** Gumagarh R.F. **17.** Machhaghat R.F. **18.** Karada P.R.F. **19.** Bandhagarh 'B' R.F. **20.** Baghanadi R.F. **21.** Bandhagarh 'A' P.R.F. **22.** Lendrikia R.F. **23.** Tudubali R.F. **24.** Tikabali R.F. **25.** Palchi R.F.	
Character of Vegetation	Different types of forests ranging from mixed deciduous to dry deciduous scrub forest are present in this Working Circle. The detailed description of the vegetation in these forests has been covered in Chapter-II (A) Part-I. The important species present are *Shorearobusta, Anogeissuslatifolia, Terminaliatomentosa, Ougeiniaoojeinensis, Syzygiumcumini, Emblicaofficinalis, Haldinacordifolia, Aeglemarmelos, Albizziaprocera, Schleicheraoelosa, Holarrhenaantidysentrica, Nyctanthes arbor-tristis, Bauhinia vahlii, Asperagusrecemosus, Dendrocalamusstrictus*etc.	
Special Objectives of Management	The special objectives are enumerated below:- **1.** To involve communities in forest and natural resources management and soliciting their active participation. **2.** To bring the people and Forest department as equal partners in management practices. **3.** To restock barren and blank areas through artificial regeneration or Assisted or Aided Natural Regeneration (ANR). **4.** To enrich available growing stock by appropriate and site specific silvicultural practices. **5.** To increase the productivity of the soil through suitable soil and moisture conservation measures.	

	6. To encourage people for rational utilization of their own community resources for the development of the community in a sustained manner. **7.** To involve, guide and facilitate people in judicious and scientific NTFP collection, storage, value addition and trade. **8.** To create multiple income generating activities in villages protecting the forests. To study the scope of enhancing the network of VSS protection areas.	
Analysis and Valuation	The forest blocks allotted to this Working Circle are Village Forests or degraded R.Fs, proposed R.Fs, D.P.Fs, and K.Fs. etc. All these blocks have potential for rapid improvement since they have rooted waste, coppice shoots and pole crops. Degradation of these forests has taken place due to continuous biotic interference, fire, unregulated grazing etc. It is expected that with the formation of VSS and allotment of these degraded forests to the villagers most of the biotic pressure will be reduced thereby allowing for rejuvenation of the crop. As per JFM resolution of the State, micro plans are prepared for the area allotted to the V.S.S. The V.S.S. micro plans should be site specific treatment plan and normally follow the prescriptions outlined in the Rehabilitation Working Circle and JFM Working Circle.	
Area Allotment	There are altogether 759 nos. of V.S.S. which has been formed in the Division, thereby covering a total area of **56369.853ha.**The community protected areas are distributed in all the Ranges coming under the jurisdiction of Phulbani Forest Division.	
Silvicultural Practices in JFM	This Working Circle is an overlapping circle and hence the silvicultural system to be followed depends on the prescriptions outlined for the main Working Circle to which the block is primarily allotted. Moreover, the system of working in these particular areas would be guided by the micro plans prepared in conformity with the prescriptions of the main Working Circle, jointly by the	

	DFO/VSS for the individual VSS allotted areas. The intermediate and final felling to be proposed in the micro plans should be clearly mentioned and the yield needs to be fixed by taking into account all safeguards.	
Method of Execution of Operations	Demarcation of the areas assigned to the VSS for protection and management is the first important task. It is seen that this step helps to give a specific identity to the VSS motivate them to protect the forest and helps for better management. Micro plans should be prepared for each VSS irrespective of whether money for implementation is available or not. Each VSS should have a Micro plan and shall be prepared by involving all the villagers and adopting the 'Participatory Rural Appraisal' technique (PRA). It is important that the motivation level of the people to protect the forests should be sustained for a long period for the forest to respond to the protection provided. Well managed VSS should be identified and rewarded. The capacity of the lower functionaries of the Forest Department to work along with the villagers should be improved by training and exposure visits.	
Conflict Management in JFM	The following conflicts remain to be negotiated by natural resource managers/Foresters: **1.** Issues of short term livelihood needs and long term ecological conservation. **2.** Increasing biotic interference and limited carrying capacity of forest area. **3.** Resource ownership and programme ownership. **4.** Controls on exploitation and harvesting and increasing the scope of sharing. **5.** Extent of management by the people. **6.** Socio-cultural background and collective management ensuring equity and no gender biases. **7.** Poor or limited market infrastructure and emphasis on NTFP's marketing.	

	8. Economic, political and social plurality and task singularities as collective resource sharing, recycling the benefits and participatory decision making. **9.** Strong authority of Forest Department and sharing of authority, responsibility, control, facilitating empowerment. **10.** Demand between forestry and non-forestry uses of land in R.F. areas. **9.23.2.** To overcome above challenges, the negotiation skills of the foresters can play a positive role in shaping the institutionalization of JFM on the Division. The real challenge lies in the pace of transformation of organizational mandate into institutionalized process of participatory management. The present day ecological conflicts have their roots in economic compulsions, sociological stresses, technological intensification, changing consumption pattern, scarce land availability and contending resource users.	
Research needs in JFM	Research is needed in a number of important policy related areas that will effectively help in monitoring the success/failure and thus need remedial action. There are: **1.** Identifying factors facilitating/retarding people's participation in different geographical areas and socio-cultural contexts. **2.** Properly understanding the socio-anthropological dimensions and historical genesis of conflicts in man-forest interface and also rationalization of man-forest interactions in the context of changing socio-economic needs of society. **3.** Addressing gender issues through forestry programmes. **4.** Systematic programmes for genetic improvement and silvicultural management of tree and non-tree species which are of direct importance to local communities.	
Sustainability in JFM	Stated briefly, the concept of JFM rests on three pillars, for example: **1.Ecological Sustainability:** i. Appropriate resource assessment and enhancement.	

	ii. In situ/Ex-situ conservation and propagation. iii. Non-destructive harvest. iv. Integrated eco-system approach. v. **2. Economic sustainability:** Rural income generation. i. Food security. ii. Health cover. iii. Institutional support. iv. Processing, grading and value addition. v. Marketing. **3. Socio-cultural sustainability:** i. Capacity building of people at all levels. ii. Liberal use of social capital. iii. Incorporation of traditional knowledge base in forest management. iv. Representation of people from different communities. v. Priority given to people dependent entirely on forest resources. vi. Respect to value based systems. vii. Consideration for social norms and traditions of various groups.	
Control	All the areas assigned to the VSS should be marked on the toposheets of 1:25000 with appropriate treatment map and plan. The works taken up in the VSS areas should be entered in the compartment histories. The checking of compartment histories should form a part of the office inspections by the conservator and the DFO.	
Rights and Concessions	Rights and concessions in this Working Circle shall be regulated in accordance with the provisions of the relevant gazette notifications of the respective forest blocks and Government of Orissa policy with regard to JFM. The existing rights and concessions are elaborated in Part-I of this Plan.	
Interim Revision	No major changes in the prescriptions of this Working Circle are anticipated. However, it may be reviewed if necessary, after five years jointly by the Conservator of Forests (T) and Conservator of Forests (WP). Any deviations than the normal prescriptions suggested shall be subjected to approval and sanction of competent authority.	

CHAPTER – 15
TREES OUTSIDE FOREST

15.0 The total geographical area of Phulbani Forest Division is 3312.61 SqKm. The total forest area of this division under administrative control of forest department is 1472.38SqKm (44.5%) and under the control of the revenue department is 1119.36 SqKm (33.8%).In order to increase canopy cover in the State tree outside concept was conceived. Accordingly the seedlings were raised by Forest Dept. and distributed to Public with free of cost or with some nominal cost. Besides this plantations were also taken up in non-forest land under Avenue plantation. The detail list of distribution of seedlings and avenue plantations in Phulbani Forest Division is furnished in the table below.

Table No. 01

year	Name of the Scheme	Name of the Range	Name of the Site	Avenue Pltn in RKM	Seedlings Planted in lakh
2007-08	MGNREGS	Phulbani	Adasipada-Bhuktakanali	8	1336
2007-08	MGNREGS	Phulbani	PWD Road-Bedangapaju	4	668
2007-08	MGNREGS	Phulbani	Tilakpada-Titrapanga	4	668
2007-08	MGNREGS	Phiringia	RD Road-Banduli	6	1002
2007-08	MGNREGS	Phiringia	Kelapada-Bandhagada	6	1002
2007-08	MGNREGS	Phiringia	Sadingia-Panga	10	1670
2007-08	MGNREGS	Phiringia	Karandagada-Taladandikia	6	1002
			Total	44	7348
2008-09			Nil		
2009-10			Nil		
2010-11	MGNREGS	TIkabali	Paburia – Tikabali - PMGSY	6	1002
2010-11	MGNREGS	TIkabali	Pasara- Pakhalikia- PMGSY	6	1002
2010-11	MGNREGS	Raikia	Mandakia- Mlasumaha- PMGSY	4	668
2010-11	MGNREGS	Raikia	Bruahabadi- Mrudipanga - PMGSY	4	668
2010-11	MGNREGS	Phiringia	Balandapada- Luisingi- PMGSY	4	668
2010-11	MGNREGS	Phiringia	Salaguda-Bakipanga RD	10	1670

2010-11	MGNREGS	Phiringia	Krandibali – Suberpanga - PMGSY	4	668
2010-11	MGNREGS	Phiringia	Taladandikia- Burepanga - GP	6	1002
2010-11	MGNREGS	Phiringia	Chadeiapalli- Mandiapadar -GP	6	1002
2010-11	MGNREGS	Phiringia	Jajespanga-Sadingia -RD	8	1336
2010-11	MGNREGS	Phiringia	Nuapadar- Dimiriguda - PMGSY	4	668
2010-11	MGNREGS	Phiringia	Majhipada-Uadurga -PWD	6	1002
2010-11	MGNREGS	Phiringia	Taragabali- Dahisara -GP	4	668
2010-11	MGNREGS	Phulbani	FCI Square- Mallickshai – PWD	6	1002
2010-11	MGNREGS	Tikabali	Kainjhar- Dugapadar - PMGSY	4	668
2010-11	MGNREGS	Tikabali	Kaliketa- Gandagaon - PMGSY	4	668
			Total	86	14362
2011-12	MGNREGS	Phiringia	Bhrungijodi- Nuapadar - PMGSY	6	1002
2011-12	MGNREGS	Phiringia	Nuapadar- Dangerikia - PMGSY	4	668
2011-12	MGNREGS	Phiringia	Gochapada- Luhurasahi RD	6	1002
2011-12	MGNREGS	Phiringia	Gochapada- Krandibali – RD	8	1336
2011-12	MGNREGS	Phiringia	Dindiragaon- Palendi- GP	6	1002
2011-12	MGNREGS	Phiringia	Balkidadi- Kailamba –GP	4	668
2011-12	MGNREGS	Phiringia	DinabaliChhak-Kutinipadar- GP	6	1002
2011-12	MGNREGS	Phiringia	Balandapada – Bhatabahali- PMGSY	6	1002
2011-12	MGNREGS	Tikabali	Tikabali- Arabaka –PWD	10	1670
2011-12	MGNREGS	Raikia	Karada- Amlapeta - RD	4	668
			Total	**60**	**10020**
2012-13	MGNREGS	Phulbani	Garakumpa-Jhagadapada-PMGSY	4	668
2012-13	MGNREGS	Phulbani	DadkiChhak-Dimiripada – RD	4	668
2012-13	MGNREGS	TIkabali	Arabaka-Sitajadi- PWD	12	2004
2012-13	MGNREGS	TIkabali	Chakapad-Rupagon-PMGSY	4	668
2012-13	MGNREGS	TIkabali	Chakapad-Chahali- RD	4	668
2012-13	MGNREGS	Phiringia	Kailamba-Kelapada- GP	6	1002
2012-13	MGNREGS	Phiringia	Tanasu-Tambisuga-PMGSY	4	668

