PART-II
CHAPTER-I
BASIS OF PROPOSAL

1.1 GENERAL CONSIDERATIONS

Forest plays a multi-dimensional role in sustaining all kinds of life forms and all life forms are dependent upon forest for their requirements. This is very much true especially for the Rourkela Division which is inhabited mainly by tribals and rural people. The rapid depletion and degradation of forests is primarily due to poverty and population growth which are responsible for increasing demand on forests for fuel wood, fodder and timber etc. Keeping in view, the above circumstances and National Forest Policy 1988, the basic aim of management of the forest covered under this plan will be to fulfill the increasing demand of forest produce without disturbing the environmental stability and ecological balance which are vital for the sustenance of all life forms.

1.2 GENERAL OBJECTIVES OF MANAGEMENT

The general object of management is to restore forests of Rourkela Division to normalcy with indigenous flora and fauna.The objectives shall be achieved by taking suitable silvicultural, rehabilitation and afforestation measures. The general objectives of management set for this working plan are as follows:

1. To prevent degradation of environment by restricting felling of trees and giving emphasis on conservation of flora and fauna.

2. To improve the condition, composition and productivity of the existing forests by enriching the standing crop through scientific management.

3. To meet the requirements of local people living in and around forest areas.

4. To rehabilitate the barren and degraded forest areas and mining degraded areas through artificial regeneration and soil conservation measures.

5. To provide employment to poor people living in and around forest areas by involving them in various forestry operations.

1.3 METHOD OF TREATMENT TO BE ADOPTED

To fulfill the above cited objectives, required change in management practices has been made and forest areas have been allotted to different working circles. In the outgoing plan and prior to that best sal forest areas lying on moderately hilly and plain areas were kept under Sal Conversion Working Circle with the objective to convert the irregular crop to more or less even aged crop and to obtain sustained yield of timber of high quality. Most of these objectives could not be achieved due to various constraints and adverse factors like increasing population pressure, uncontrolled fire hazards, excessive grazing, illicit removal of trees and continuous operation of large number of mining projects in these areas. In most of these areas, regeneration is poor in general and even absent in some localities. Status of pole crop which serves as future crop is also

not satisfactory. These forests will be worked under selection system with the objective to take up suitable silvicultural operations including opening of the canopy in order to create favorable conditions for natural regeneration.

Most of the forests which have been worked under selection system in the past are having limited number of exploitable girth class trees at present. Hence, restricted marking and felling is proposed for all the forest areas which are to be worked under Selection System and more emphasis will be given on subsidiary silvicultural operations for improving the quality of growing stock. The guidelines issued by Government of India with regard to implementation of Forest Conservation (amendment) Act, 1988, clearly restricts the management of forest under coppice system. Moreover, it has been found in the past that the main objectives like improvement in the quality and quantity of crop, better copping etc. from the forest area maintained under coppice system could not be achieved due to want of various silvicultural and tending operations accompanied with other adverse factors. Natural regeneration is sufficient in many areas because root stock is available in plenty. Most of the trees left as standards have been removed illigally by local inhabitants. Because of these factors, these forest areas are to be managed under Selection, Rehabilitation and Plantation Working Circle in the present plan.

The potentiality of bamboo forests have reduced to an alarming level. There is an urgent need to increase the potential of these forests, preferably through cultural operations and by following cutting rules at the time of working of clumps. It should be kept in mind that natural vegetation, however, inferior it may be, is not to be replaced by monoculture or with plantation of fast growing exotic species. The existing growth in the natural forest will be improved and it will be planted with the species natural to these areas. Keeping the view above facts and objectives following working circles have been formed for the purpose of better management of forests for coming ten years. Considering the above facts the present working plan proposes following nine Working Circles.

1. Selection Working Circle
2. Rehabilitation Working Circle
3. Protection(overlapping) Working Circle
4. Plantation Management Working Circle
5. Bamboo(Overlapping) Working Circle
6. NTFP(Overlapping) Working Circle
7. Village Forest Working Circle
8. Wild life (Overlapping) Working Circle
9. Eco-restoration (Overlapping) Working Circle

1. SELECTION WORKING CIRCLE

This Working Circle includes the sal as well as miscellaneous forests available in the terrain varying from level plain to steep hilly slopes. Forest areas which were worked under Sal Conversion Working Circle, Selection-cum-Improvement Working Circle and Coppice with Reserve Working Circle in the previous plan are included in this working circle for improvement of forest growth. The RF blocks will be worked under a regular scientific management system. The total area of this Working Circle is 9781.599 Ha.

2. REHABILITATION WORKING CIRCLE

This Working Circle includes forest areas which have degraded to great extent. The average crop density of these areas is less than 0.4. The worked out coppice areas, old plantation areas, 57 RF Blocks, 6 PRF blocks and 31 DPF blocks have been allotted to this Working Circle. The PRF and DPF blocks have degraded type of growth. The main objective of this Working Circle is to provide rest to these areas covered for the plan period and to restock them adequately by suitable rehabilitation and afforestation measures. Then the area will be restocked with commercially valuable species. The objective also includes reclaiming shifting cultivated and encroachment areas through social, administrative and silvicultural measures. The total area under this Working Circle is 38856.96 hectares.

3. PROTECTION (OVERLAPPING) WORKING CIRCLE

The Working Circle includes forest areas which could not be allotted to other Working Circle owing to their specific problems and requiring specific silvicultural requirement such as (i) Ecologically fragile areas (ii) Areas under active encroachment for cultivation and habitation purposes (iii) Areas subjected to shifting cultivation (iv) Areas which have already been deforested for the purpose of resettlement of the displaced people. The main objective of this Working Circle is to provide suitable vegetative cover in the catchment areas of Ib and Brahmani rivers. The objective also includes rehabilitation of forest area subjected to encroachment or shifting cultivation. Forest Blocks such as Sagjore Compartment of Haldipani, Satbhaya, Mandirapahad and Chhatamb RFs have been included in this circle.

4. PLANTATION MANAGEMENT WORKING CIRCLE

The present condition of the areas allotted to this Working Circle is due to excessive biotic pressure and extraction without silvicultural operations. The Working Circle includes the areas of plantation working circle of the outgoing plan and the old existing plantations. This includes the areas having blank stretches of forestland in the forest blocks allotted under Rehabilitation Working Circle. It is stated in the review of past management of this Working Circle that afforestation area were rarely successful except for a few patches. Due to absence of regular and coordinated effort with advance planning and adequate resources, the efforts of creating man-

made forests are not encouraging. The plantation areas of the past due to their excessive failure are allotted to be worked under this Working Circle. Main objective of this Working Circle is to reforest the barren and depleted areas as quickly as possible, rotation is of theoretical value for this Working Circle. Programmes of plantations are prepared to create and expand forest resource base especially for the need of the people and as source of industrial raw materials. Since natural regeneration is less in barren/depleted areas, regeneration will be done through artificial means. Total area covered in this Working Circle is 6,188.6396 Ha.

5. BAMBOO (OVERLAPPING) WORKING CIRCLE

The availability of bamboo is very less in this Division and it is found at selected patches in some forest blocks. No working of bamboo has been prescribed in this plan.

6. NTFP (OVERLAPPING) WORKING CIRCLE

This overlapping Working Circle includes all other Working Circles except the areas under the Protection Working Circle. The term Non-Timber Forest Produce (NTFP) includes all forest produce except timber, small timber and fuel wood of Rourkela Forest Division. The tribals, who constitute major part of population being about 50.74 percent along with other rural people, are dependent on forest produce for sustenance. Non-Timber Forest Produce can provide increased employment opportunities and has income generating capabilities. The high potential of NTFP should be utilized through scientific management aided by research, acquisition of technology and peoples participation.

7. VILLAGE FOREST WORKING CIRCLE

The plantations raised by the Social Forestry Project in erstwhile Sundargarh Division have been declared as Village Forests by the State Government in accordance with Section - 30(I) of Orissa Forest Act, 1972. These areas are notified and have been included in the Working Circle. Village Forests cover an area of 125.46 Ha. in 19 villages situated within Rourkela Division.

8. WILD LIFE (OVERLAPPING) WORKING CIRCLE

The Working Circle includes the Wildlife (overlapping) Working Circle and the Recreation Working Circle of the out going plan. Hence, the Working Circle includes all forest areas having importance of wildlife and recreation of Rourkela Division. In the past, under the patronage of Ex-rulers, the Sundargarh was rich in wildlife, both in variety and numbers. However, during the past few decades due to various adverse factors the population of wild animals has vastly diminished and some of them are on the verge of extinction. Wild life is an integral part of forest ecosystem and there is need to protect them and improve their habitats by suitable protective measures.

9. ECO-RESTORATION (OVERLAPPING) WORKING CIRCLE

Due to biotic pressure the fragmentation of habitat has taken place and eco-restoration measures are required to be adopted. For city dwellers and industrial workers, a biological park on the lines of Nandankanan in Rourkela steel city, should be planned. This will create awareness among the visitors and improve their concern for the cause of protection, preservation and propagation of both flora and fauna for bio-aesthetic purposes. Eco-development measures will be taken up to provide employment to local people. The pre-historic sites along with the forest vegetation inside the RFs will be developed for eco-tourism in the area. Minor Irrigation Department has constructed many small reservoirs at Kansbahal, Pitamahal and Mandira adjoining to the forest areas. Permanent closed cover is maintained at hill slopes and catchments of reservoirs to check soil erosion maintain hydrological cycle and regulate water supply.

1.4 ALLOTTMENT OF AREA TO DIFFERENT WORKING CIRCLES

The present Working Plan covers forest blocks consisting of 69 RFs in full and Jharbeda-Katang RF in part, 6 PRFs, 33 DPFs, 123 UDPFs, 19 village forests and other forests having total area of 62597.546 hectares. All the blocks and compartments have been shown in management, stock and other maps. The compartment boundaries are based generally on natural features. Some new compartments have been constituted in revised plan. The allocation of blocks, compartments and sub-compartments in different Working Circles are presented in respective Working Circle Chapters. An abstract of Range wise and forest blocks wise allotment of area to various Working Circle is presented in Annexure 36(Page-139 to 143, Vol-II).