2012-13	MGNREGS	Phiringia	Khajurigaon-Krandibali - RD	4	668
2012-13	MGNREGS	Phiringia	Luising-Bhatul -PMGSY	6	1002
2012-13	MGNREGS	G.Udayagiri	Gutingia-Padangi - PMGSY	2	334
2012-13	MGNREGS	G.Udayagiri	Ranjabradi-Gandanaju - PMGSY	2	334
2012-13	MGNREGS	Raikia	Budringia-Jarginaju - RD	8	1336
			Total	**60**	**10020**
2013-14	Avenue	Sudrukumpa	Vetkhol- Ranipathar-PWD	15	3750
2013-14	Avenue	Tikabali	Padhanpada-Khajurisahi	4	1000
2013-14	Avenue	Tikabali	PWD Road-Lambarkhol	4	1000
2013-14	Avenue	Tikabali	Sankarakhol-Kainjhar	8	2000
2013-14	Avenue	Tikabali	Nidhiaberena-Pingujhol	4	1000
2013-14	Avenue	Tikabali	Pasara-Mundagaon	8	2000
2013-14	Avenue	Phulbani	TilakpadaChhak-Rasimendi	2	500
2013-14	Avenue	Phulbani	TilakpadaChhak-Rasimendi	3	750
2013-14	Avenue	Phulbani	Gudari-Datpaju	5	1250
2013-14	Avenue	Phiringia	Gochhapada-Nedipanga	4	1000
2013-14	Avenue	Phiringia	Similisahi-Sitikapati	4	1000
2013-14	Avenue	Phiringia	Balandapada-Boupanga	4	1000
2013-14	Avenue	G,Udaygiri	Malaguda-Manikeswar	12	3000
2013-14	Avenue	G,Udaygiri	PetapangaChhak-GP office	2	500
2013-14	Avenue	G,Udaygiri	Billabadi-Gressingia	2	500
2013-14	Avenue	Raikia	Ranjabradi-Gadingia	2	500
2013-14	Avenue	Raikia	Ranjabradi-Gandanaju	2	500
			TotalAvenue	**70**	**17500**
2013-14	Avenue	G.Udaygiri	G.Udayagiri-Kalinga	4	1000
2013-14	Avenue	G.Udaygiri	G.Udayagiri-Malansuga	2	500
2013-14	Avenue	G.Udaygiri	G.Udayagiri-Paburia	4	1000
2013-14	4406-SP Avenue	Raikia	BeredikiaChhak-Bedari	8	2000
2013-14	Avenue	Raikia	KanyasramChhak, Raikia-Gomandi	2	500
			Total	**20**	**5000**
2014-15	Avenue plntn	G.Udaygiri	Argadi-Saradamaha	4	1000

2014-15	Avenueplntn	Tikabali	Tikabali-Kainjhar	10	2500
2014-15	Avenueplntn	Tikabali	Lujuramunda - Alarsahi	4	1000
2014-15	Avenueplntn	Tikabali	Chakapd to Subalaya RD road	6	1500
2014-15	Avenueplntn	Tikabali	Ghudkapadar to Nediguda	10	2500
2014-15	Avenueplntn	Phulbani	Damigaon-Allami	4	1000
2014-15	Avenueplntn	Phulbani	Ghodagaduchhk-Balaskumpa	4	1000
2014-15	Avenueplntn	Phulbani	JaganathMandir - Majuribida	4	1000
2014-15	Avenueplntn	Raikia	Gumamaha -Mandasour	7	1750
2014-15	Avenueplntn	Raikia	Gressingia-Burupati road	3	750
2014-15	Avenueplntn	G.Udaygiri	Srikalaghat - Katadaganda	4	1000
2014-15	Avenueplntn	Phiringia	Biluri -Balandapada RD road	4	1000
2014-15	Avenueplntn	Phiringia	Manipadar - Seskajodi PMGSY	4	1000
2014-15	Avenueplntn	Phiringia	Gochhapadahatapada-Pipalmaha GP road	4	1000
2014-15	Avenueplntn	Phiringia	Atasramu-Dinabalichhaka	4	1000
2014-15	Avenueplntn	Phiringia	Kamatana-Biluri RD road	8	2000
2014-15	Avenueplntn	Phiringia	Nuapadar - Motingia GP road	6	1500
			Total Avenue	**90**	**22500**
2014-15	2406-State Plan Avenue	Phulbani	Main Road-Gudari	2	500
2014-15	2406-State Plan Avenue	Phulbani	Sartaguda-Alami	4	1000
2014-15	2406-State Plan Avenue	Phulbani	Belpadar-Dagarsuga	4	1000
2014-15	2406-State Plan Avenue	Phulbani	Pakanagaon-Biraguda	4	1000
2014-15	2406-State Plan Avenue	G.Udaygiri	Balumaha-Kalinga	6	1500
			Total SP Avenue	**20**	**5000**
2015-16	SP-Avenue	Tikabali	Purunapani-Bapalmendi	10	2500
2015-16	SP-Avenue	Phulbani	R.Nuagaon-Sankarakhole	10	2500
			Total SP-Avenue	**20**	**5000**
2015-16	MGNREGS	Phiringia	Jajespanga-Uperamingia GP road	5	1250
2015-16	MGNREGS	Phiringia	Kekeringia - Galesuga PMGSY road	5	1250
2015-16	MGNREGS	Phiringia	Balkidadi -	5	1250

			BandhagadaPWD road		
2015-16	MGNREGS	Phiringia	Sunamudi River- Kadipari GP Road	5	1250
2015-16	MGNREGS	Phiringia	Luising-Tetalpada Road	5	1250
2015-16	MGNREGS	G.Udayagiri	Penagoberi Chaka-Penagoberi	4	1000
2015-16	MGNREGS	G.Udayagiri	Lingagada-Betikala	5	1250
2015-16	MGNREGS	Tikabali	Gobardhanpur-Kutrasingh RD Road	6	1500
2015-16	MGNREGS	Tikabali	Kutrasingh - Nediguda RD Road	10	2500
			Total MGNREGS	**50**	**12500**
2016-17	Avenue	Phulbani	Teraguda-Majaganda	4	1000
2016-17	Avenue	Phulbani	AmbapadaChhak-Salunki Bridge	2	500
2016-17	Avenue	Phulbani	Katringia-Talapada	10	2500
2016-17	Avenue	Phulbani	R.Nuagaon-Sambepadar	10	2500
2016-17	Avenue	Phulbani	KhaumudaChhak-Nabaguba	6	1500
2016-17	Avenue	Phulbani	Bhuktakanali-Pradhanpada	8	2000
2016-17	Avenue	Phiringia	Bijukuti- Marisapada	4	1000
2016-17	Avenue	Phiringia	Motingia-Sundhigaon	6	1500
2016-17	Avenue	Phiringia	Suberpanga-Banduli	5	1250
2016-17	Avenue	Phiringia	KatadiSahi- Kenduguda	5	1250
2016-17	Avenue	G.Udayagiri	Gressingia-Gutuguda	4	1000
2016-17	Avenue	G.Udayagiri	TropaGhat- Katingia PWD Road	4	1000
2016-17	Avenue	G.Udayagiri	Kilapanga-Sipaeju PMGSY Road	4	1000
2016-17	Avenue	G.Udayagiri	Boriguda-Gutingia	8	2000
2016-17	Avenue	Tikabali	Sankarakhol-Bapalmendi	6	1500
2016-17	Avenue	Raikia	Borepanga-Sidingipatta RD Road	4	1000
			Total Avenue MGNREGS	**90**	**22500**
2016-17	Avenue	Phulbani	BisipadaChhak-Salunki River	2	500
2016-17	Avenue	Phiringia	Phulbani Range Border ,Bisipada -Bandhagada	18	4500
			Total Avenue SP	**20**	**5000**
2017-18	AvenuePltn	Phulbani	Suduli - Nabaguba	2	5000
2017-18	AvenuePltn	Phulbani	Tudipaju - Dubagada	4	10000

2017-18	AvenuePltn	Phulbani	Garakumpa - Balisugri	4	10000
2017-18	AvenuePltn	Phulbani	Lambagudri - Sitagudri	3	7500
2017-18	AvenuePltn	Phiringia	Jajespanga - padipanga	2	5000
2017-18	AvenuePltn	Phiringia	Rangapanga - Rugudisahi	4	10000
2017-18	AvenuePltn	Phiringia	Pabingia - Dengagadu	6	15000
2017-18	AvenuePltn	Phiringia	Telapali - Bisipada	6	15000
2017-18	AvenuePltn	Phiringia	Bisipada - Mallickpada	7	17500
2017-18	AvenuePltn	G.Udayagiri	Gutingia - Banangia	6	15000
2017-18	AvenuePltn	G.Udayagiri	Gutingia - Adasikupa	4	10000
2017-18	AvenuePltn	G.Udayagiri	Nilungia - Srikala	4	10000
2017-18	AvenuePltn	G.Udayagiri	Nilungia - Lingagada	6	15000
2017-18	AvenuePltn	Tikabali	Salaguda - Sirikakuti	6	15000
2017-18	AvenuePltn	Tikabali	Nandini - Pakhalakhia	8	20000
2017-18	AvenuePltn	Tikabali	Ghudukapadar - Ranagaon	6	15000
2017-18	AvenuePltn	Tikabali	Brahmanpada - Ringibadi	6	15000
2017-18	AvenuePltn	Raikia	KanyashramChhak to Badajeri	6	15000
			Total MGNREGS (Avenue Pltn)	**90**	**225000**
2018-19	MGNREGS	Phulbani	KendrigudaChhak to Padarsahi	4	1000
2018-19	MGNREGS	Phulbani	Balaskumpa to Ghodapathar-RD road	6	1500
2018-19	MGNREGS	Phulbani	R.Nuagaon to Dalapada-PMGSY	6	1500
2018-19	MGNREGS	Phiringia	Bhrungijodi to Sungamaha	6	1500
2018-19	MGNREGS	Phiringia	Masiripada to Sakhipada	8	2000
2018-19	MGNREGS	G.Udayagiri	Sirki to Dakapala	4	1000
2018-19	MGNREGS	G.Udayagiri	Nandagiri to Padasahi	3	750
2018-19	MGNREGS	G.Udayagiri	Raipada to Kurmingia	3	750
2018-19	MGNREGS	Raikia	Talagada to Podamari	6	1500
2018-19	MGNREGS	Tikabali	Linepada to Ladda	10	2500
			Avenue Pltn(MGNREGS)	**56**	**14000**
2019-20	MGNREGS (Avenue)	Tikabali	Linepada to Nandani	8	2000
2019-20	MGNREGS (Avenue)	Tikabali	Beheragaon to Takalmendi	4	1000
2019-20	MGNREGS (Avenue)	Tikabali	Chakapad to Ranagaon	4	1000
2019-20	MGNREGS (Avenue)	Tikabali	Sunapanga to Tengedapathar	10	2500
2019-20	MGNREGS (Avenue)	Tikabali	Koinjhar to Nuasahi	10	2500

2019-20	MGNREGS (Avenue)	Tikabali	Kalikheta to Gandagaon	4	1000
2019-20	MGNREGS (Avenue)	G.Udayagiri	Rudangia to Gadaguda	3	750
2019-20	MGNREGS (Avenue)	G.Udayagiri	Kurmingia to Sujeli	4	1000
2019-20	MGNREGS (Avenue)	G.Udayagiri	Lingagada to Mundakanga	3	750
2019-20	MGNREGS (Avenue)	Phiringia	Bandhagada to Karandagada	4	1000
2019-20	MGNREGS (Avenue)	Phiringia	Kalipanga to Nuapadar	5	1250
2019-20	MGNREGS (Avenue)	Phiringia	Kutiguda to KekeringiaChhaka	7	1750
2019-20	MGNREGS (Avenue)	Phiringia	Pabingia to Lengarana	6	1500
2019-20	MGNREGS (Avenue)	Raikia	Badejore to Gurudev high School	5	1250
			Total MGNREGS (Avenue)	**77**	**19250**
2020-21	MGNREGS (Avenue)	Phulbani	Lambabadi to Rangamatia	6	0.015
2020-21	MGNREGS (Avenue)	Phulbani	Kabara to Ghodapathar	8	0.02
2020-21	MGNREGS (Avenue)	Phulbani	Palchi to Gadipadar	6	0.015
2020-21	MGNREGS (Avenue)	Phiringia	Bisipada to Dimiriguda	10	0.025
2020-21	MGNREGS (Avenue)	Phiringia	Lampadar to patkhol	5	0.0125
2020-21	MGNREGS (Avenue)	Phiringia	Dimiriguda to Sripala	3	0.0075
2020-21	MGNREGS (Avenue)	Phiringia	Gerupada to Jayalamba	2	0.005
2020-21	MGNREGS (Avenue)	Tikabali	Gasaguda to Purunagarh	6	0.015
2020-21	MGNREGS (Avenue)	Tikabali	BrekaChhak to Bidangia	4	0.01
2020-21	MGNREGS (Avenue)	Tikabali	Bodimunda to Gadasoru	6	0.015
2020-21	MGNREGS (Avenue)	Tikabali	Budukakhol to Tilabadi	10	0.025
2020-21	MGNREGS (Avenue)	Tikabali	Gudari to Ududubа	4	0.01
2020-21	MGNREGS (Avenue)	Raikia	Chunapali to Gadisala	10	0.025
2020-21	MGNREGS (Avenue)	Raikia	DigiChhack to Padasai	6	0.015
2020-21	MGNREGS (Avenue)	Raikia	Birachack to Sikabadi	4	0.01
2020-21	MGNREGS (Avenue)	G.Udayagiri	GutingiaChowk to Tlausuga	4	0.01

2020-21	MGNREGS (Avenue)	G.Udayagiri	Kalinga DAV to Kundasahi	4	0.01
2020-21	MGNREGS (Avenue)	G.Udayagiri	Katadaganda to Nilungia	3	0.0075
2020-21	MGNREGS (Avenue)	G.Udayagiri	KatadiChowk to Giruti	3	0.0075
2020-21	MGNREGS (Avenue)	G.Udayagiri	Puklingia to Linga	2	0.005
2020-21	MGNREGS (Avenue)	G.Udayagiri	Brenguda to Gasaguda	4	0.01
			Total MGNREGS	**110**	**0.275**

Table No. 02 Distribution of Seedlings

Year	**Name of the Scheme**	**Name of the Range**	**seedlings distributed in Lakhs**
2013-14	13th FC	Phiringia	1.1
2013-14	13th FC	Raikia	1
2013-14	13th FC	G.Udaygiri	1.3
2013-14	13th FC	Phulbani	1.2
2013-14	13th FC	Sudrukumpa	1
2013-14	13th FC	Tikabali	1.3
2013-14	13th FC	Karada	0.5
	Total		7.4
2014-15	13th FCG	Phulbani	1.2
2014-15	13th FCG	Phiringia	1.2
2014-15	13th FCG	G.Udaygiri	1.2
2014-15	13th FCG	Karada	0.5
2014-15	13th FCG	Sudrukumpa	0.75
2014-15	13th FCG	Tikabali	1.3
2014-15	13th FCG	Raikia	1.25
	Total		7.4
2014-15	2406-SP Agro Forestry	Phulbani	1.15
2014-15	2406-SP Agro Forestry	Phiringia	1.15
2014-15	2406-SP Agro Forestry	G.Udaygiri	1.15
2014-15	2406-SP Agro Forestry	Tikabali	1.15
2014-15	2406-SP Agro Forestry	Sudrukumpa	0.25
2014-15	2406-SP Agro Forestry	Raikia	1.15
	Total		6
2015-16	3024-SP-Mgmt of Forest (TOF)	Phiringia	0.434
2015-16	3024-SP-Mgmt of Forest (TOF)	Raikia	1
2015-16	3024-SP-Mgmt of Forest (TOF)	Tikabali	0.5903
2015-16	3024-SP-Mgmt of Forest (TOF)	G.Udayagiri	0.62
2015-16	3024-SP-Mgmt of Forest (TOF)	Karada	0.5
2015-16	3024-SP-Mgmt of Forest (TOF)	Sudrukumpa	0.75
2015-16	3024-SP-Mgmt of Forest (TOF)	Phulbani	0.8625
2015-16	Total		4.7568
2015-16	Agro Forestry-SP	Phulbani	0.5
2015-16	Agro Forestry-SP	Phiringia	0.2425

2015-16	Agro Forestry-SP	G.Udayagiri	0.42875
2015-16	Agro Forestry-SP	Tikabali	0.2102
2015-16	Agro Forestry-SP	Raikia	0.32
2015-16	Agro Forestry-SP	Sudrukumpa	0.25
	Total		**1.95145**
2016-17	TOF - CAMPA	Tikabali	1
2016-17	TOF - CAMPA	Raikia	0.75
2016-17	TOF - CAMPA	Phiringia	1
2016-17	TOF - CAMPA	G.Udayagiri	1
2016-17	TOF - CAMPA	Phulbani	1
2016-17	TOF - CAMPA	Sudrukumpa	0.1
2016-17	TOF - CAMPA	Karada	0.15
	Total TOF		**5**
2016-17	Agro - SP	Tikabali	0.5
2016-17	Agro - SP	Raikia	0.25
2016-17	Agro - SP	Phiringia	0.75
2016-17	Agro - SP	G.Udayagiri	0.5
2016-17	Agro - SP	Phulbani	0.75
2016-17	Agro - SP	Sudrukumpa	0.25
	Total Agro.SP		**3**
2017-18	MGNREGS-Agro Forestry	Phulbani	0.06855
2017-18	MGNREGS-Agro Forestry	Raikia	0.014
2017-18	MGNREGS-Agro Forestry	Tikabali	0.1
	Total		**0.18255**
2017-18	MGNREGS-TOF	Phiringia	0.353
2017-18	MGNREGS-TOF	G.Udayagiri	0.06
2017-18	MGNREGS-TOF	G.Udayagiri	0.026
	Total		**0.439**
2017-18	Urban Pltn. OEMF	Phulbani	0.008
2017-18	Urban Pltn. OEMF	G.Udayagiri	0.008
	Total		**0.016**
2017-18	Urban-OMC	Phulbani	0.008
2017-18	Urban-OMC	G.Udayagiri	0.008
	Total		**0.016**
2018-19	MGNREGS (TOF)	Phiringia	0.5
2018-19	MGNREGS (TOF)	Tikabli	0.3
2018-19	MGNREGS (TOF)	G.Udayagiri	0.1
2018-19	MGNREGS (TOF)	Phulbani	0.5
2018-19	MGNREGS (TOF)	Sudrukumpa	0.1
	Total		**1.5**
2018-19	MGNREGS(Agro Forestry)	Phiringia	0.3
2018-19	MGNREGS(Agro Forestry)	Phulbani	0.9
2018-19	MGNREGS(Agro Forestry)	Tikabali	0.5
2018-19	MGNREGS(Agro Forestry)	Raikia	0.5
2018-19	MGNREGS(Agro Forestry)	G.Udayagiri	0.5
2018-19	MGNREGS(Agro Forestry)	Sudrukumpa	0.3
	Total		**3**
2019-20	IGC-Distribution Nursery	Phulbani	0.273
2019-20	IGC-Distribution Nursery	Phiringia	0.2

2019-20	IGC-Distribution Nursery	G.Udayagiri	0.25
2019-20	IGC-Distribution Nursery	Sudrukumpa	0.1
2019-20	IGC-Distribution Nursery	Raikia	0.08
2019-20	IGC-Distribution Nursery	Tikabali	0.2
	Total		**1.103**
2019-20	**MGNREGS(TOF)**	**Phulbani**	**0.5**
2020-21	CAMPA Distn	Phulbani	1
2020-21	CAMPA Distn	Tikabali	1
	Total		**2**
2020-21	OEMF	Phiringia	1
2020-21	OEMF	Raikia	0.5
2020-21	OEMF	Karada	0.3
2020-21	OEMF	Sudrukumpa	0.7
2020-21	OEMF	G.Udayagiri	0.5
	Total		**3**
2020-21	MGNREGS-TOF	Phulbani	0.3
2020-21	MGNREGS-TOF	Karada	0.4
2020-21	MGNREGS-TOF	Tikabali	0.3
2020-21	MGNREGS-TOF	Raikia	0.2
2020-21	MGNREGS-TOF	G.Udayagiri	0.3
	Total		**1.5**
2020-21	MGNREGS-Agro Forestry	Phiringia	1
2020-21	MGNREGS-Agro Forestry	Sudrukumpa	1
2020-21	MGNREGS-Agro Forestry	Raikia	1
2020-21	MGNREGS-Agro Forestry	G.Udayagiri	1
	Total		**4**
2020-21	IGC-Surplus AR	Phulbani	0.16
2020-21	IGC-Surplus AR	Phiringia	0.32
2020-21	IGC-Surplus AR	Tikabali	0.16
2020-21	IGC-Surplus ANR	Phulbani	0.4
2020-21	IGC-Surplus ANR	Raikia	0.4
2020-21	IGC-Surplus ANR	G.Udayagiri	0.14
2020-21	IGC-Surplus ANR	Phiringia	0.8
2020-21	IGC-Surplus UTP	Phulbani	0.04
2020-21	IGC-Surplus UTP	G.Udayagiri	0.05
	Total IGC		**2.47**

15.1 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.

15.1.1 General Objectives:

i. To increase tree cover of the district through planting outside the forest land. ii. To increase bio mass production by planting quick growing species. iii. To stabilize the

sand / loose soil through planting. iv. To improve the aesthetic value along the road network. v. To increase availability of Bamboo for artisans.

a) Avenue Plantations:

To improve the aesthetic value of the land scape,

- 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.

b) 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

15.2 Method of Treatment:

15.2.1 In case of mixed Plantation:

- The mixed plantations assigned to a particular year is to be treated in the following manner.
- Area to be re-demarcated and pillars posted are to be rechecked.
- The survival percentage is to be ascertained along with the growth pattern.
- Elite thinning is to be carried out. If the survival percentage is around 60% no thinning is to be taken up.
- Any substantial blank area, if created due to mortality / biotic interference etc, the same is to be planted up with the help of VSS.
- In course of protection, if natural vegetation has come up it may be recorded in the plantation journal.
- During thinning importance of natural grown species is to be kept in mind.
- If the natural vegetation is in a sapling stage, then Silvicultural cleaning is to taken up instead of thinning. (Cleaning in Sapling stage – height within 3m.