1.5 BLOCKS AND COMPARTMENTS

There is no change in the names of Reserve Forest blocks dealt with in the outgoing plan. The Proposed Reserve Forest blocks notified as RFs have been incorporated in the present plan. Area of all RF and PRF blocks has been computed from the latest topographical sheets of scale 1:25,000. Most of the PRF and DPF blocks were not depicted in the latest topographical map of Survey of India. Such PRF and DPF blocks were transformed from trace maps of Scale 4"=1 mile to latest topo maps of scale 1:25,000 by co-ordinate method. Computed area of some of the RF, PRF, DPF block do not tally with the corresponding notified areas as maintained in the records of Division Office.

All the RF blocks have been divided into compartments and demarcated in the field on the basis of conspicuous topographical features. Compartments have been formed and delineated in topographical maps only for the RF, PRF and DPFs. All the Compartment line of various blocks have been demarcated on the ground by giving double rings of white paints on prominent trees at breast height.

1.6 PERIOD OF PLAN AND NECESSITY FOR INTERMEDIATE REVISION

This Working Plan has been prepared for a period of 10 years commencing from the year 2014-15. Intermediate revision is not anticipated. However, if situation warrants, intermediate revision shall be taken up with the approval of the Working Plans Committee.

PART-II
CHAPTER-II

2 SELECTION WORKING CIRCLE

2.1 GENERAL CONSTITUTION

Two well-stocked forest blocks having density higher than 0.5 coupled with moderate to excellent, regeneration and higher degree of bio-diversity are allotted to Selection Working Circle. The forest area under this Working circle is distributed over 2 RFs. Selection; Conversion and Coppice un-worked areas of the out going plan are included in this Working Circle. For the first time PRF, blocks with adequate number of maturing/matured trees have been incorporated in revised working plan. Total area allotted to the Selection Working circle is 9781.599 Ha.

2.2 CHARACTER OF VEGETATION

The forest allotted to this Working Circle fall mainly under Moist Peninsular and Dry Peninsular Sal Forests. North Chirobeda and South Chirobeda RF blocks contain good quality sal forest. Here quality-II sal finds its occurrence in the valley and low-lying areas having deep loamy soil while hill slopes are mostly covered with quality III sal. The high level Moist Peninsular Sal Forest occurs in upper slopes and hills of North Chirobeda and South Chirobeda. These areas contain mostly laterite soil and granite rocks. Here the sal is of quality III and IV and crop is slightly open. The crop density varies from 0.4 to 0.8. The regeneration is adequate but fire hazard is limiting factor for the establishment of seedlings. The common associates of sal are *Terminalia tomentosa, Anogeissus latifolia* and *Syzygium cuminii* etc.

The low level Moist Peninsular Sal Forest occurs in lower hill slopes of North Chirobeda and South Chirobeda. The soil in these localities is clayey loam or alluvium. Sal constitutes 40 to 50 percent of standing crop and the crop density varies from 0.5 to 0.8. The regeneration is good. Due to occurrence of annual fire and severe biotic pressure, establishment of seedlings is poor. In general, the quality of Sal is III.

Soil in these localities is derived usually from crystalline and metamorphic rocks and is shallow in nature. Sal forms 25 to 40 percent of standing crop and its quality is IV. The crop density varies from 0.4 to 0.6.Regeneration of sal is fairly good. Here common associates of sal are *Terminalia tomentosa, Adina cordifolia, Terminalia chebula* and *Buchanania lanzan* etc. The lower hill slopes and low-lying areas are covered with quality III sal and upper slope ridges and hill tops are having sal forests confirming to quality IV. The density of crop is more than 0.5 and regeneration is adequate. The bamboo occurs extensively in Dhanubans and Garjanpahad RF. Among the bamboo species, *Dendrocalamous strictus* (Salia bamboo) is the most important species available in these blocks.

2.3 SPECIAL OBJECTIVES OF MANAGEMENT

The special objectives of management set for this working circle are within the scope and ambit of the general objectives of management of the Working Plan. There objectives are as follows:

(i) To build up the growing stock and improve the stand structure and to encourage natural regeneration by taking suitable silvicultural operations with emphasis on soil and water conservation measures.

(ii) To remove the mature and silviculturally available trees before they become unsound on sustainable basis.

(iii) To maintain and improve biodiversity of forest blocks.

2.4 AREA STATEMENT

The following table gives Range, block and compartment wise distribution of RF and PRF blocks allotted to this working circle.

Table no.11.1

NAME OF RANGE	NAME OF FOREST BLOCKS	COMPARTMENT NUMBER	AREA	TOTAL AREA (in ha.)
(1)	**(2)**	**(3)**	**(4)**	**(5)**
1. Bisra	Chirobeda (N) RF	1 to 8	3654.8457	3654.8457
	Chirobeda (S) RF	1 to 15	6126.7533	6126.7533
	TOTAL		**9781.5990**	**9781.5990**

2. 5 ANALYSIS AND VALUATION OF CROP

As recommended in Second PWPR one percent enumeration by systematic strip sampling method was conducted in 13 Forest blocks. Enumeration details of these blocks are furnished in Chapter 6. The total area of 13 Forest Block is 33084.01 hectares and area of enumeration was 335 hectares in un-divided Sundergarh Division. The crop composition shows that all the forest blocks are dominated by sal trees.

Tree Enumeration For Test Check- As per the decision of the Working plan Committee on 28.04.14 tree enumeration was done in S.chirobeda and N. Chirobeda forest blocks in 200 sample plots of 0.1 ha each during the year 2014. The details of the enumeration is given belowin table no. 11.2 and 11.3.The present enumeration shows there is a drastic reduction in the no. of trees in exploitable and pre-exploitable girth class. So, keeping in view the change in crop composition and without altering the working series, no timber harvesting except for the removal of dead, dying and uprooted trees is prescribed. Silvicultural operations, SMC work will be done in the selection coupes. This will allow the pole crops to grow in to harvestable class in few years.

2.6 SILVICULTURAL SYSTEM

2.7 Selection-cum-Improvement system will be adopted with emphasis on sustainable production and stability of the ecosystem. The failure of conversion to uniform system adopted in the out going plan has necessitated the adoption of this silvicultural system.

2.7 CHOICE OF SPECIES

No species will be preferred at the cost of miscellaneous species. The emphasis is on conservation of bio-diversity and development of balanced forest in which natural selection of species will be encouraged. Sal is the most important species in all forest blocks of this Working Circle and is to be treated as principal species. In addition Bija, Sissoo, Gambhar, Halanda are also to be treated as principal species. Asan, Kurum, Dhaura, Kasi, Mundi, Bandhan, Tentra and bamboo are to be treated as secondary species. Fruit bearing and NTFP yielding species such as Mahul, Amba, Anla, Bahada, Tentuli, Karanja, Jamu, Char and Bela etc are to be treated as guest species. Rest other species will be given due importance.

Table no.11.2 Enumeration done in North Chirobeda RF over 100 sample plots of 0.1 ha each

Species	No. of trees 30 cm-60 cms	No. of trees 60-90	No. of trees 90-120	No. of trees 120-150	No. of trees 150 >
Acacia	2	2			
Amala					
Asan	64	21	1		
Bahada	2				
Bandhan					
Baraghana		1			1
Barkoli	2				
Bela			1		
Bherua	3				
Bija	8	3			
Char	145	39	4		1
Dhaura	30	8			
Doka	11	3	1		
Gambhar			1		
Gandhi		1			
Harida	3				
Hirmuchina	2				
Jamun			1		
Karda	18				
Kashi	1				
Kendu	73	15	2		
Kumbhi					
Kurai	4				
Kurum	9	3	1		
Kusum	2				

Mahul	12				
Mango					
Manja	1				
Misan	4	1	1	1	
Misc	13	1	2		
Mundi		1			
Neem					
Paldhua	1	1			
Papda	1				
Penphena					

Species	No. of trees 30 cm-60 cms	No. of trees 60-90	No. of trees 90-120	No. of trees 120-150	No. of trees 150 >
Rai-moi	12	2			
Rohini		1			
Ruchumuchina	3				
Sal	512	81	34	4	
Salei	1				
Senha	2	1			
Sidha	18				
Simuli	2	1		1	
Sirish	2				
Sisoo					
Sunari	5				
Teak	42	3			
Tentuli					
Total	**1010**	**189**	**49**	**6**	**2**

Table no.11.3 Enumeration done in South Chirobeda RF over 100 sample plots of 0.1 ha each

Species	No. of trees 30 cm-60 cms	No. of trees 60-90	No. of trees 90-120	No. of trees 120-150	No. of trees 150 >
Acacia					
Amala					
Asan	59	51	14	1	
Bahada	2	4			
Bandhan	1			1	
Baraghana					
Barkoli					
Bela	12	3			

Bherua					
Bija	3	5	1		
Char	43	9			
Dhaura	72	36	5		
Doka					
Gambhar					
Gandhi					
Harida	4	2	1		
Hirmuchina					
Jamun	10	4			
Karda					

Species	**No. of trees 30 cm-60 cms**	**No. of trees 60-90**	**No. of trees 90-120**	**No. of trees 120-150**	**No. of trees 150 >**
Kashi	9	4		1	
Kendu	30	7	7	2	
Kumbhi	1				
Kurum	8	6	2	1	
Kusum	1				
Mahul	3	4	1		
Mango					
Manja					
Misan	2	1	2		
Misc	33	24	5	1	2
Mundi	2	8	2		
Neem					
Paldhua					
Papda					
Penphena					
Phasi					
Rai-moi	13	15	9	2	
Rohini					
Ruchumuchina					
Sal	93	93	66	16	4
Salei					
Senha					
Sidha	7				
Simuli					
Sirish					
Sisoo					
Sunari		1			
Teak					
Tentuli					
Total	**408**	**277**	**115**	**25**	**6**

2.8 EXPLOITABLE GIRTH CLASS

The exploitable girth class fixed for various species is based on the silvicultural rotation period. The other factors such as production capacity, growth, yield, demand, site quality, and size beyond which the unsoundness begins to develop etc. have also been taken into account. The exploitable girth of different species at g.b.h. is provided in the following table.