Thinning in Pole crop and above i.e BGH above 30 cms. And dead bark formation).

- The thinning materials are to be distributed among the VSS members as per JFM resolutions.

15.2.2For Avenue Plantations:

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.

a) 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.

b) 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.

c) 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.

d) All retained plants above 30cm GBH are to be checked for hanging branches if found to be removed.

e) The PWD / NH authority may be requested to put Radiant paints on trees at Breast Height for visibility during night.

15.2.3 Species suggested for Road Side Plantation.

Considering the soil characteristics, proximity to tourist sports, 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) *Lagerstromia flosreginae* (Patuli),
b) *Cassia fistula* (Sunari),
c) *Dalbergia sisoo* (Sisoo),
d) *Syzigium cumini* (Jamu)
e) *Mangifera indica*(Aam)
f) *Samania saman* (BadaChakunda)
g) *Peltoferrum ferugineum* (Radha Chuda)
h) Sp*athodia campanulata*(Mysore Queen)
i) *Mimusops elengi* (Baula)
j) *Azadiractai ndica* (Meem)
k) *Alstonia scholaris* (Chatiana)
l) *Pongamia pinnata* (Karanja)

Planting of 18months old promising seedlings is suggested for avenue plantation.

15.2.4 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 100 seedlings for planting.
- 10% of such cases, the person is 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 rendered. 2% of such plantation sites are to be verified by the Range Officer.
- 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 for future reference.

CHAPTER -16

Reduce Emissions from Deforestation and forest Degradation (REDD+)

16.1 Introduction:

16.1.1REDD+ 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.

16.1.2 Eighty percent of the Earth's above-ground terrestrial carbon and forty percent of belowground 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.

16.1.3 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.

16.1.4 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.

16.1.5 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.

16.1.6 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.

16.1.7 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.

16.2 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 adaption. 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.

16.3 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 publicprivate partnerships to scale up investments on REDD+ implementation

16.3.1 Country highlights:

16.3.1.1 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.

16.3.1.2 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.

16.3.1.3 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.

16.3.2 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 VikasYojana,
- Soil Health Card Scheme,
- PradhanMantri Krishi SinchayeeYojana,
- National Mission for Clean Ganga etc among others.

16.3.3 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.

16.3.3 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) Reduction of number of mature trees in Forest stand in accordance to working plan prescription since this does not contribute to Carbon sequestration.
c) To reduce dependency on fossil fuel including that of firewood.
d) To enhance use of solar energy / wind energy where ever possible.

e) To motivate people to reduce consumerism & reduce generation of solid waste.
f) Conserve water body and enhance efficient use of water.
g) To utilize forest eco system as potential source of food alternatives for the local people and promoting suitable species.

CHAPTER-17

WATER RESOURCE MANAGEMENT

17.1 Introduction:

The forests are sources of water (surface, sub-surface and ground water). It is desirable to have forest management practices dovetailed with the principles of watershed based development approach especially in the source areas of water.

17.2 Importance of Water Management from Forests:

17.2.1 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.

17.2.2 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 program at the national and regional levels.

17.2.3 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.

17.2.4 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.

17.3 Rainfall & Climate

17.3.1 The district enjoys sub-tropical climate characterized by summer's cold winters & rainy. The winter season generally commences from late November & continues up to the end of February. It is observed that about 90% of the total annual rainfall takes place due to South West monsoon between the middle of June & mid-October. The northeast monsoon gives erratic & insufficient rainfall. The normal annual rainfall is 1443.5mm. The rainfall is highly erratic both in space and time. There is a large spatial variation as observed from the rainfall data of various blocks. The summer season commences from March & continues till middle of June where the maximum temperature varies from 34.3^{o} to 47.7^{o} C. May being the hottest with the mean daily maximum temperature of 41.4^{o} C while December is the coldest month of the year when the temperature drops down to 6^{o} C. Humidity of the air is generally high during southwest monsoon season and decreases due to the effect of cold waves during the end of November. The relative humidity varies from 26% to 84% during different periods of the year. Wind is generally light to moderate but it increases during summer. During summer wind direction is variable and in rainy season wind from southwest direction is very common.

17.3.2 Rainfall is largely influenced due to highly undulating hilly terrains. High hills of Karada, Burtang, Chakapad, Ranipathar, Donga, Kalabagh etc. form a contineous stretch the part of eastern ghats. The rainfall varies from place to place in this division. Wind ward side gets ample rain fall. The lee ward side experiences scanty rain fall. Rainfall data of 2008-2015 is furnished below.

Year-2008

Month	Chakapad	G.Udayagiri	Khajuripada	Phiringia	Phulbani	Raikia	Tikabali	Total
January	0.00	0.00	3.00	40.00	0.00	35.00	497.60	575.60
February	0.00	0.00	0.00	8.00	0.00	0.00	0.00	8.00
March	0.00	0.00	0.00	5.00	0.00	0.00	95.00	100.00
April	0.00	0.00	0.00	15.00	0.00	0.00	0.00	15.00
May	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
June	171.00	60.40	341.00	245.00	270.00	170.00	285.40	1542.80
July	316.00	78.00	71.50	296.00	262.20	181.00	444.00	1648.70
August	287.00	305.00	163.00	332.00	489.40	292.00	545.00	2413.40
September	540.00	358.00	153.00	760.00	449.00	464.00	753.00	3477.00
October	117.00	121.00	0.00	79.00	31.00	10.00	25.00	383.00
November	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
December	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**1431**	**922.4**	**731.5**	**1780**	**1501.6**	**1152**	**2645**	**10163.50**

Year-2009

Month	Chakapad	G.Udayagiri	Khajuripada	Phiringia	Phulbani	Raikia	Tikabali	Total

January	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
February	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
March	0.00	0.00	0.00	14.00	0.00	0.00	0.00	14.00
April	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
May	78.00	0.00	0.00	12.00	0.00	0.00	0.00	90.00
June	846.20	0.00	0.00	1080.00	0.00	0.00	0.00	1926.20
July	846.00	0.00	0.00	1080.00	0.00	0.00	0.00	1926.00
August	303.00	0.00	0.00	285.00	0.00	0.00	0.00	588.00
September	195.00	0.00	0.00	174.00	0.00	0.00	0.00	369.00
October	136.00	0.00	0.00	0.00	0.00	0.00	0.00	136.00
November	49.00	0.00	0.00	17.00	0.00	0.00	0.00	66.00
December	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	2453.2	0	0	2662	0	0	0	5115.2

Year-2010

Month	**Chakapad**	**G.Udayagiri**	**Khajuripada**	**Phiringia**	**Phulbani**	**Raikia**	**Tikabali**	**Total**
January	61.00	33.00	22.00	0.00	1.00	4.00	84.00	205.00
February	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
March	0.00	85.00	0.00	0.00	0.00	5.00	0.00	90.00
April	18.00	0.00	20.00	0.00	0.00	56.00	10.00	104.00
May	161.00	184.00	138.00	27.00	78.00	129.00	187.00	904.00
June	173.00	136.00	144.00	144.00	127.00	53.50	163.00	940.50
July	341.00	324.00	299.00	255.00	279.00	263.00	2097.00	3858.00
August	274.00	292.00	246.00	330.60	234.00	151.00	386.00	1913.60
September	349.00	273.60	293.90	270.30	258.00	162.00	1030.00	2636.80
October	276.00	248.00	79.00	80.00	35.60	75.50	289.00	1083.10
November	57.00	81.00	24.00	0.00	15.00	0.00	74.00	251.00
December	50.00	38.00	38.00	42.90	12.00	429.00	46.00	655.90
Total	1760	1694.6	1303.9	1149.8	1039.6	1328	4366	12641.9

Year-2011

Month	**Chakapad**	**G.Udayagiri**	**Khajuripada**	**Phiringia**	**Phulbani**	**Raikia**	**Tikabali**	**Total**
January	0.00	15.00	0.00	0.00	16.00	0.00	84.00	115
February	33.00	26.50	9.00	0.00	3.00	6.00	38.00	115.5
March	10.00	18.00	4.00	4.00	0.00	9.00	9.00	54
April	94.00	117.30	101.30	88.50	0.00	4.50	158.00	563.6
May	79.00	143.81	92.00	62.00	32.05	52.00	131.60	592.46
June	132.00	99.00	206.00	148.00	5.50	809.00	185.00	1584.5
July	160.00	108.00	109.00	125.50	1397.00	184.30	230.00	2313.8
August	254.00	277.00	460.00	324.00	239.16	519.16	452.00	2525.32
September	317.60	106.00	339.60	340.50	203.30	514.00	303.20	2124.2
October	52.00	9.00	35.00	81.00	54.20	5.00	75.00	311.2
November	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00

December	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	1131.6	919.61	1355.9	1173.5	1950.21	2103.96	1665.8	10300.58

Year-2012

Month	Chakapad	G.Udayagiri	Khajuripada	Phiringia	Phulbani	Raikia	Tikabali	Total
January	63.00	3.00	110.00	139.00	880.00	39.00	67.20	1301.2
February	0.00	0.00	0.00	8.00	0.00	0.00	0.00	8
March	0.00	0.00	0.00	5.00	0.00	0.00	95.00	100
April	0.00	0.00	0.00	15.00	0.00	0.00	0.00	15
May	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
June	170.00	63.00	342.00	200.00	150.00	120.00	179.00	1224
July	347.00	77.00	71.50	296.00	262.20	181.00	444.00	1678.7
August	290.00	300.00	163.00	332.00	489.40	292.00	545.00	2411.4
September	530.00	357.00	153.00	760.00	449.00	464.00	753.00	3466
October	112.00	112.00	0.00	79.00	31.00	10.00	25.00	369
November	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
December	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	1512	912	839.5	1834	2261.6	1106	2108.2	10573.3

Year-2013

Month	Chakapad	G.Udayagiri	Khajuripada	Phiringia	Phulbani	Raikia	Tikabali	Total
January	0.00	13.00	0.00	13.20	43.00	609.00	44.00	722.20
February	24.00	2.00	7.00	0.00	0.00	3.00	0.00	36.00
March	0.00	0.00	0.00	5.00	0.00	0.00	95.00	100
April	0.00	0.00	0.00	15.00	0.00	0.00	0.00	15
May	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
June	179.00	65.00	345.00	200.00	155.00	125.00	174.00	1243
July	350.00	75.00	72.00	295.00	264.00	187.00	455.00	1698
August	295.00	350.00	165.00	339.00	495.00	293.00	555.00	2492
September	550.00	339.00	155.00	769.00	444.00	465.00	755.00	3477
October	112.00	113.00	0.00	75.00	35.00	15.00	26.00	376
November	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
December	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**1510**	**957**	**744**	**1711.2**	**1436**	**1697**	**2104**	**10159.2**

Year-2014

Month	Chakapad	G.Udayagiri	Khajuripada	Phiringia	Phulbani	Raikia	Tikabali	Total
January	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

February	0.00	0.00	0.00	8.00	0.00	0.00	0.00	8.00
March	0.00	0.00	0.00	5.00	0.00	0.00	95.00	100.00
April	0.00	0.00	0.00	15.00	0.00	0.00	0.00	15.00
May	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
June	170.00	60.20	341.00	255.00	275.00	176.0	275.00	1552.20
July	320.00	79.31	71.50	295.00	263.00	159.0	445.00	1632.81
August	290.00	305.20	163.00	330.00	245.00	200.0	555.00	2088.20
September	550.00	359.00	153.00	750.00	445.00	465.0	780.00	3502.00
October	115.00	122.00	0.00	80.00	31.00	15.00	37.00	400.00
November	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
December	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**1445**	**925.71**	**728.5**	**1738**	**1259**	**1015**	**2187**	**9298.21**

Year-2015

Month	**Chakapad**	**G.Udayagiri**	**Khajuripada**	**Phiringia**	**Phulbani**	**Raikia**	**Tikabali**	**Total**
January	56.00	16.80	25.00	15.00	25.00	24.00	23.00	184.80
February	52.00	20.00	19.00	20.00	23.00	12.00	12.00	158.00
March	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
April	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
May	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
June	170.00	145.00	60.52	342.00	175.00	312.00	244.00	1448.52
July	139.00	160.00	158.00	125.00	181.00	272.00	256.00	1291.00
August	188.00	201.20	334.00	255.00	166.00	123.00	157.00	1424.20
September	157.00	250.00	129.00	130.00	172.00	124.00	553.00	1515.00
October	245.00	126.00	125.00	125.00	100.00	200.40	251.00	1172.40
November	0.00	0.00	12.00	0.00	0.00	0.00	17.31	29.31
December	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**1007**	**919**	**862.52**	**1012**	**842**	**1067.4**	**1513.312**	**7223.23**

17.3.3 Rain water harvesting:

Rainwater 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.