Species	Exploitable girth at breast height
1. Sal	150 cm and above
2. Pisal, Gambhar, Halande, Kasi, Mundi, Moi, Asan, Kurum	150 cm. and above
3. Bandhan	120 cm and above
4. Miscellaneous	150 cm and above

2.9 FELLING CYCLE

Felling cycle is fixed at 10 years which synchronises with the period of the Working Plan.

2.10 ROTATION

From silvicultural point of view, the concept of rotation may not be applicable to the selection system as under this system the forest area is to be reworked after fixed interval known as "Felling Cycle". However, the theoretical rotation may be taken as the age at which the principal species attains exploitable girth, i.e, where the MAI (Mean Annual Increment) curve meets CAI (Current Annual Increment) curve on stem timber volume consideration. From this point of view, the rotation for sal may be taken as 120 years.

2.11 CALCULATION OF YIELD

The yield has been regulated by area with a percentage check as removal of selection trees arrived at by Smythie's safeguard formula. For rate of growth and other statistics pertaining to sal All India Yield Table has been referred. The numerical check has been computed for sal only basing on following assumptions and facts.

(i) The exploitable trees already exist and young recruit are available everywhere and not in any particular compartment only. Felling passes regularly through the forests in consecutive annual coupes in felling cycle of 10, 15, 20, 25 or 30 years.

(ii) The basic objective of management is to ensure sustained and increased yield of exploitable trees above the exploitation limit in every felling cycle.

(iii) The middle aged and younger diameter classes are well represented and present rate of recruitment into two highest diameter classes (I and II) will not decrease for a few decades.

(iv) Sustained yield of Selection trees is adequately safeguarded, if the number of trees to be felled is limited to the number that grows by the time one felling cycle is complete.

According to the Smythie's safeguard formula, the number of Class-II trees(X) per ha that pass into class-I within the felling cycle is determined by following formula.

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

where, **B** = No. of trees in pre-exploitable girth class or approach class (120-150 cm for Sal and others, 90-120 cm. for Bandhan)
X= Number of trees in approach class which passes into the exploitable class.
F=Felling cycle.(10 years)
T= Time period in years that takes approach class to pass into exploitable class (Here 40 years)
Z= Percentage of Class II trees that do not pass into class I in T years, due to mortality or removal or thinning etc.

The percentage of trees available for exploitation (Y) is calculated as follows.

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

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 per equation (**1**) is substituted in the equation (**2**) the resulting equation is as follows.

$$Y = \frac{2\,F\,B\,(100 - Z)}{200\quad I\,T + FB\,(100 - Z)} \times 100 + A \quad \text{.....(3).}$$

The value of **T** is 36 years for average site quality III. In respect of irregular sal forests, the value of **T** and **Z** as per yield table are 39 years and 43 %. In hill forests, the value of **T** and **Z** for sal in this plan is 40 years and 43 % and for other species 40 years and 50 percent.

By substitution of these values of **T** and **Z** in equation **(3),** we get

For Sal $$Y = \frac{114\,B}{(800\,I + 57\,B)} \times 100 + A$$

For others $$Y = \frac{10B}{80\,I + 5B} \times 100 + A$$

if T ∞ Z for other species are 40 years and 50% respectively

YIELD CALCULATION TABLE

sl no	Name of the block enumerated	no. of tree /Ha				Yield (Y) %		Tree Limit/Ha		Total
		Sal		Non Sal		Sal	Non Sal	Sal	Non Sal	
		I	II	I	II					
1	Chirobeda (N) RF-37.004 Ha	0	0.135	0.6757	1.756	0	27.900	0	0.18852	0.18
2	Chirobeda (S) RF- 62.02 Ha	2.03	5.756	1.54	3.627	33.6	25.600	0.68208	0.39424	1.07632

Abstract of Yield Regulation

Sl. No.	Name of the Block	Tree limit per hectare		Average tree limit/ ha after 25% reduction to compensate biotic interferences and for conservation purposes.		
		Sal	Others	Sal	Others	Total
1	Chirobeda (N)	0	0.18	0	0.14	0.14
2	Chirobeda (S)	0.68	0.39	0.51	0.3	0.81

2.12 FELLING SERIES

In total there are two felling series covering the entire area of Working Circle. The felling series have been constituted taking into account silviculaturally available exploitable trees and extraction of timber in the working coupes. This has led to division of some of the compartments in slope direction. The statement showing the composition and area of different felling series is given in the following table.

Selection Working Circle									
South Chirobeda Felling Series									
Year of working	Coupe No.	Block and Comptt.	Area (in ha.)	Total area of annual coupe (in ha.)	Harvesting of Sal trees	Harvesting of other trees	Assumed volume of timber (CUM)		Map Reference 1: 25,000
							Sal	Non Sal	
-1	-2	-3	-4	-5	-6	-7			-8
2014-15	**I**	SC-I, 2 (P)	647.5	647.5	441.65975	255.2704	450.226561	260.2532782	73 F/4 NW
2015-16	**II**	SC-2(P) 3(P) 4(P)	569.5	569.5	388.45595	224.51968	395.9907745	228.9023042	73 F/4 NW
2016-17	**III**	SC-3(P) 4(P),9	649.5	649.5	443.02395	256.05888	451.6172221	261.0571493	73 F/4 NW
2017-18	**IV**	SC-5, 6(P)	549	549	374.4729	216.43776	381.7364972	220.6626251	73 F/4 NW
2018-19	**V**	SC-6(P), 7,12	779	779	531.3559	307.11296	541.6625343	313.107805	73 F/4 NW
2019-20	**VI**	SC-8,12	754	754	514.3034	297.25696	524.2792694	303.0594159	73 F/4 SW
2020-21	**VII**	SC-10	520	520	354.692	205.0048	361.57191	209.0064937	73 F/4 SW
2021-22	**VIII**	SC-11	424	424	289.2104	167.15776	294.8201727	170.4206795	73 F/4 SW
2022-23	**IX**	SC-13,14	606.25	606.25	413.523125	239.008	421.5441739	243.6734362	73 F/4 SW
2023-24	**X**	SC-15	628	628	428.3588	247.58272	436.6676143	252.4155347	73 F/4 SW
		Total	**6126.75**	**6126.75**	4179.056175	2415.40992	**4260.116729**	**2462.558722**	
SC- South Chirobeda RF (6126.75 Ha)									

Selection Working Circle									
North Chirobeda Felling Series									
Year of working	Coupe No.	Block andComptt.	Area (in ha.)	Total area of annual coupe (in ha.)	Harvesting of Sal trees	Harvesting of other trees	Assumed volume of timber (CUM)		Map Reference 1:25,000
							Sal	Non Sal	
-1	-2	-3	-4	-5	-6	-7			-8
2014-15	**I**	NC-I Part	415	415	Nil	78.2358	0	79.75332861	73 B/16 NE
2015-16	**II**	NC-I (P) & 2(P)	246	246	Nil	46.37592	0	47.27546708	73 B/16 NE
2016-17	**III**	NC-2 Part	516	516	Nil	97.27632	0	99.16317485	73 B/16 NE
2017-18	**IV**	NC-3(P) 4(P)	457	457	Nil	86.15364	0	87.82474982	73B/ 16 NE
2018-19	**V**	NC-3(P) & 4 (P)	396.34	396.34	Nil	74.7180168	0	76.16731148	73 B/16 NE
2019-20	**VI**	NC-5(P) & 6(P)	396	396	Nil	74.65392	0	76.1019714	73 B/16 NE
2020-21	**VII**	NC-5 Part	343.5	343.5	Nil	64.75662	0	66.01269489	73 B/16 NE
2021-22	**VIII**	NC-6 Part	304	304	Nil	57.31008	0	58.42171542	73 B/16 NE
2022-23	**IX**	NC-7	258.5	258.5	Nil	48.73242	0	49.67767578	73 B/16 NE
2023-24	**X**	NC-8	322.5	322.5	Nil	60.7977	0	61.97698428	73 B/16 NE
		Total	**3654.84**	**3654.84**		689.0104368	0	702.3750736	
NC-North Chirobeda RF (3654.84 Ha)									

2.13 SEQUENCE OF FELLING

The annual coupes of all felling series have been shown in the management map of scale 1:25,000. The coupes have been made by taking the natural features, compartment boundaries, administrative boundaries of different ranges and the crop condition. Two felling series have been constituted and each felling series has been divided into 10 annual coupes, so that the entire felling series is covered during the plan period. The coupe working will commence from 2014-15.

2.14 METHOD OF EXECUTION OF FELLING AND DEMARCATION

2.14.1 DEMARCATION OF ANNUAL COUPES

(i) The demarcation of coupes shall be carried out in the winter season (October to December) in the year preceding the year of Working.

(ii) If the coupe line coincides with the compartment line, then it is to be cleared to a width of 5 m. The trees already marked with white paint double rings along the compartment line shall be again painted.

(iii) When the coupe line is not coinciding with the compartment line, then a strip of 3 meter width shall be cleared along the coupe line, stone cairns of size 90 cms X 60 cms X 60 cms. shall be erected at 300 m. intervals along the coupe line and at coupe corners with serial numbers on it. Clearance shall be done for the purpose of identification and visibility. Trees of large girth occurring along coupe line at visible distance shall be painted with double coal-tar rings at the breast height.

(iv) In case, a coupe overlaps two or more compartments, each shall not be treated as separate lot, which will ensure proper maintenance of compartment history. In all these cases, the lot line should be demarcated with single coal-tar ring along the compartment/sub-compartment line.

(v) Coupes shall be indicated by sign boards at corners or at points of intersection with roads, inspection paths, boundary lines of RF etc. The signboards should contain the name of felling series, serial number of the coupe, area, year of working and compartment number etc.