17.3.4 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.

17.3.5 The rainwater harvesting system is one of the best methods practiced 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.

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.

17.4 Rivers and its tributaries of Phulbani Division

This division has three major rivers namely, Salki, Bagh, Khadag. Baghanadi, forming the western boundary of the division separating it from Baliguda division to some extent in the Phiringia range. These three rivers are flowing from the southern part of the division towards the north; and they formulate the major perennial source of water supply.

A number of tributaries are supplying water to these rivers. Salki&Baghnadi are the two main tributaries of river Mahanadi. But Khadagnadi is a tributary of Salkinadi. Salkinadi carries water from different parts of Raikia and G.Udaygiri range through a number of small nalas in one branch. Similarly, the other branch of Salkinadi, carries water from Khajuripada and Phulbani areas, in the name of Pilasalunki river, which remains perennial throughout the year. So the course of river Salki and its tributaries play a major role in supplying water to the local tribal people. Similarly, Khadagriver, Baghnadi and its tributaries mostly remain perennial, along their course to supply water to the people of Phiringia range. In Karada range, Karadanala is the main tributary of the river Rusikulya supplying water to the Karada area and remains perennial throughout the year. Other tributary-nalas flowing in this area remain dry throughout the year except the rainy season.

17.4.1 The water supply in the eastern part of this division i.e. in Chakapad plateau depends on the tributary nalas of Burtangriver, originating from Burtang north & South and Chakapad hills. Burtangnala emerges as a stream from the Chakapad hills which subsequently meet Kalaranala to form Burtang nadi and runs downward through Nayagarh division to meet river Mahanadi. It is perennial throughout the year, but its tributaries remain dry except during rains. These are the major sources of water supply in this area besides the ground water. However water supply becomes scanty in summer when majority of the streams dry out.

17.4.2 Duration of water flow in the selected streams

Information on water flow in the selected streams					
Sl. No.	**Name of the Block**	**Name of stream/river**	**Original from**	**Passes through**	**Duration of water flow**
1	Phulbani PRF	Panaspadar river	Bhetkhol	Adjacent to Phulbani PRF	10 month
2	Khaumunda RF	SakadiNala	Gumurukhol	Adjacent to Khaumunda PRF	8 month
3	Dakpala A RF	Luhurubali	Buluni village forest area	Adjacent to Dakpala Ä RF	10 month
4	Dadaki RF	Uleketanala	Uleketa	Pundali	Whole year
5	Kalabagh RF	Gunjimarinala	Gadapaju	Butumendi	10 month
6	Kalabagh RF	Orakajajhhora	Tadri	Krandijhari	Whole year
7	Katringia PRF	Kusumpaninala	Ranisbali	Palchi	Whole year
8	Palchi RF	Katramlanala	Mundasahi	Katramalanala	Whole year
9	Dutiemendi RF	Lambagudrinala	Arapaju	Balaskumpa, Sidingi	Whole year

10	Gumagada RF	Doninala	Doni	Gumagada	10 month
11	Gumagada RF	Bausa	Dubaghati	Gumagada	10 month
12	Gumagada RF	RangagudaNala	RingagaduNala	Badabhuin	10 month
13	Gumagada RF	Bhuktakanali	Bhuktakanali jungle	Bhuktakanali	10 month
14	Gumagada RF	Kuragadi	Koragadu	Dudulipadarasahi	June to April
15	Gumagada RF	Makarajharinala	Gumagada RF	Kambaguda village	Whole year
16	Brutanga N RF	Sakadi stream	Arapajku village	Sakadihatibadi	8 month
17	Pandrisuga RF	R.Nuagaon	Arapaju	Sidngi dam	10 month
18	Krandibali East RF	Baghanadi	Bandhagada	Bagali	Whole year
19	Ladapadar RF	Khadganadi	Khamankhol RF	Pandurgara	Whole year
20	Kiamunda PRF	Khadganadi	Khamankhol RF	Pijubali, Godapanga	Whole year
21	Gochhapada RF	Sunamudi river	Majhipada	Kanibali	Whole year
22	Baghanadi RF	Baghanadi	Bandhagada	Labangi, Murja	Whole year
23	Baghanadi RF	Budajornadi	Kaladi	Pindangi	Only rainy season
24	Krandibali (W) RF	Baghanadi	Bandhagada	Baladuli, Gadapanga	Whole year
25	Bandhagada A PRF	Baghanadi	Bandhagada	Panjapadar, Lambagudri	Whole year
26	Baghanadi RF	Kerengejodinala	Bandhagada	Kalamunda	Only rainy season
27	Sudrukumpa RF	Bananginala	Dadimari	Dadaki, Barpulia, Kholiapadara	July to April 10 month
28	Sudrukumpa RF	DodamaskaNala	Sarkesaru	Mallickpada	July to January 7 month
29	Ranipathar RF	NateikholaNala	Janmeni	Badghara, Badiguda, Panisal	July to March

17.5 Hydrogeology

The district is mostly underlain by Archean crystalline of Eastern-ghatfacies with limited patches of lower Gondwana sandstone and recent laterites and alluvium. Features like geological set up, rainfall distribution and the degree of primary and secondary porosity controls the hydrogeological framework of a place. As the district is underlain by diverse rock type as already discussed, it results in contrasting water bearing properties of these different geological formation. Depending on the nature of formations and their water bearing capacities etc, the rock formations of the district may be divided broadly into two major hydrogeological units viz –

1) Consolidated formations

2) Semi-consolidated formation

3) Unconsolidated formations

17.6 Ground Water Resource-

The ground water level goes down considerably resulting in drying up of most of the dug-wells, ponds & tube wells at least for some time during peak summer, in the month of May.

17.6.1 The district was geologically studied by Geological Survey of India and the geological map of the district was prepared. The initial hydrogeological survey on regional scale was carried out by Central Ground Water Board during nineteen eighties. Subsequently the entire district was covered by Central Ground Water Board under reappraisal hydrogeological surveys during nineteen nineties. Under ground water exploration programme and accelerated exploratory drilling programme 32 numbers of exploratory wells including 1 observation wells were drilled by Central Ground Water Board to access the ground water potentials of rock formations at deeper depths. The ground water regime condition is being monitored by quite a large number of permanent hydrograph stations four times a year.

17.6.2 Estimation of Ground Water Resource is essential before planning any programme for development of ground water resource. It involves study of various factors affecting ground water recharge and discharge and demarcation of potential area of ground water development. Rainfall, seepage from tanks & ponds are some of the principal source of recharge to ground water. As per the study group for the year 2009 the following facts of ground water resource of Phulbani district is revealed. The Phulbani district has an annually replenishable ground water resource of 70266 Hectare Meter (HM), out of which 8748 HM is committed for the domestic and industrial requirements for coming 25 years based on the projected population. The block wise ground water resource as estimated by the study group has been presented in the following table. The present draft for irrigation use has been estimated as 1745 HM . The overall stage of ground water development which includes both domestic and irrigation in the district as a whole is 12.45% .

17.6.3Judicious 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.

17.6.4 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.

17.7 Suitability of ground water for drinking purposes

As per the norms of Indian standard institution for water for drinking, mostly the ground water of Phulbani district is suitable for drinking purpose except for a few places. Out of the 28 nos of samples 2 nos of samples contain total Arsenic in the range of 0.0002 -.0004 mg/l, rest 26 nos of samples do not c ontain any arsenic. The NHNs in the district having arsenic are Ranipathar (Ar-0.0002 mg/l) and Lingagada (Ar-0.0004 mg/l). G Udaigiri has high nitrate (>100mg/l), while Sudrukumpa has high iron (2.3 mg/l).

17.8 Chemical Quality of ground water in deeper aquifer:

The ground water from deeper aquifers are suitable for drinking purposes as almost all the constituents are well within the permissible limit. The quality of ground water for irrigation use is also good. A study of the chemical analysis datashows that in general ground water in the area is marginally alkaline in nature. Ground water is fresh with the average EC value within the permissible limits. NO3and F values are well within the permissible limit except only at a few places.

17.9 Maintenance of water sources and wetlands

The hilly tracts of Phulbani are laden with several streams and perennial rivers in a criss-cross manner. The water sources need to be protected from silting, poisoning, and drain off. As the Dist. of Kandhamal is worst affected by the pernicious practice of shifting cultivation, appropriate soil and moisture conservation measures, both in degraded and barren sites, in the form of percolation tanks and appropriate technique to tap and preserve rain water, should be carried out in specific sites which ultimately provides water source for the available wildlife population in the habitat.

17.9.1 The river systems of the Division constitute number of Watersheds and mini watersheds. The details of watersheds covering different forest blocks is furnished below.