(vi) Coupes shall be demarcated by an officer not below the rank of a trained Forester and shall be checked by Range Officer before commencement of marking. Coupe should be demarcated as per plan irrespective of availability of exploitable girth trees as coupe demarcation is essential not only for felling of trees but also for carrying out subsidiary silvicultural operations.

2.14.2 MARKING RULES

(i) The marking officer shall assess illicit felling inside the annual coupes prior to marking. The number of trees illicitly felled shall reduce the quantum of marking. Thus, the trees to be marked shall be difference between the maximum permissible number of trees due for marking and number of trees illicitly felled between previous felling and current felling. If the difference is negative then no marking shall be done in that coupe.

1. All dead, diseased, uprooted, malformed and fallen trees shall be marked for felling irrespective of their girth class. A tree whose top one-third portion is already dead shall be treated as a dying tree.

2. All trees above the exploitable girth class shall be marked. Out of the exploitable girth trees available, only four trees per hectare in case of Sal and one tree per hectare in case of other species of trees shall be marked for felling.

(iv) The trees retained should be well grown and vigorous. The reserved trees shall be painted with single white paint ring at breast height and at base and serially numbered in each coupe. The list of such trees shall be maintained in the compartment history and coupe register.

(v) All trees to be marked for felling shall be given two blazes approximately of size 15cm X 15cm, one at breast height and the other as close to the ground as possible and on the sides opposite to each other. The blazes should be marked with marking hammer and numbered serially.

(vi) Marking shall not be done within 50 meters from roadside on either side of nallah banks. Marking shall not be done within 50 meter of radius around the key habitat of wild animals such as den, salt lick, wallows, game tank and water holes etc.

(vii) If a tree is marked for felling than other trees should not be marked for felling within a radius of 15 meters.

(viii) No marking shall be done in eroded areas and in the areas having steep slopes except for removal of dead and uprooted trees.

(ix) Marking should be done only for those trees whose removal will not create a permanent gap in the canopy and will not affect regeneration.

(x) The guest species like Mahul,Mango, Jamu, Char, Tentuli, Anla, Bel,Harida, Bahada and other fruit bearing species shall not be marked for felling unless dead or uprooted.

(xi) The maximum number of tees to be removed in a particular coupe shall be regulated as per yield table described previously.

(xii) All climbers shall be cut at the time of marking at two places, one at the base and other at the area of reach.

(xiii) Once marking is over then the marking officer shall prepare the marking list on the following format.

Name of Felling Series:-
Coupe Serial Number:-
Year of Working:-

Tree Sl.No.	Species	Girth (cm.)	Approximate height (mt)	Sound/ unsound	Dead/diseased/ uprooted / malformed

After preparation of the marking list, the marking officer shall prepare an abstract of marking species wise and girth class wise. Each page of the marking list shall be given facsimile impression of the marking hammer used for marking of the coupe. Each page of the marking list shall be signed by the marking officer.

(xiv) The marking officer shall submit the marking list to the Range officer concerned and it is mandatory for the Range officer to check 70 % of the marking. After completion of checking at the level of Range office, the marking list shall the submitted to the Divisional Forest Officer. The Divisional Forest Officer shall check marking up to 10 percent.

(xv) In case of plantation raised inside the selection coupes, the marking rules shall not be applicable. The Divisional Forest Officer shall prepare site-specific scheme for working out plantation with provision for fresh plantation with approval of the competent authority.

(xvi) A tree forked at breast height and above shall be treated as one tree and forked below breast height shall be treated as two trees.

2.14.3 EXECUTION OF FELLING

(i) The method of disposal of trees marked for felling shall be as per Chapter-XIV of the Orissa Forest Department Code, 1979 as modified by Government from time to time.

(ii) Felling and extraction in any annual coupe shall be allowed from 1st October to 30th June. No felling, logging, passing and dragging shall be allowed from 1st June to 30th September every year. The DFO shall, if required, allow extension of time only after physical verification.

(iii) The felling shall start from one end of the coupe and shall proceed ahead in a systematic manner. For this purpose, the coupe shall be divided into convenient number of lots. All the marked trees in a lot shall be felled before proceeding to the next lot. Felling, logging, dragging and passing should be completed by March. Transportation of timber and firewood shall be completed by May-June.

(iv) Felling and conversion work shall be done as far as possible with saw as it reduces wastage. The felling should be as close to the ground as possible. Trees shall be lopped before felling otherwise it may damage the young crops including seedlings and saplings. The trees shall be felled towards up hillside and adequate care should be taken to avoid damage to the standing crop.

(v) Details of works e.g. number of lots formed, detailed passing list, deviation, if any and subsidiary silvicultural operations under taken must be mentioned in the compartment history.

2.15 SUBSIDIARY SILVICULTURAL OPERATIONS

Subsidiary silvicultural operations shall the carried out departmentally in the year following the main felling. It shall be done over the entire coupe except the degraded areas and steep slopes. The following operations are prescribed.

1. All the marked trees left standing by the coupe purchaser will be felled and removed from annual coupes.

2. All the trees damaged during main felling, which and do not have any scope for survival, shall be felled and removed from annual coupes.

3. All the other species under 60 cms. g.b.h interfering with the growth of established regeneration of principal and secondary species will be felled and removed.

4. All high stumps shall be cut and removed.

5. Thinning in congested group of principal and secondary species under 60 cm g.b.h. will be done so that most promising young crops are free from interference. For this purpose under mentioned formula may be applied.

D=0.25 d

Where **D** = the distance in meters between two consecutive stems after thinning and **d** = the average crop diameter in cms.

6. All the climbers left during marking per chance shall be cut.

7. In the eroded areas, only dead and uprooted trees will be removed and no cleaning operation will be carried out.

8. All fallen pieces of branches, small wood left during the main felling shall be removed to avoid fire hazard.

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

2.16 CONTROL

Compartment histories, control forms, and other records shall be maintained for each selection coupe, compartment and felling series in accordance with the provisions of the working plan code.

2.17 MISCELLEANEOUS REGULATIONS

2.17.1 GRAZING

The annual coupes will be closed for grazing for a minimum period of 5 years after main felling. Grazing shall be regulated in other areas on the basis of rotation. Lopping is strictly prohibited. Sheep and goats shall not be allowed to graze.

2.17.2 FIRE PROTECTION

The worked out areas shall be rigidly protected from fire hazard for a period of at least 5 years. For taking suitable fire protection measures, the provision of rule 283 of Orissa Forest Department Code and Orissa Forest (Fire Protection) Rules shall be followed. Efforts shall be taken to maintain coupe lines as fire lines every year.

2.17.3 RIGHTS AND CONCESSIONS

Rights and concession shall be regulated as per the provision of the Orissa Forest Act, 1972 and rules made under relevant Govt. policies in vogue.

2.17.4 SAMPLE PLOTS

Due to heavy biotic pressure it is not possible to lay sample plots.

2.18 WORKING NORM

The total area under Selection Working Circle is 9,781.599 Ha. The cost norm having wage rate @ Rs.150.00 per day is given below:

(a) Demarcation of coupe at the rate of 10 ha /day /labor.

i.e., 0.1 x 150.00 = Rs. 15.00 per ha.

(b) Marking of coupe at the rate of 5 ha. /day /labor

i.e., 0.2 x 150.00 = Rs.30.00 per ha.

(c) Treatment of Selection coupe which includes subsidiary silvicultural operations, maintenance of RF boundary, tracing of fire lines and protection against grazing at the rate of 10 man days per hectare = Rs. 1500.00 per ha.

Total cost of management comes to Rs. 1545.00 per ha.

Total requirement of funds under this working circle will be Rs.15112556.55 or 152lakhs and the annual requirement of funds shall be around Rs.15.2 lakhs with subsequent rise of 10 percent every year.

2.19 INTERMEDIATE REVISION

Intermediate revision is not expected during the plan period. However, if necessary prescriptions may be reviewed after 5 years jointly by the concerned Conservator of Forests (Territorial) and the Conservator of Forests (Working Plan). Any deviation suggested shall be subject to the sanction of the competent authority.

PART-II
CHAPTER-III

3 REHABILITATION WORKING CIRCLE

3.1 GENERAL CONSTITUTION

The forest blocks that are in various stages of degradation are allotted to this Working Circle. The degradation of these forest blocks is due to biotic interference such as illicit felling, repeated fire, grazing etc. The area can be restocked with commercially valuable species by gap plantation. The forest area of this working circle covers 60 RF blocks, 6 PRF blocks and 33 DPF blocks of this Division. Coppice worked areas and blocks worked under Rehabilitation Working Circle of the out going plan and the areas where plantations have been raised in the past are included in this Working Circle. The PRF and DPF blocks have been incorporated for the first time in the regular plan. The total area of this circle is 38856.96 hectares. Many forest blocks covered under this working circle are situated near thickly populated habitation and they have been repeatedly exploited by local inhabitants for meeting their requirements of small timber, fire wood and fodder etc. Proper protection coupled with silvicultural operation will improve the crop condition in these blocks.

3.2 CHARACTER OF VEGETATION

The forest blocks of this working circle are widely scattered and spread over all the Ranges. All forest types present in the Division are present in this working circle. The area allotted to this working circle covers the regions of moist peninsular Sal forest ($3C_2/2e$), **N**orthern dry mixed deciduous forest $5BC_2$ and Dry peninsular sal forest ($5\ B\text{-}C_1/1_C$). In general, the crops are quite open having density less than 0.5 and regeneration status is poor. The forest varies from less stocked to highly degraded hills.

The forest vegetation in the small RF blocks i.e. Harapali, Luaram, Satbhaya, Haldipani RF (Sagjore Compartment) part, Kharikamunda, Brahmani, Kusumura have depleted to a great extent and reduced to scrub type . In the last plan a good number of plantations have been raised in the degraded patches of these blocks. The vegetation in PRF blocks is primarily of miscellaneous type with poor growth. The low lying areas and lower slopes of some PRF blocks are mainly covered with dry peninsular Sal type of forest while upper slopes and hill tops of these blocks are covered with dry mixed deciduous forest .Due to unsystematic management of forests of these PRF blocks in the past as well as due to severe biotic pressure, distribution of various species is not uniform.

The natural species which find their occurrence in the areas of this Working Circle are mainly Sal, Asan, Dhaura, Kasi, Bija, Kendu, Jamu, Bahada, Karada, Kurei, Mahul, Bel, Tentuli etc. However,

the natural growth is mostly confined to young age group with very less proportion of higher girth class trees .Over all, the areas bearing vegetation of natural origin are in degraded stage and require immediate rehabilitation measures. Areas where the plantations have been raised in the past are also more or less in poor state with out adequate growth. Most of the plantations have not been subjected to regular weeding, cleaning and thinning operations. The planted species in these blocks are mainly Teak, Sissoo, Gambhar, Cassia, Acacia, Asan, Bamboo, Eucalyptus, Siris and Karanja etc.

3.3 SPECIAL OBJECTIVE OF MANAGEMENT

The following special objectives of management are set for this working circle which is within the ambit of the general objective of management. These are as follow:

1. To enrich the micro-edaphic conditions and ensure maximum conservation of soil and water through proper soil conservation measures and through involvement of local people.

2. To tend and improve the existing growing stock through suitable silvicultural measures.

3. To regenerate the barren and blank patches by planting suitable indigenous species. Part of forest blocks which were under shifting cultivation in the past will be planted and rehabilitated.

4. To boost up growth of Sal and other valuable species of coppice origin by appropriate cultural operation.

5. To tend the existing plantation so as to get maximum annual increment.

6. To provide adequate protection to the areas having rootstock and constitute JFM Committee to involve the local people.

7. To meet the bona fide needs of local inhabitants like fire wood, small timber, fodder, NTFP etc in future when restocked.

3.4 AREA STATEMENT AND REHABILITATION SERIES

Total 38856.96 hectares of area is to be rehabilitated within the plan period. For this purpose,10 rehabilitation series have been constituted. Each rehabilitation series has been divided into 10 annual rehabilitation coupes as shown in Annexure 37(Page-144 to 151, Vol-II). Rehabilitation area of various RF, PRF and DPF blocks covered under this Working Circle have been delineated in the topographical map of scale 1:25,000. In the present plan RF/PRF/DPF blocks have been fixed for annual rehabilitation. It shall be the responsibility of concerned Range Officer to delineate and demarcate the respective annual rehabilitation areas after thorough field survey in consultation with the DFO in the year in which it is due for working. The following table gives the area and composition for each Range under Rehabilitation WC.

Sl. No.	Range	RF/PRF/DPF	Area of Forest block (in hectare)	Area of Rehabilitation Working Circle (in hectares)
(1)	(2)	(3)	(4)	(5)
1	**Rajgangpur**	Chhatamb RF	7527.42	7527.42
2		Haldipani RF	9591.39	7591.89
3		Laing RF	562.533	562.533
4		Mandirapahar RF	26.3055	26.3055
5		Chiroberna RF	15.3786	15.3786
6		Chudia pahar RF	263.055	263.055
7		Laimurapahar RF	124.2429	124.2429
8		Datni RF	530.157	530.157
9		Jharbeda (Katang) RF	80.7376	80.7376
10		Khindapahad RF	80.94	80.94
11		Pathuria RF	40.47	40.47
12		Datarampur RF	82.9635	82.9635
13		Gudiali RF	922.716	622.716
		Total :-	**19848.3091**	**17548.8091**
1	P.R.Fs	Chhatabar PRF	76.86	76.86
		Total :-	**76.86**	**76.86**
1	D.P.Fs	Sunakhan-Dubku DPF	45.82	45.82
2		Saplata DPF	167.13	167.13
3		Bhursulia DPF	150.14	150.14
4		Budham DPF	81.34	81.34
		Total:-	**444.43**	**444.43**
1	**Kuarnmunda**	Chadri RF	251.7234	50.00
2		Brahmanipahar RF	396.606	296.606
3		Mudra RF	385.2744	385.2744
4		Madalia RF	137.1933	
5		Harapali RF	304.7391	304.7391
6		Tangarani RF	177.6633	177.6633
7		Khindapahad RF	80.94	80.94
8		Rion RF	266.6973	266.6973
9		Rangamati RF	694.4652	694.4652
10		Bhaisamunda RF	2062.7559	2062.7559
11		Rutukupedi RF	6440.3958	4540.3958
12		Badmaren RF	78.1071	78.1071
13		Kumarpahad RF	117.363	
14		Jugsahi RF	67.1802	
15		Vedvyas RF	19.42	19.42
		Total:-	**11480.52**	**8957.06**
1	P.R.Fs	Birual PRF	24.43	24.43
		Total:-	**24.43**	**24.43**
1	D.P.Fs.	Ratakhandi DPF	53.77	53.77
2		Putrikhaman DPF	34.91	34.91
3		Tangarani DPF	80.93	80.93
4		Tainsar DPF	182.30	182.30
5		Khukhundubahal DPF	87.41	87.41
6		Teliposh DPF	14.52	14.52
7		Balanda DPF	258.23	258.23

Sl. No.	Range	RF/PRF/DPF	Area of Forest block (in hectare)	Area of Rehabilitation Working Circle (in hectares)
8		Vedvyas DPF	18.21	18.21
9		Kacharu DPF	33.99	33.99
10		Rani Patak DPF	29.27	29.27
11		Jaltaranga DPF	44.97	44.97
		Total :-	**838.51**	**838.51**
1	**Panposh**	Ergeda RF	520.0395	520.0395
2		Lathikata RF	70.8225	70.8225
3		Sonaparbat RF	900.0528	900.0528
4		Hatibandha RF	278.0289	278.0289
5		Durgapur RF	352.089	
6		Bandamunda RF	21.4491	
		Total:-	**2142.4818**	**1768.9437**
1	P.R.Fs	Lohadarha PRF	88.62	88.62
		Total:-	**88.62**	**88.62**
1	D.P.Fs	Manko 'A' DPF	50.45	50.45
2		Baribeda -Manko 'B' DPF	38.76	38.76
3		Karlakhaman DPF	88.62	88.62
4		Lathikata DPF	38.44	38.44
5		Sapdarah DPF	96.53	96.53
6		Baribeda DPF	94.29	94.29
7		Kanarsuan DPF	45.54	45.54
8		Ramjodi DPF	16.39	16.39
		Total:-	**469.02**	**469.02**
1	**Biramitrapur**	Jharbeda RF	40.47	40.47
2		Jaidega RF	82.9635	82.9635
3		Jhurmur RF	352.089	352.089
4		Darlipahar (Jhandapahar RF)	829.635	829.635
5		Makarchuan RF	41.3522	41.3522
6		Andhari RF	318.0942	318.0942
7		Ghogar RF	812.2329	612.2329
8		Jalangbira RF	196.6842	196.6842
9		Jhitingora RF	112.5066	112.5066
10		Lasse RF	101.9844	101.9844
11		Satbhaya RF	322.1412	322.1412
12		Jatia RF	382.4415	382.4415
13		Dhumagada RF	407.1282	407.1282
14		Barpani RF	95.1045	
15		Purunapani RF	327.807	327.807
16		Lahanda RF	218.9427	218.9427
17		Kalighat RF	35.2089	35.2089
18		Patipahad RF	216.9192	216.9192
19		Biringahudi RF	55.8486	55.8486
20		Banglopahad RF	164.7129	164.7129
21		Bhaldungri RF	36.423	
22		Beurpahad RF	61.1306	

Sl. No.	Range	RF/PRF/DPF	Area of Forest block (in hectare)	Area of Rehabilitation Working Circle (in hectares)
23		Lamki RF	12.5457	
		Mankadchua RF	41.3522	41.3522
		Total:-	**5243.366**	**4819.1622**
1	P.R.Fs	Deuli PRF	149.73	149.73
2		Dulhadulhin PRF	56.33	56.33
		Total:-	**206.06**	**206.06**
1	D.P.Fs	Sakumbahal DPF	14.16	14.16
2		Matipahad DPF	542.29	342.29
3		Dandapahad DPF	135.57	135.57
4		Ulhani DPF	19.85	19.85
5		Dulha Dulhi DPF	51.39	51.39
		Total:-	**763.26**	**563.26**
1	**Bisra Range**	Kudahudunga RF	335.4963	335.4963
2		Luaram RF	106.4361	106.4361
3		(N) Sukuda RF	628.0944	628.0944
4		(S) Sukuda RF	323.3553	323.3553
5		Lindidiri RF	200.7312	200.7312
6		Ajaykela RF	31.5666	31.5666
7		Baribeda RF	29.5431	29.5431
8		Baghdega RF	424.1256	424.1256
9		Mahipani RF	658.0422	350.00
10		Jharbeda RF	508.3032	508.3032
11		Gainjore RF	48.3899	48.3899
12		Santoshpur RF	59.8956	
13		(S) Chirobeda	6126.7533	
14		(N) Chirobeda	3654.8457	
		Total :-	**13135.5785**	**2986.0417**
1	P.R.Fs	Surda PRF	29.62	29.62
		Total :-	**29.62**	**29.62**
1	D.P.Fs.	Titheiposh DPF	20.63	20.63
2		Katepur DPF	33.18	33.18
3		Koilsuta DPF	21.04	21.04
4		Kaliaposh DPF	14.56	14.56
5		Sorda DPF	27.66	27.66
		Total :-	**117.07**	**117.07**
		G.Total:-	**54827.2**	**38856.96**

3.5 ANALYSIS AND VALUATION OF CROP

Due to inappropriate management in the past and severe biotic pressure in the form of illicit felling, overgrazing, fire hazard, encroachment etc., most of areas covered under this Working Circle are in various stages of degradation. At many places, the original vegetation has been replaced by a series of secondary flora comprising of inferior bushy and scrubby species which are capable to withstand regular

felling, grazing and annual fires. The available crop shows poor, stunted growth and contains irregular age and dia class-wise trees distributed irregularly. The floristic diversity index shows that regeneration of different species is coming up well and all forest blocks will gain normalcy within a period of ten years. The areas of PRF, DPF, blocks have been incorporated for the first time in this Working Circle. These blocks were not subjected to any regular silvicultural system in the past. The existing crop cover in these blocks is in irregular form.