Watersheds Covering different blocks of Phulbani Forest Division					
Sl. No.	**MWS code**	**Type (Hill/Forest/ Reservoir)**	**Area in Ha.**	**Block name**	**MWS Area in Ha.**
1	0406020306030203	Forest	623.09	Chakapad	778.92
2	0406020306040101	Forest	450.40	Chakapad	714.03
3	0406020306030101	Forest	394.74	Chakapad	619.47
4	0406020306030102	Forest	238.35	Chakapad	381.93
5	0406020306030201	Forest	252.39	Chakapad	548.23
6	0406020306030202	Forest	669.28	Chakapad	756.83
7	0406020306040102	Forest	714.22	Chakapad	1089.03
8	0406020306040202	Forest	310.86	Chakapad	537.37
9	0406020306040201	Forest	476.48	Chakapad	877.63
10	0406020306010201	Forest	542.20	Chakapad	733.41
11	0406020306010202	Forest	716.53	Chakapad	947.01
12	0406020306020104	Forest	380.98	Chakapad	562.26
13	0406020306020201	Forest	389.77	Chakapad	556.65
14	0406020306020202	Forest	368.55	Chakapad	601.52
15	0406020306020101	Forest	627.05	Chakapad	850.80
16	0406020306020102	Forest	534.99	Chakapad	679.64
17	0406020306020103	Forest	330.07	Chakapad	515.61
18	0407010307130102	Forest	84.37	Chakapad	1049.20
19	0407010304060101	Forest	816.88	Chakapad	1315.86
20	0407010304060102	Forest	581.71	Chakapad	941.15
21	0407010304060202	Forest	162.63	Chakapad	869.11
22	0407010304060201	Forest	594.80	Chakapad	778.33
23	0407010304050101	Forest	655.22	Chakapad	990.44
24	0407010304050201	Forest	111.28	Chakapad	1300.39
25	0407010304050102	Forest	478.23	Chakapad	786.86
26	0407010304070202	Forest	151.41	Chakapad	861.47
27	0407010304070102	Forest	80.57	Chakapad	520.43
28	0407010304070103	Forest	172.76	Chakapad	913.30
29	0407010304040202	Forest	33.20	Chakapad	542.08
30	0407010304030202	Forest	259.51	Chakapad	946.17
31	0407010304030102	Forest	448.16	Chakapad	704.51
32	0407010304030101	Forest	145.26	Chakapad	594.87
33	0407010304030201	Forest	341.91	Chakapad	1023.27
34	0407010304040201	Forest	202.41	Chakapad	593.55
35	0407010304010102	Forest	255.34	Chakapad	503.03
36	0407010304020102	Forest	531.24	Chakapad	912.29
37	0407010304140101	Forest	417.30	Chakapad	634.84
38	0407010304080203	Forest	1174.90	Chakapad	1670.79
39	0407010304080201	Forest	341.07	Chakapad	690.79
40	0407010307150202	Forest	221.60	Chakapad	960.67

41	0407010307150201	Forest	114.49	Chakapad	621.84
42	0407010307160203	Forest	249.50	Chakapad	1001.76
43	0407010307160102	Forest	208.30	Chakapad	835.69
44	0407010307160101	Forest	456.68	Chakapad	1051.66
45	0407010307160202	Forest	345.85	Chakapad	1069.70
46	0407010307160201	Forest	292.77	Chakapad	619.03
47	0407010307220101	Forest	441.26	Chakapad	909.35
48	0407010307220202	Forest	169.31	Chakapad	862.90
49	0407010307220201	Forest	459.44	Chakapad	993.25
Sub. Total			**19019.30**		**39818.87**
50	0407010304040203	Forest	271.99	Khajuripada	877.95
51	0407010304040102	Forest	155.40	Khajuripada	955.50
52	0407010306110102	Forest	405.25	Khajuripada	1257.65
53	0407010306110201	Forest	719.88	Khajuripada	1199.68
54	0407010306110202	Forest	661.14	Khajuripada	1024.61
55	0407010304090203	Forest	199.27	Khajuripada	843.90
56	0407010304090202	Forest	767.22	Khajuripada	1205.07
57	0407010305010102	Forest	654.89	Khajuripada	654.91
58	0407010305010101	Forest	946.23	Khajuripada	1110.05
59	0407010304080101	Forest	708.35	Khajuripada	813.03
60	0407010304080102	Forest	389.93	Khajuripada	948.67
61	0407010306100201	Forest	499.97	Khajuripada	646.95
62	0407010306100202	Forest	596.30	Khajuripada	1008.37
63	0407010306110101	Forest	343.22	Khajuripada	1064.42
64	0407010306100203	Forest	865.76	Khajuripada	946.54
65	0407010306080201	Forest	450.10	Khajuripada	530.42
66	0407010306080102	Forest	633.59	Khajuripada	977.19
67	0407010306080101	Forest	556.74	Khajuripada	724.15
68	0407010306090101	Forest	241.79	Khajuripada	825.26
69	0407010306070203	Forest	768.30	Khajuripada	802.19
70	0407010306090201	Forest	1133.05	Khajuripada	1464.68
71	0407010306080202	Forest	807.34	Khajuripada	1068.24
72	0407010306090102	Forest	159.70	Khajuripada	603.55
73	0407010307310101	Forest	380.98	Khajuripada	1253.63
74	0407010307360101	Forest	555.73	Khajuripada	1142.99
75	0407010307310102	Forest	252.90	Khajuripada	818.97
76	0407010307300101	Forest	173.35	Khajuripada	1231.57
77	0407010307340101	Forest	751.82	Khajuripada	1281.22
78	0407010307330102	Forest	230.81	Khajuripada	533.31
79	0407010307320202	Forest	379.20	Khajuripada	620.92
80	0407010307340102	Forest	383.40	Khajuripada	609.01
81	0407010307330101	Forest	628.80	Khajuripada	1110.99
82	0407010307340103	Forest	788.34	Khajuripada	1033.23
83	0407010307320101	Forest	184.14	Khajuripada	842.44
84	0407010307310202	Forest	555.68	Khajuripada	1029.07
85	0407010307310201	Forest	335.50	Khajuripada	777.07
86	0407010307320201	Forest	267.91	Khajuripada	1029.05
87	0407010307320102	Forest	228.01	Khajuripada	896.96

88	0407010307320103	Forest	54.67	Khajuripada	513.54
89	0407010307260102	Forest	40.56	Khajuripada	801.09
90	0407010307260202	Forest	32.63	Khajuripada	773.18
91	0407010307360104	Forest	390.21	Khajuripada	707.67
92	0407010307360102	Forest	662.17	Khajuripada	1061.95
93	0407010307240103	Forest	49.28	Khajuripada	683.26
94	0407010307240102	Forest	89.16	Khajuripada	806.41
95	0407010307240201	Forest	176.17	Khajuripada	851.42
96	0407010307240104	Forest	37.73	Khajuripada	412.68
97	0407010307230201	Forest	69.75	Khajuripada	1026.38
98	0407010307240101	Forest	73.79	Khajuripada	591.87
99	0407010307230103	Forest	26.35	Khajuripada	819.05
100	0407010307230202	Forest	41.82	Khajuripada	797.08
101	0407010307250202	Forest	28.18	Khajuripada	797.21
102	0407010307260101	Forest	175.51	Khajuripada	882.87
103	0407010307250203	Forest	248.59	Khajuripada	810.25
104	0407010307250101	Forest	71.22	Khajuripada	609.15
105	0407010307250201	Forest	3.77	Khajuripada	745.05
106	0407010307250102	Forest	57.82	Khajuripada	771.12
107	0407010307240202	Forest	150.71	Khajuripada	949.46
108	0407010307210202	Forest	81.89	Khajuripada	546.41
109	0407010307210201	Forest	148.37	Khajuripada	737.39
110	0407010307210101	Forest	253.23	Khajuripada	1234.93
111	0407010307210103	Forest	68.32	Khajuripada	938.29
112	0407010307210102	Forest	125.87	Khajuripada	999.13
113	0407010307230101	Forest	28.88	Khajuripada	607.43
114	0407010307230102	Forest	77.15	Khajuripada	871.12
Sub. Total			**22295.78**		**57108.83**
115	0407010502080202	Forest	489.82	Phiringia	497.00
116	0407010502050101	Forest	718.85	Phiringia	1319.72
117	0407010502050102	Forest	605.43	Phiringia	814.94
118	0407010502050201	Forest	581.05	Phiringia	860.99
119	0407010502070103	Forest	652.96	Phiringia	652.96
120	0407010502050202	Forest	415.25	Phiringia	731.57
121	0407010502080201	Forest	587.60	Phiringia	1067.04
122	0407010502080102	Forest	377.35	Phiringia	377.35
123	0407010502080101	Forest	673.83	Phiringia	779.85
124	0407010502070101	Forest	612.11	Phiringia	627.79
125	0407010502050203	Forest	795.54	Phiringia	833.56
126	0407010502070102	Forest	559.24	Phiringia	654.32
127	0407010502060201	Forest	536.43	Phiringia	681.51
128	0407010502060202	Forest	369.45	Phiringia	627.24
129	0407010502060101	Forest	1091.17	Phiringia	1134.42
130	0407010502060102	Forest	745.52	Phiringia	821.45
131	0407010502170202	Forest	431.97	Phiringia	896.17
132	0407010502170203	Forest	492.77	Phiringia	786.51
133	0407010503270101	Forest	332.19	Phiringia	1313.08
134	0407010503270201	Forest	328.05	Phiringia	1880.53

135	0407010503260104	Forest	388.13	Phiringia	907.30
136	0407010307100201	Forest	297.33	Phiringia	1382.90
137	0407010307100103	Forest	120.26	Phiringia	721.04
138	0407010307100202	Forest	264.09	Phiringia	854.75
139	0407010307280201	Forest	246.90	Phiringia	752.20
140	0407010309040103	Forest	218.31	Phiringia	1006.76
141	0407010309040202	Forest	301.71	Phiringia	1267.99
142	0407010309040104	Forest	190.63	Phiringia	693.86
143	0407010309040201	Forest	84.10	Phiringia	1103.95
144	0407010309030201	Forest	67.63	Phiringia	652.47
145	0407010309030202	Forest	202.96	Phiringia	762.49
146	0407010309030103	Forest	2.76	Phiringia	825.66
147	0407010309040101	Forest	388.38	Phiringia	1432.96
148	0407010309030203	Forest	446.70	Phiringia	1038.60
149	0407010309060102	Forest	685.74	Phiringia	988.14
150	0407010309060101	Forest	162.57	Phiringia	769.83
151	0407010309070102	Forest	166.72	Phiringia	612.44
152	0407010309070101	Forest	340.55	Phiringia	1037.55
153	0407010309060201	Forest	59.14	Phiringia	542.69
154	0407010309060202	Forest	202.97	Phiringia	798.92
155	0407010309050102	Forest	522.23	Phiringia	984.88
156	0407010309050101	Forest	427.25	Phiringia	949.59
157	0407010309050202	Forest	291.17	Phiringia	986.28
158	0407010309050201	Forest	395.06	Phiringia	1030.28
159	0407010309030102	Forest	139.03	Phiringia	725.03
160	0407010309010201	Forest	188.12	Phiringia	940.39
161	0407010309010202	Forest	151.37	Phiringia	915.05
162	0407010309010203	Forest	145.92	Phiringia	1049.36
163	0407010309010101	Forest	24.98	Phiringia	908.54
164	0407010309010103	Forest	58.76	Phiringia	737.32
165	0407010309010102	Forest	136.49	Phiringia	868.48
166	0407010309020201	Forest	85.00	Phiringia	1082.87
167	0407010309030101	Forest	102.30	Phiringia	821.72
168	0407010309020202	Forest	186.31	Phiringia	1145.53
169	0407010309020101	Forest	117.67	Phiringia	719.95
170	0407010309010204	Forest	58.68	Phiringia	834.46
171	0407010309020103	Forest	178.75	Phiringia	838.77
172	0407010309020102	Forest	20.22	Phiringia	551.25
173	0407010307180201	Forest	446.96	Phiringia	1039.47
174	0407010307180102	Forest	285.92	Phiringia	1157.23
175	0407010307180101	Forest	417.18	Phiringia	1311.40
176	0407010307190101	Forest	334.17	Phiringia	982.15
177	0407010307190201	Forest	220.45	Phiringia	934.05
178	0407010307190102	Forest	464.47	Phiringia	1044.84
179	0407010307170101	Forest	391.63	Phiringia	798.62
180	0407010309170203	Forest	628.46	Phiringia	900.97
181	0407010309170204	Forest	562.60	Phiringia	869.94
182	0407010309170102	Forest	323.83	Phiringia	711.58