3.6 SILVICULTURAL SYSTEM

The first and foremost concern of management is to protect and improve the existing growth through rehabilitation measures. No exploitation will be done in natural vegetation area except removal of dead, dying disease moribund trees. Hence, no formal silvicultural system is prescribed.

3.7 CHOICE OF SPECIES

The areas to be rehabilitated are in general sparsely vegetated with average stock density less than 0.4 and for that reason improvement, thinning and fencing operations are not required. However, in the clusters of dense growth, tending and thinning operations are required for improving the growth of vigorous species. For that purpose Sal, Asan, Kusum, Dhaura, Kurum, Kasi, Gambhar will be taken as principal species and the rest will be treated as secondary species. While carrying out these operations, it should be kept in mind that no undesirable gap is created in the canopy. The choice of species will also depend upon the needs and requirements of local inhabitants. The plantations raised should be of mixed type and the species planted should be site specific. In the areas subjected to uncontrolled grazing, non-browsable species like *Cassia siamea, Agave sisalana*, Karanj, Euphorbia species etc. are to be given priority for plantation. In the area effected with annual fire, species like *Dalbergia sissoo, Cleistanthus collinus, Tectona grandis* and *Gmelina arborea* may be preferred.

SPECIES SUITABLE FOR PROBLEMATIC SITES

Site	Measures to be taken	Species to be planted
Ravine	1. Soil & water conservation measures 2. Full protection from g razing and fire. 3. Safe disposal of run-off. 4. Grassland development. 5. Afforestation.	*Dalbergia sisoo, Albizzia lebbek, Acacia catechu, Acacia nilotica, Azadirachta indica, Agave americana, Agave hybrid, Agave sisalana and Eulaliopsis binata* and *soil binding grasses.*
Laterite soil	1. Soil and water conservation measures 2. Full protection from grazing and fire. 3. Application of fertilizer. 4. Afforestation.	*Eucalyptus hybrid, Dendrocalamus strictus, Acacia auriculiformis, Madhuca indica, Bombax ceiba, Soymida febrifuga, Cleistanthus collinus, Albizzia lebbek, Anacardium occidentale, Agave species* and soil binding grasses.

Water logged areas	1. Preparation of mounds. 2. Planting of tall plants. 3. Application of anti-termite chemicals. 4. Early planting. 5. Drainage.	*Eucalyptus robusta, Anthocephalus chinensis, Syzygium cumini, Terminalia arjuna, Bombax ceiba, Legerstroemia speciosa, Sisoo, Derris indica, Acacia nilotica.*

3.7.1 Soil conservation measures

Various measures will be adopted to check soil erosion by plugging the gullies, creation of check dams and adopting anti-erosion vegetation measures to check soil erosion. The soil conservation measures will be site specific.

3.7.2 Choice of Species

The areas to be rehabilitated are in general sparsely vegetated with average stock density less than 0.4 and for that reason improvement, thinning and fencing operations are not required. However, in the clusters of dense growth, tending and thinning operations are required for improving the growth of vigorous species. For that purpose Sal, Asan, Kusum, Dhaura, Kurum, Kasi, Gambhar will be taken as principal species and the rest will be treated as secondary species. While carrying out these operations, it should be kept in mind that no undesirable gap is created in the canopy.

The choice of species will also depend upon the needs and requirements of local inhabitants. The plantations raised should be of mixed type and the species planted should be site specific. In the areas subjected to uncontrolled grazing, non-browsable species like Cassia siamea, Agave sisalana, Karanj, Euphorbia species etc. are to be given priority for plantation. In the area effected with annual fire, species like *Dalbergia sissoo, Cleistanthus collinus, Tectona grandis* and *Gmelina arborea* may be preferred.

Species	Fodder/ Non-fodder	Habitat factors	Successional status
1. Aristida setacea	Fodder	Soil having brown sandyloam with gravel, pH 7.0 soluble salt content. 0.028 percent medium in potash, very low in phosphate and devoid of $CaCO_3$	Retrogression Sehima/ Dicanthium cover as a result of grazing
2. Arundinella benghalensis	Fodder	Soil colour yellowish brown, sandy loam pH 6.2	Themada/Arundinella cover
3. Arundinella nepalensis	Fodder	Slopes having good drainage and permeability, soil sandy loam, pH 6.5	Themada/Arundinella cover
4. Bothriochloa intermedia	Fodder	Level sites but extends in hilly topography too, Grows in variety of soil in subtropical condition.	Themada/Arundinella cover
5. Bothriochloa pertusa	Fodder	Variety of soil, pH ranges from 5.8 to 7.5 fine-textured soils.	Sehima/Dicanthium &Themda/ Arundinella cover.
6. Cenchrus ciliaris	Fodder	Grasses of Semi-arid zone. Dry sandy soil, pH 7.6 to 7.75	Dicanthium, Cenchrus lasiurus

7. Cenchrus setigerus	Fodder		Dicanthium, Cenchrus lasiurus
8.Chrysopogon aciculatus	Fodder	It has creeping rhizome and prefers sandy loam, acidic soils on level or moist slopes, pH 5.1 to 6.1. This is one of the few grasses, which can withstand heavy grazing. Cannot survive on dry stones or sandy soils, Promising species for stabilization of embankments etc.	Pharagmites/ Saccharum imperata cover.
9. Chrysopogon f ulvus	Fodder	Hilly gravely soils, black cotton soils, red soil with low level of moisture.	Sehima/ Dicanthium & Themeda/ Arundinella covers**.**
10. Chrysopogon gryllus	Fodder	Strong acidic soil on high hills, pH 4.2	Themeda/ Dicanthium thin cover on burning.
11.Cymbopogon coloratus	Non-fodder	Occurs on a variety of sites in dry areas (Rain fall 500 to 1000 mm) having gravelly to sandy loam, exposed rocks, acidic to neutral soil on hill and plains.	Sehima/ Dicanthium thin cover on burning
12.Cymbopogon iwarancusa	Non-fodder	Level to hilly topography, sandy and rocky soil, pH 6.5 to 7.5	Sehima/ Dicanthium thin cover on burning.
13.Cymbopogon martini	Non-fodder	Very wide distribution below tropic of cancer, pH 5.2 to 7.0	Sehima/ Dicanthium thin cover on burning
14.Cynodon dactylon	Fodder	All type of soil on level land prefers moist area and stands moderate grazing and trampling.	Dicanthium, Cenchrus cover.
15.Dactyloctenium sindicum	Fodder	Dry area, level terrain, first colonizer of freshly deposited alluvial sands, Prefers slightly alkaline soil.	Dicanthium/ Cenchrus lasiurus cover.
16. Demostachys bipinnate	Fodder	A grass of semi-arid and arid region, tolerates pH as high as 9.5	Dicanthium/ Cenchrus lasiurus cover
17. Dicanthium species, Dicanthium annulatum,Dicanthium caricosum	Fodder	A species of level land prefers sandy loam to loamy soil, moist areas**.**	Dicanthium/ Cenchrus lasiurus cover
18.Dimeria uscescens	Fodder	A grass of North-east, prefers good drainage and permeability, pH 4.2	Themeda/ Arundinella cover
19.Elesine compressa	Fodder	A grass prefers good drainage and permeability, pH 4.2	Themeda/Arundinella cover
20. Eragrostis coarctata	Fodder	A xerophytic grass	Sehima/Dicanthium cover
21.Eremopogon foveolatus	Fodder	A grass for deep soil, high calcium and low land of north east.	Sehima/Decanthium cover
22. Eulalia trispicata	Fodder	A grass for deep soil,high calcium and low land of north east	Sehima/Decanthium cover
23.Eulaliopsis binata	Non-fodder	Can grow in slopes up to 50%, hot dry localities withstands forest fire	Sehima/Decanthium cover
24.Heteropogon contortus	Non-fodder	Shallow eroded,black or red soil, pH 6.8 to 7.00	Sehima/Decanthium cover
25. Imperate cylindrica	Fodder	Wide range of soil moist to swampy areas, pH 4.00 to 7.5	Sehima/Decanthium cover
26. Ischaemum indicum	Fodder	Low lying wet ground on black soil, pH 7.00 to 8.5	Sehima/Decanthium cover
27. Sporobolus narginatus	Fodder	Level sandy tract of arid zone	Sehima/Decanthium cover

28. Themeda quadrivalvis	Fodder	A grass of western Himalaya above 2000 M and RF 1100 mm	Sehima/Decanthium cover
29. Themeda quadrivalvis	Fodder	Rainfall 500 to 1250 mm Foothill, Kankar belts, pH 7 to 8.5, stands very dry sal forests, fairly gregarious.	Sehima/Decanthium cover
30.Themeda triendra	Fodder	Gravelly soil on hills, pH acidic to neutral, Rainfall 1000 mm and above.	Sehima/Decanthium cover
31. Vetiveria zizanoides	Non-fodder	Low lying ill drained land where water table is high. Soil sandy loam to clay pH 4.0 to 7.5, prefers neutral soil.	Sehima/Decanthium cover

3.8 REHABILITATION CYCLE

The Rehabilitation Cycle is fixed at 10 years which synchronizes with the period of the Working Plan.

3.9 CALCULATION OF YIELD – No yield is prescribed.

3.10 SEQUENCE OF REHABILITATION OPERATIONS

In total 10 rehabilitation series have been constituted and each of them has been divided into 10 annual rehabilitation coupes. All these rehabilitation series have been formed in such a manner so as to rehabilitate the covered areas within the plan period. The annual rehabilitation area has been shown in the topographical sheets of the scale 1:25,000. As far as possible the backlog annual rehabilitation areas should be taken up for treatment simultaneously along with the current year areas. The year wise areas to be rehabilitated in each rehabilitation series is furnished in Annexure 37.

3.11 METHOD OF EXECUTION OF REHABILITATION OPERATIONS

3.11.1 Demarcation of Annual Rehabilitation Area

For ensuring timely field operations, the annual rehabilitation areas are to be delineated in the map and demarcated in the field in the year preceding that in which it is due for working. This is to be done in following manner:

(i) For identifying and locating the annual rehabilitation areas for respective rehabilitation series a preliminary reconnaissance survey will be carried out in the month of October.

(ii) If the forest block or Compartment has been divided into more than one annual coupe, then the whole area shall be surveyed and as per the degree of degradation, annual rehabilitation area will be identified and located. The areas which more degraded are to be rehabilitated first than the less degraded areas.

(iii) Once the annual rehabilitation area is identified then it should be delineated in the management map and demarcated in the field.

(iv) In the situation when the coupe line is not coinciding with the block or Compartment lines, it is to be demarcated by cleaning a strip of 2m width and stone cairons of size 90 cmX60 cm

are to be erected at the corners at visible intervals along the line. While clearing 2mt strip, all trees below 30 cm are to be felled .Trees of larger girth occurring along coupe line at visible distances are to be given with two coal tar rings at breast height.

(v) When coupe line is co-terminus with block or compartment line then the latter will be maintained.

(vi) When the coupe line is coterminous with compartment line and the same has not been demarcated earlier, then two white paint rings at breast height are to be given in the trees standing along the Compartment line.

(vii) The sign boards exhibiting the serial number of the coupe and extent of rehabilitation area, name of Rehabilitation series, year of working etc. shall be posted at prominent places preferably at the points where the coupe line meets the road.

3.12 PREPARATION OF TREATMENT MAP

Once the annual rehabilitation areas has been identified, delineated and demarcated in the field then an officer not below the rank of Range Officer, shall inspect and examine such area and prepare a treatment map. The treatment map so prepared should exhibit measures to be taken for different patches within the annual rehabilitation area. The areas included under this Working Circle are in different stage of degradation and require different type of site-specific treatment. While preparing treatment map following three types of areas will be distinguished:

Type "A"

Thinning in congested crops or coppice with standards in areas having rooted waste with good coppice vigour. Areas previously worked under coppice system requiring singling out of coppice shoot, pruning, climber cutting removal of high stumps and other tending operations.

Type "B"

The areas, which were cut back, will be treated with replanting in areas biotically suppressed and having poor coppice vigour. Degraded patches having plain to gentle slope require plantation of fast growing species. Hill slopes devoid of vegetation or having scanty forest growth requiring soil conservation and afforestation measures.

Type "C"

The soil moisture conservation with protection measures are suggested in highly degraded and eroded areas of different forest blocks. Some of the areas subjected to encroachment in the past having bushy and scrubby type of growth requiring soil conservation as well as afforestation measures shall be included in this type. The blocks or patches having scrubby vegetative growth up to 4 ha or more shall be identified and depicted on the treatment map for taking up plantation along with other

rehabilitation measures. Similarly, all the blanks having areas less than 4ha and the patches having poor stocking are to be identified and reflected on the treatment map for taking up gap plantation and other rehabilitation operations including soil conservation measures. The treatment map should also reflect erosion channels and indicate various mechanical and vegetative measures required for preventing soil erosion.

3.13 TREATMENT PLAN

3.13.1 Each rehabilitation coupe shall be treated for four years excluding the zero (0^{th}) year. The concerned Range Officer shall prepare an Annual Treatment Plan in the zeroth year. It shall include all vital information like,

(i) Site identification, i.e., Forest Block/ Compt. No./ Coupe No.

(ii) Area and Treatment map.

(iii) Site Category.

(iv) Site characteristics (terrain, slope, drainage, soil type and depth).

(v) Vegetation and extent of regeneration.

(vi) Extent of degradation.

(vii) Year of operations (including maintenance, if any).

(viii) Major operation to be undertaken**.**

(ix) Cost norms and calendar of operations.

3.13.2 The Treatment Plan shall also include provision for monitoring of the execution of operations. The DFO/ACF, who is responsible for the implementation of the approved plan, shall check the annual action plan and it will be approved by the concerned Conservator of Forests.

3.14 EXECUTION OF REHABILITATION METHOD

All the rehabilitation measures in annual coupes shall be carried out systematically as per the treatment map and suggestions having prior approval of the DFO. The treatment of rehabilitation areas require enough funds under RDF and other plantation Schemes. Therefore, depending availability of funds, DFO should ensure continuity of rehabilitation operations as per sequence prescribed in the plan. When funds are insufficient to cover the whole target area in a particular year then the balance area should be taken up in the next year. Proper records should be maintained and deviation statement should be submitted to the all concerned. Depending upon degree of degradation, various rehabilitation areas will require different types of area specific treatment. For that purpose following area specific rehabilitation measures is suggested.

Operation in Type "A" areas

This covers coppice worked out areas and areas having Sal rooted waste. In these areas, following operations are suggested.

1. Cutting back of high stumps.

2. Cutting of climbers and uprooting them wherever possible.

3. Singling out of multiple coppice shoots and retaining most promising ones.

4. 'C' grade thinning in congested patches. Under this dead, moribund, diseased, suppressed, dominated and defective trees are to be removed without creating gap in canopy. Planting of two year old seedlings of bamboo along with fruit bearing and NTFP species. Required tending and thinning operations are to be carried out in such areas. Besides, enrichment plantation by Sissoo, Teak, Bija Sal and Bamboo are to be taken up in the gaps.

Operations in Type 'B' areas

This covers degraded patches having plain to gentle slope. These areas are to be rehabilitated by following operations.

1. Planting of fast growing leguminous species like Acacia, Cassia, Subabul etc.

2. Planting of species like Ailanthus, Siris, Karada, Sidha, Neem, Chakunda, Kusum, Sisso etc. in the plain barren areas.

3. Planting of Babul, Khair, Rohini, Sabai grass etc in eroded patches.

4. Planting of Jamu, Karanja, Arjun etc in the low lying degraded patches having higher moisture content.

5. Planting of bamboo wherever possible.

6. While carrying out plantation activity in these areas the plant spacing should be closer, i.e. 2m. x 2m. for tree species and 6m x 6m for bamboo

7 . Causality replacement, soil working, manuring and weeding shall be taken up for all the gap plantations in the 1st and 2nd year.

Operations in Type 'C' areas

This covers the hill slopes devoid of vegetation or with scanty vegetative growth. For such type of areas, following measures may be taken up

1. Suitable soil conservation measures such as gully plugging check dams done of brush wood, rubbles etc across the gullies. Where the gully erosion is acute, then masonry may be provided. Diversion channels are also to be provided to divert the run-off .Just after the advent of monsoon, the beds of gullies should be planted with the species like sabai grass, *Ipoemia cornea, Agave, Acacia, Ailanthus excelsa, Vitex negundo, Sisoo* etc and the spacing for the same should be kept as 2m x 2m.

2. For the areas having more than 15^0, slope staggered contour trenches will be dug along the contour. The size of contour trenches should be 6m x 0.3m and their spacing should be 8m along the contour line and 10 m along the slopes. The dug out earth of the contour trench shall be deposited on the down hill side and the same will serve as seed bed for raising tree species like Acacia,Khair,Sisoo,Babul ,Siris etc. Agave and Sabai grass may be planted in the intervening space of contour trenches.

3. All the preventive measures against soil erosion should be completed before the end of April so that soil and trenches settle suitably before the onset of monsoon.

4. Enrichment plantation shall be taken up in degraded patches, while block plantation will be done in blank and open patches having scanty growth .All the planting operations will be completed within the time schedule as prescribed in the plantation manual. This covers the areas which were subjected to shifting cultivation and encroachment in the past and which are either open with no vegetative growth or covered with bushy scrubby type of vegetation.

5. The patches which are open with no vegetative growth are to be planted with fast growing species.

6. In the areas having dense bushy and scrubby type of growth, the cleaning and pruning operations are to be carried out. All the bushy growth is to be removed except the saplings, poles and trees of important and useful species. The site is to be given control burning without causing any harm to retained species .Afterwards, as per requirement enrichment plantation is to be taken up.

7. Wherever required, necessary soil and water conservation measures are to be taken up.

8. Necessary administrative and educative measures are to be taken up for dissuading tribals against shifting cultivation and encroachments.

3.15 REHABILITATION OPERATIONS

(i) Fencing

The biotic interferences are most prominent cause of degradation of the areas covered under this working circle. To minimize the intensity of this factor it is essential to close the forest areas affected by grazing, browsing and illicit felling. The fencing is the key to success of rehabilitation measures .The DFO should ensure proper fencing of all the area selected for rehabilitation measures.

(a) Vegetative fencing

It is a very useful and the cheapest mode of fencing. Species which form close hedges and which are non-browsable shall be planted .For this purpose Euphorbia and Agaves spacies are preferred. These species can be readily grown from cuttings because they possess thorns and the same is disliked by

animals. These species are to be planted in a staggered manner in six rows at spacing of 1m x 1m along boundaries of the block. Two rows of vetiver grass 30 cm apart may be sown on the inner side of boundary close to the rows of planted species. This type of fencing should be done as a pre-rehabilitation measure.

(b) Trench fencing

Where the entire block is allotted to this Working Circle trapezoidal cattle proof trenches may be excavated on the boundary lines with a depth of 1.5 m and width at bottom and top being 1.0 m 2.0 m respectively. The dug earth of trench should be heaped in the form in ridges on inner side of the rehabilitation area. Such ridges should be provided with gaps at regular intervals. The trench digging should be confined to gentle slope or plain areas .The undulated terrains should be avoided for this purpose as that may give rise to subsequent erosion and gully formation. This operation should start in winter and should be completed before the end of May. During the month of June, sowing of seeds of Babul, Neem and Acacia etc shall be taken up around the trench. The bulbils of Agave may be planted to provide additional protection. Though the trench fencing is one of the most effective protection measures, it involves a large amount of expenditure, which may not be always available at Divisional level. So this type of fencing is to be resorted to when surplus funds for this purpose are available.