183	0407010309170202	Forest	225.42	Phiringia	717.65
184	0407010309170201	Forest	432.17	Phiringia	683.43
185	0407010309160102	Forest	3.40	Phiringia	666.95
186	0407010309160101	Forest	128.22	Phiringia	554.23
187	0407010309150201	Forest	418.84	Phiringia	824.72
188	0407010309150202	Forest	255.05	Phiringia	519.77
189	0407010309160202	Forest	297.99	Phiringia	953.07
190	0407010309170101	Forest	493.15	Phiringia	1269.96
191	0407010309160103	Forest	225.20	Phiringia	907.24
192	0407010309160201	Forest	126.35	Phiringia	696.96
193	0407010309220201	Forest	747.54	Phiringia	890.01
194	0407010309200202	Forest	745.71	Phiringia	753.19
195	0407010309200203	Forest	804.02	Phiringia	936.96
196	0407010309230101	Forest	450.47	Phiringia	956.39
197	0407010309220102	Forest	63.01	Phiringia	709.45
198	0407010309240103	Forest	719.37	Phiringia	961.56
199	0407010309240102	Forest	422.00	Phiringia	935.73
200	0407010309240203	Forest	495.61	Phiringia	574.04
201	0407010309240201	Forest	440.67	Phiringia	1021.09
202	0407010309230102	Forest	630.84	Phiringia	645.03
203	0407010309200201	Forest	641.43	Phiringia	699.57
204	0407010309240101	Forest	173.29	Phiringia	755.04
205	0407010309230103	Forest	1011.97	Phiringia	1052.97
206	0407010309150203	Forest	185.40	Phiringia	805.89
207	0407010309100104	Forest	383.16	Phiringia	923.37
208	0407010309080102	Forest	147.92	Phiringia	697.85
209	0407010309070201	Forest	529.91	Phiringia	1096.80
210	0407010309080101	Forest	454.34	Phiringia	974.64
211	0407010309080103	Forest	101.90	Phiringia	529.43
212	0407010309080201	Forest	297.24	Phiringia	951.26
213	0407010309080202	Forest	459.98	Phiringia	852.77
214	0407010309140103	Forest	570.98	Phiringia	819.89
215	0407010309130202	Forest	527.28	Phiringia	786.59
216	0407010309140102	Forest	3.13	Phiringia	442.63
217	0407010309140101	Forest	372.23	Phiringia	932.69
218	0407010309130102	Forest	1042.29	Phiringia	1208.74
219	0407010309130201	Forest	198.70	Phiringia	667.50
220	0407010309150101	Forest	343.82	Phiringia	935.87
221	0407010309140203	Forest	367.88	Phiringia	693.02
222	0407010309150102	Forest	408.15	Phiringia	718.16
223	0407010309140202	Forest	296.33	Phiringia	706.56
224	0407010309140201	Forest	305.36	Phiringia	822.14
225	0407010309110202	Forest	498.89	Phiringia	790.41
226	0407010309110104	Forest	10.19	Phiringia	777.64
227	0407010309110201	Forest	186.75	Phiringia	757.19
228	0407010309110101	Forest	0.98	Phiringia	811.20
229	0407010309120202	Forest	325.41	Phiringia	690.63
230	0407010309120201	Forest	264.14	Phiringia	757.20

231	0407010309130101	Forest	339.30	Phiringia	820.94
232	0407010309120101	Forest	175.50	Phiringia	712.62
		Sub. Total	**42287.99**		**101719.10**
233	0407030407270202	Forest	102.79	Phulbani	519.13
234	0407010307300202	Forest	150.70	Phulbani	852.96
235	0407010307310103	Forest	139.50	Phulbani	666.20
236	0407010307290202	Forest	306.86	Phulbani	884.51
237	0407010307290201	Forest	27.82	Phulbani	748.35
238	0407010307300201	Forest	195.31	Phulbani	492.57
239	0407010307300102	Forest	159.56	Phulbani	675.05
240	0407010307350102	Forest	712.86	Phulbani	1102.08
241	0407010307350101	Forest	622.66	Phulbani	698.53
242	0407010307270101	Forest	72.89	Phulbani	806.86
243	0407010307260203	Forest	189.90	Phulbani	899.23
244	0407010307270102	Forest	115.08	Phulbani	695.15
245	0407010307260201	Forest	111.11	Phulbani	830.22
246	0407010307270103	Forest	204.04	Phulbani	492.47
247	0407010307280202	Forest	69.93	Phulbani	871.34
248	0407010307290102	Forest	233.77	Phulbani	818.09
249	0407010307290101	Forest	28.07	Phulbani	948.46
250	0407010307280103	Forest	170.30	Phulbani	1027.90
251	0407010307270201	Forest	174.12	Phulbani	698.15
252	0407010307280101	Forest	217.38	Phulbani	808.76
253	0407010307280102	Forest	105.75	Phulbani	679.89
254	0407010307180202	Forest	104.71	Phulbani	709.33
255	0407010307170202	Forest	217.93	Phulbani	609.71
256	0407010307200202	Forest	363.87	Phulbani	942.63
257	0407010307200201	Forest	56.91	Phulbani	676.24
258	0407010307200102	Forest	80.64	Phulbani	878.34
259	0407010307200101	Forest	557.44	Phulbani	1069.41
260	0407010307190202	Forest	139.64	Phulbani	795.85
261	0407010309180201	Forest	293.99	Phulbani	818.77
262	0407010309190101	Forest	92.17	Phulbani	982.98
263	0407010309180202	Forest	51.56	Phulbani	557.70
264	0407010309180101	Forest	66.76	Phulbani	963.45
265	0407010309180102	Forest	255.56	Phulbani	668.83
266	0407010309220103	Forest	331.57	Phulbani	737.85
267	0407010309220101	Forest	1.51	Phulbani	773.93
268	0407010309190201	Forest	3.09	Phulbani	809.89
269	0407010309190202	Forest	73.30	Phulbani	836.38
270	0407010309190102	Forest	248.04	Phulbani	871.59
271	0407010309190103	Forest	467.23	Phulbani	853.66
272	0407010309200103	Forest	196.96	Phulbani	832.11
273	0407010309200104	Forest	132.44	Phulbani	702.66
274	0407010309200102	Forest	162.66	Phulbani	895.33
275	0407010309200101	Forest	87.96	Phulbani	462.50
276	0407010309090202	Forest	162.18	Phulbani	887.87
277	0407010309090203	Forest	247.49	Phulbani	570.15

278	0407010309100202	Forest	340.35	Phulbani	1151.19
279	0407010309090201	Forest	251.88	Phulbani	1035.98
280	0407010309100201	Forest	705.55	Phulbani	843.43
281	0407010309100101	Forest	303.35	Phulbani	704.69
282	0407010309100102	Forest	150.81	Phulbani	485.04
283	0407010309100103	Forest	335.13	Phulbani	635.61
284	0407010309070202	Forest	256.47	Phulbani	598.73
285	0407010309090101	Forest	258.99	Phulbani	991.35
286	0407010309090102	Forest	190.51	Phulbani	864.97
		Sub. Total	**11299.05**		**42434.04**
287	0406020308150201	Forest	653.03	Raikia	799.01
288	0406020308150202	Forest	104.09	Raikia	396.73
289	0406020308150203	Forest	713.02	Raikia	1011.34
290	0406020305030202	Forest	759.50	Raikia	983.28
291	0406020305030201	Forest	757.46	Raikia	1017.69
292	0406020305030102	Forest	502.69	Raikia	1044.13
293	0406020305030203	Forest	276.99	Raikia	289.79
294	0406020305040101	Forest	224.12	Raikia	1150.94
295	0406020308140102	Forest	750.20	Raikia	1096.01
296	0406020308140201	Forest	337.21	Raikia	795.62
297	0406020308140202	Forest	396.02	Raikia	610.90
298	0406020305030101	Forest	332.89	Raikia	477.90
299	0406020308150103	Forest	311.45	Raikia	532.02
300	0406020308150102	Forest	495.06	Raikia	785.43
301	0406020305020201	Forest	370.03	Raikia	608.93
302	0406020305020102	Forest	466.55	Raikia	678.31
303	0406020305020202	Forest	411.29	Raikia	706.67
304	0406020308140101	Forest	522.58	Raikia	873.30
305	0406020305010103	Forest	578.68	Raikia	578.68
306	0406020305010201	Forest	341.85	Raikia	493.36
307	0406020305020101	Forest	594.69	Raikia	682.80
308	0406020308100102	Forest	659.78	Raikia	785.78
309	0406020308100103	Forest	560.50	Raikia	583.13
310	0406020308090203	Forest	519.85	Raikia	628.39
311	0406020308100101	Forest	698.52	Raikia	819.27
312	0406020308110101	Forest	775.06	Raikia	1080.89
313	0406020308100202	Forest	950.53	Raikia	1025.82
314	0406020308090102	Forest	507.03	Raikia	699.67
315	0406020308090101	Forest	588.91	Raikia	860.01
316	0406020308070102	Forest	665.17	Raikia	810.30
317	0406020308130201	Forest	467.84	Raikia	952.66
318	0406020308130202	Forest	455.22	Raikia	890.81
319	0406020308120201	Forest	646.48	Raikia	1336.45
320	0406020308120102	Forest	183.55	Raikia	208.29
321	0406020308120101	Forest	2.80	Raikia	1081.15
322	0406020308130102	Forest	540.88	Raikia	932.33
323	0406020308120202	Forest	991.28	Raikia	1310.17
324	0406020308130101	Forest	520.35	Raikia	867.82

325	0406020308110201	Forest	494.07	Raikia	994.74
326	0406020308110102	Forest	619.83	Raikia	769.76
327	0406020308110203	Forest	581.80	Raikia	911.34
328	0406020308110202	Forest	602.60	Raikia	879.73
329	0407010503010103	Forest	576.64	Raikia	864.27
330	0407010503100202	Forest	669.23	Raikia	1571.99
331	0407010503100201	Forest	427.24	Raikia	1013.48
332	0407010503100103	Forest	395.64	Raikia	1783.17
333	0407010503110101	Forest	193.24	Raikia	909.37
334	0407010503110102	Forest	262.61	Raikia	1027.58
335	0407010503110201	Forest	268.65	Raikia	1043.27
336	0407010503110202	Forest	51.43	Raikia	916.06
337	0407010503010101	Forest	198.76	Raikia	1102.20
338	0407010307080102	Forest	194.43	Raikia	1055.71
339	0407010307080101	Forest	34.71	Raikia	780.11
340	0407010307070101	Forest	53.49	Raikia	725.08
341	0407010307060101	Forest	95.08	Raikia	1024.21
342	0407010307010201	Forest	93.10	Raikia	696.68
343	0407010307010202	Forest	81.09	Raikia	1146.74
		Sub. Total	**25526.81**		**49701.29**
344	0407010307070203	Forest	320.18	Tikabali	585.48
345	0407010307070202	Forest	35.63	Tikabali	685.62
346	0407010307060201	Forest	225.81	Tikabali	1035.04
347	0407010307060202	Forest	574.07	Tikabali	832.91
348	0407010307080201	Forest	701.13	Tikabali	1327.91
349	0407010307130202	Forest	45.31	Tikabali	1021.42
350	0407010307130201	Forest	235.01	Tikabali	956.90
351	0407010307040202	Forest	41.86	Tikabali	719.78
352	0407010307050101	Forest	90.35	Tikabali	1049.25
353	0407010307050202	Forest	46.10	Tikabali	919.20
354	0407010307060102	Forest	208.04	Tikabali	739.65
355	0407010307080202	Forest	560.96	Tikabali	1235.17
356	0407010307090102	Forest	49.97	Tikabali	658.56
357	0407010307090101	Forest	428.03	Tikabali	1353.68
358	0407010307120103	Forest	254.26	Tikabali	632.98
359	0407010307130101	Forest	49.99	Tikabali	1031.25
360	0407010307110103	Forest	161.17	Tikabali	820.05
361	0407010307120102	Forest	321.60	Tikabali	587.81
362	0407010307110101	Forest	83.48	Tikabali	816.72
363	0407010307110102	Forest	369.67	Tikabali	952.19
364	0407010307120101	Forest	184.21	Tikabali	671.84
365	0407010307110202	Forest	149.88	Tikabali	763.82
366	0407010307110201	Forest	25.61	Tikabali	699.46
367	0407010304020201	Forest	551.92	Tikabali	649.85
368	0407010304020202	Forest	480.91	Tikabali	668.54
369	0407010304020101	Forest	761.62	Tikabali	1139.97
370	0407010307170201	Forest	156.58	Tikabali	610.87
371	0407010307150103	Forest	383.48	Tikabali	1054.83

372	0407010307150102	Forest	52.45	Tikabali	825.23
373	0407010307150101	Forest	91.37	Tikabali	915.80
374	0407010307140202	Forest	153.32	Tikabali	885.83
375	0407010307170102	Forest	284.23	Tikabali	627.66
376	0407010307170103	Forest	385.28	Tikabali	630.25
		Sub. Total	**8463.45**		**28105.51**
377	0406020305040103	Forest	547.67	G.Udayagiri	970.74
378	0406020305060101	Forest	631.23	G.Udayagiri	799.33
379	0406020305040201	Forest	933.60	G.Udayagiri	1619.44
380	0406020305040102	Forest	41.53	G.Udayagiri	833.09
381	0406020305080201	Forest	103.83	G.Udayagiri	769.21
382	0406020305060102	Forest	329.32	G.Udayagiri	752.31
383	0406020305080101	Forest	105.31	G.Udayagiri	947.41
384	0407010307040201	Forest	95.83	G.Udayagiri	982.61
385	0407010307030201	Forest	16.66	G.Udayagiri	1162.83
386	0407010307030202	Forest	192.87	G.Udayagiri	651.55
387	0407010304010202	Forest	460.44	G.Udayagiri	1036.08
388	0407010304010101	Forest	224.89	G.Udayagiri	637.27
389	0407010304010201	Forest	109.45	G.Udayagiri	968.21
390	0407010304010203	Forest	337.92	G.Udayagiri	596.24
391	0407010307020102	Forest	387.60	G.Udayagiri	1229.40
392	0407010307020101	Forest	139.62	G.Udayagiri	888.68
393	0407010307010102	Forest	463.41	G.Udayagiri	1092.13
394	0407010307010101	Forest	297.86	G.Udayagiri	1017.22
395	0407010307020203	Forest	34.93	G.Udayagiri	577.48
396	0407010307030101	Forest	255.84	G.Udayagiri	932.22
397	0407010307030102	Forest	105.70	G.Udayagiri	1043.50
398	0407010307020201	Forest	586.90	G.Udayagiri	1128.14
399	0407010307020202	Forest	182.24	G.Udayagiri	778.87
400	0407010307140201	Forest	22.96	G.Udayagiri	900.69
		Sub. Total	**6607.63**		**22314.66**
		Grand Total	**135500.02**		**341202.30**

17.9.2<u>Addition of new wetlands and waterbodies</u>

INFORMATION ON CREATION OF WATER BODY BY FOREST DEPARTMENT					
Year of construction	**Name of the scheme**	**Range**	**Site**	**No. created**	**Remarks**
2012-13	CAMPA APO 2011-12 (WILD LIFE MGMT)	Tikabali	Chakapad RF (Jitaghati)	2	30mX20mX3m
		Phiringia	Tetekapadar	1	30mX20mX3m
			Total	**3**	
2013-14	CAMPA APO 2012-13	Phiringia	Gocchapada RF (Derakumpa)	1	30mX20mX3m
		Phiringia	Bandhagada B RF	1	30mX20mX3m
		Sudrukumpa	Ranipathar RF	3	30mX20mX3m
		Phulbani	Dakpalla RF	1	30mX20mX3m

		Phulbani	Phulbani PRF	1	30mX20mX3m
		G.Udayagiri	Pukulingia RF	2	30mX20mX3m
		Tikabali	Nediguda(Kadami)	1	30mX20mX3m
			Total	**10**	
2013-14	CAMPA APO 2011-12 (WILD LIFE MGMT)	Tikabali	Chakapad RF (Jenaguda)	3	30mX20mX3m
		Raikia	Karada PRF	1	30mX20mX3m
			Total	**4**	
2014-15	CAMPA APO 2013-14	Phiringia	Kellapada "B" PRF	1	30mX20mX3m
		Phiringia	Gerupada East RF	1	30mX20mX3m
		Phiringia	Krandibali East RF	1	30mX20mX3m
		Phulbani	Mularujangi-1	1	30mX20mX3m
		Phulbani	Mularujangi-2	1	30mX20mX3m
		Phulbani	Mularujangi-3	1	30mX20mX3m
		Phulbani	Sarupada-1	1	30mX20mX3m
		Phulbani	Sarupada-2	1	30mX20mX3m
		Phulbani	Kalamburi-1	1	30mX20mX3m
		Phulbani	Kalamburi-2	1	30mX20mX3m
		Phulbani	Sakadi-1	1	30mX20mX3m
		Phulbani	Sakadi-2	1	30mX20mX3m
		Phulbani	Baikhol	1	30mX20mX3m
		Phulbani	Dedibali	1	30mX20mX3m
		Phulbani	Bulungi	1	30mX20mX3m
		Phulbani	Damigaon	1	30mX20mX3m
		Phulbani	Kanidani	1	30mX20mX3m
		Phulbani	Pusipaju	1	30mX20mX3m
		Phulbani	Landreju	1	30mX20mX3m
		Phulbani	Pabedi	1	30mX20mX3m
		Phulbani	Bhaliapada	1	30mX20mX3m
		Phulbani	R.Nuagaon	1	30mX20mX3m
		Phulbani	Medrikhole	1	30mX20mX3m
		Phulbani	Sarachud	1	30mX20mX3m
		Phulbani	Lambagudri	1	30mX20mX3m
		Phulbani	Landrupada	1	30mX20mX3m
		Phulbani	Arasahi	1	30mX20mX3m
		Phulbani	Gedripaju	1	30mX20mX3m
			Total	**28**	
2014-15	CAMPA APO 2011-12 (WILDLIFE MGMT)	Phulbani	Katringia PRF (Sraki)	1	30mX20mX3m
		Phulbani	Katringia PRF (Pabedi)	1	30mX20mX3m
		Phulbani	Gumagada RF (Kenpaju)	1	30mX20mX3m
		Phulbani	Gumagada RF (Dubaghati)	1	30mX20mX3m
			Total	**4**	

2015-16	CAMPA APO 2011-12 (WILD LIFE MGMT)	Raikia	Karada PRF (Kendukhari)	1	30mX20mX3m
		Raikia	Karada PRF (Podhamari)	1	30mX20mX3m
			Total	**2**	
2018-19	CAMPA APO 2017-18 (WILDLIFE MGMT)	Karada	Ranaba RF	1	30mX20mX3m
Total					
2019-20	CAMPA APO 2017-18 (WILDLIFE MGMT)	Sudrukumpa	Ranipathar RF (compt-4)	1	30mX20mX3m
		Raikia	Karada PRF (Barimunda)	1	30mX20mX3m
Total				**2**	
GRAND TOTAL				**53**	

17.9.3Objectives of integrated watershed development

To promote the economic development of watershed community through:-

- Optimum utilization of Natural Resource base
- Employment generation, promoting savings and other IGS
- Human and social resource development

To encourage restoration of ecological balance of the W/s through

- Sustained community action for the O &M of the assets created
- Further development of potentials created
- Simple, easy and affordable technical solutions
- Institutional arrangement that make use of, built upon local technical knowledge & available material.

To improve the economic and social conditions of resource poor's through

- Equitable distribution of benefits
- Addressing gender issues
- Greater access to income generating opportunities
- Human and social resource development

17.9.4 Outputs of Watershed management

- Increased cropping intensity and productions in both rainfed and partial irrigated situations;
- Reduced threat of drought to both crops and livestock;
- Increased ground water recharge- enhance water use potential
- Decline in downstream sedimentation- increase in flow rates and volume of the stream networks and improved moisture regimes

- Change in livestock system dynamics-improved fodder quality and availability leading to change in herd size, quality and composition
- Increased opportunities for short term, medium term and long term and off farm employment

17.10The Present Practices:

The present practices for water resources management involves protection of catchment area of major rivers and origin of springs. Important forest blocks coming within critical catchment area are managed under Protection working Circle.

In the Selection working circle which constitute 31.5% of the total forest area, provision of soil and moisture conservation has been made as subsidiary silvicutural operation.

The degraded forest which constitutes about 63.08% 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 to maintain high level of water regime.

17.10.1 Method of treatment:

The method of treatment is mainly focused on

a) Intensive Soil & Moisture Conservation.

b) Judicious use of Ground Water

c) Creation of Inland water body

d) Rain water harvesting

e) Awareness program on "Importance of Water & its management"

17.10.2 Soil & Moisture conservation:

In any forest development program, Soil & Moisture Conservation will be taken up as an **"Integralpart 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. Standard Procedure for SMC as found in standard text book on "Soil & Moisture Conservation" will be followed.

17.11 Water resource for local public

The ZillaParished approved to provide fresh drinking water to the local inhabitants by installation tube wells, sanitary wells and pipe line water facility. A table showing the detailed CD block wise availability of drinking water facilities is furnished below. Tube wells are the safest and most preferred source of rural water supply in this division. The tube well

water is readily accepted by the villagers and hence these wells are the major sources of drinking water supply. Both shallow & deep wells have been dug up to provide drinking water by the RWSS department & PHD. The well water is free from pollutants and minimise the incidence of water borne diseases. Forest department has also installed some tube wells to provide fresh drinking water to the remote villagers inside the forest areas.

Sl. No	Name of the Block	Minor Irri.Proj		LIP		W.H.S		Borewell		Dug well		Other source	% of irrigation
		Nos	Pote	Nos	Pote.	Nos	Pote.	Nos	Pote.	Nos	Pote	Pote	
1	Khajuripada	7	448	20	400	60	374	87	174	652	261	812	42.01
2	Phiringia	7	466	73	1498	42	377	92	184	630	252	2212	31.63
3	Phulbani	7	714	35	704	65	485	100	200	446	178	873	45.28
4	Chakapad	6	840	27	544	76	447	77	154	406	162	127	23.53
5	G.Udayagiri	5	648	3	60	42	471	0	0	312	125	128	17.52
6	Raikia	5	404	11	228	82	457	15	30	298	119	334	11.66
7	Tikabali	3	290	25	518	31	207	17	34	456	182	352	13.84
		40	3810	194	3952	398	2818	388	776	3200	1279	4838	185.47

Source:-**Executive Engineer., RWSS, Kandhamal (As on 2017)**

17.12 Conclusion

Although no large water harvesting projects have been created in this Division, the moisture conservation measures and rainfall harvesting methods enunciated above will have significant impact on the improvement of the water resource management. The water flow in the rivers and streams can be made perennial if large scale soil and moisture conservation works are taken up in the catchment areas of the streams.