(c) Stone wall fencing

Where trench fencing is not feasible due to rocky or boulder terrains, the construction of stone wall may be preferred. The size of stone wall should be 2.0 m at bottom and 1.0 m at top with a height of 1.5 mt .The stone wall shall be provided with sufficient numbers of gaps for drainage of water. The prime importance of this fencing is easy availability of stones and relatively low labour cost. However, this type of fencing needs repeated repairs and is not very effective against goats.

3.16 REHABILITATION IN DIFFERENT REHABILITATION SERIES.

The site-specific rehabilitation scheme for afforestation and soil conservation measures shall be prepared by Divisional Forest Officer depending upon availability of allotment in that year.

3.17 CONTROL

The Journals and other records will be maintained for each rehabilitation coupe in accordance with the provisions of Orissa Forest Plantation Manual 1972. Necessary entries shall be made in the compartment histories about all the works undertaken inside the annual coupes.

3.18 MISCELLANEOUS REGULATIONS

3.18.1 Grazing

All the annual rehabilitation areas and new plantation shall be closed to grazing for a minimum period of 5 years. However, depending upon the result, the DFO can further extend the closure period. In case, it is decided to open the area for grazing, it shall be regulated as per carrying capacity of the area-concerned .The Orissa Forest (Grazing of Cattle) Rules, 1980 should be strictly followed.

3.18.2 Fire Protection

The entire rehabilitation area should be rigidly protected from fire hazard. The fire protection measures shall be regulated as per the Orissa Forest (Fire Protection) Rules, 1979 and Chapter-XVIII of Orissa Forest Department Code.

3.19 RIGHTS AND CONCESSIONS

Rights and concessions shall be regulated as per the existing provisions of the relevant Gazette notifications of the respective forest blocks and the Govt. of Orissa policy with regard to JFM.

3.20 WORKING NORM

(I) The total area under Rehabilitation Working Circle is 38856.96 hectares. Thus, the average annual rehabilitation area to be worked out comes to 3885 Ha.

(II) The cost norm that will be followed in Rehabilitation Working Circle will be Rs. 67592.9/- per hectares approximately.

(III) The total annual requirement under this Circle will be Rs.650lakhs per year with subsequent rise of 10 percent every year.

Cost norm for activities under Rehabilitation Working Circle with labour rate @ Rs.90 /- per day which has been up scaled to wage rate of 150/- per day.

Work	Mandays	Amount	Material cost	Total cost
ADVANCE WORK				
1. Survey and demarcation	4	360	-	360
2. Weeding and climber cutting	10	900	-	900
3. Regeneration cleaning, multiple shoot cutting, coppicing and pruning.	15	1350	-	1350
4. Raising of nursery stock at the rate of 400 plants per ha including 10 % for current year casualty.	4	360	500	860
5. Pitting over gaps at the rate of 400 pits per ha of size 45 cm x 45 cm x 45 cm	10	900	-	900
6. Miscellaneous expenses	-	-	200	200
Total	43	3870	700	4570

CREATION

1. Maintenance of nursery from January to June	3	270	-	270
2. Carriage and planting over gaps	4	360	-	360
3. Soil working, weeding and twice manuring.	4	360	-	360
4. Cost of chemical fertilizer, NPK and urea at the rate of 50 gm each including application.	2	180	1000	1180
5. Cost of bio-fertilizer including application.	1	90	800	890
6. Maintenance of regenerated area by weeding and cleaning.	2	180	-	180
7. Fire tracing and inspection path	2	180	-	180
8. Miscellaneous expenses	-	-	2000	2000
Total	18	1620	3800	5420

SECOND YEAR

1. Cutting back of weeds growth and climbers	10	900	-	900
2. Singling of shoots of tree species.	15	1350	-	1350
3. Casualty replacement at the rate of 10% over gap planted area including pitting, carriage and cost of seedlings.	1	90	800	890
4. Tending of seedlings planted over gap through soil working, weeding and manuring.	4	360	-	360
5. Cost of chemical fertilizers at the rate of 50 gm of DAP per plant including application.	2	180	2000	2180
6. Fire tracing	4	360	-	360
7. Miscellaneous expenses	-	-	2000	2000
Total	36	3240	4800	8040

THIRD YEAR

1. Cutting back of weeds, climber and cleaning.	10	900	-	900
2. Tending of seedlings including weeding and pruning.	5	450	-	450
3. Fire tracing	4	360	-	360
4. Miscellaneous expenses	-	-	2000	2000
Total	19	1710	2000	3710

ABSTRACT	Man days	Amount	Material cost	Total cost@ 90/-per MD	Total cost@ 150/-per MD
Advance work	43	3870	700	4570	7616.6
Creation	18	1620	3800	5420	9033.3
2nd year maintenance	36	3240	4800	8040	13400.0
3rd year maintenance	19	1710	2000	3710	6183.3
TOTAL	**116**	**10440**	**11300**	**21740**	**36233.2**

Break up of expenditure for soil and moisture conservation measures

Work	Mandays	Amount
1. Digging up of trenches of size 0.5m x 0.5m x 2.0 m.	20	1800
2. Gully plugging with loose boulders/vegetative materials to check run off of water.	10	900
3. Miscellaneous expenses	-	2000
Total	30	4700

SECOND YEAR

1. Renovation of trenches.	10	900
2. Maintenance of structures erected during 1st year	4	360
3. Miscellaneous expenses	-	2000
Total	14	3260

THIRD YEAR

1. Renovation of trenches	10	900
2. Maintenance of structures	4	360
3. Miscellaneous expenses	-	2000
Total	14	3260

A B S T R A C T

	MD	@Rs 90/-	@Rs 150/-
1st Year	30	4700	7833.3
2nd Year	14	3260	5433.3
3rd Year	14	3260	5433.3
Total	**58**	**11220**	**18699.9 or 18700**

Break up for Entry Point Activities

WORK	AMOUNT (in Rupees)
FIRST YEAR	
1. Training of staff and VSS members	400
2. Awareness through meeting, dialogue and audio visual programmes.	200
3. Fencing of plantation area with brush wood.	500
4. Promotional activities through supply of fuel efficient chulhas etc.	500
5. Miscellaneous expenses	200

SECOND YEAR	
1. Extension activities to sustain awareness	400
2. Monitoring and evaluation	200
3. Maintenance of fencing	200
4. Miscellaneous expenses including stationery and publicity materials etc.	200
THIRD YEAR	
1. Extension activities	200
2.Training, extension and promotional activities	3000
3. Micro Planning	500
4. Fencing	700
5. Monitoring and evaluation	400
Total	**7600**

A B S T R A C T

Work	Total (in Rupees)@Rs 90/-	Total in Rupees@ Rs 150/-
Advance work	4570	7616.6
Creation	5420	9033.3
2nd Year	8040	13400.0
3rd Year	3710	6183.3
Soil and moisture conservation	11220	18700
E.P.A.	7600	12660
TOTAL	**Rs.40,560.00**	**67592.9**

3.21 INTERMEDIATE REVISION

No major changes in the prescription of the Working Circle are anticipated. However, it may the reviewed, if necessary, after 5 years jointly by the C.F. (T) and the CF (WP). Any deviations suggested shall be subject to sanction of competent authority.

PART-II
CHAPTER-IV

4 PLANTATION MANAGEMENT WORKING CIRCLE

4.1 GENERAL CONSTITUTION

This Working Circle includes areas of plantation of working circle of out going plan and old existing plantations. The statistics about old plantations are available from the year 1961-62 onwards. Total area allotted to this working circle is 6188.6396 ha spread over 17 RFs and one DPF. Since 2003 till date there was no approved working plan. During this period 5381.13ha of plantation has been already done in the area allotted for the plantation management working circle by the end of financial year 2013-14. Besides the PWC area some plantations have also been done in RWC and SWC area. Hence this part of the plan proposes for the management of these old plantations done in the past

4.2 GENERAL OBSERVATION AND VEGETATION

The area allotted to this Working Circle is distributed throughout the division. Though the plantations already exist in field, the condition of the plants and their growth is not remarkable. The growth of the plantation is suppressed due to heavy biotic pressure like grazing and fire. In all the blocks there is good cover of soil. Most of the plantations have not been subjected to regular weeding, cleaning and thinning operations. The planted species are mainly Teak, Sisoo, Gambhar, Cassia, Acacia, Chakunda, Asan, Bamboo, Eucalyptus, Siris, Karanja,Simaruba and Neem etc.

The regeneration of sal and other species are less because of continuous cutting of trees, encroachment, grazing and forest fire etc. The description of crop which once dominated these areas was Northern Dry Mixed Deciduous Scrub Forest. The details of soil analysis in respect of these forest blocks have been described in Part I. The list of old plantations of Rourkela Division during the last plan period is furnished in Annexure 12 and 13. The plantations existing in the RFs / PRFs / DPFs etc are included in this working circle. However, in most of the cases past record of plantations have not been maintained and year of plantations are not mentioned on sign boards. Many plantations have been illicitly felled and haphazard coppice growth is available in many forest blocks. Most of the plantations are below exploitable girth size and thinning of such plantations is not recommended. Due to illicit felling of trees plantations at many places are haphazardly thinned and further thinning will expose the soil of forest block. Therefore, thinning of plantations is not advisable from silivcultural point of view. But singling of multiple coppice shoots of such plantation areas can be done for a good single coppice shoot to come.

4.3 SPECIAL OBJECTIVE OF MANAGEMENT

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

1. To restock left out barren areas (if any) or the gap created due to illicit felling, through artificial regeneration.

2. To maintain and tend the existing plantations through suitable silvicultural measures.
3. To improve land productivity through soil and moisture conservation measures.
4. To raise block plantations preferably of economic importance in large gaps having area of more than 4 ha (if any)
5. To increase the biodiversity of species in Division.

4.4 ANALYSIS AND VALUATION OF CROP

The plantation activity in the Division began during the year 1961-62. Most of the plantations raised are of mixed type and Teak. The data for Teak, Sissoo and other important species planted have been recorded in the past. The plantations raised in the division have not been exploited so far. In most of plantations regular weeding, thinning, pruning and other cultural measures have not been taken up. Hence the planted stocks are not up to mark and in some areas it is poor and growth is also not satisfactory. The plantations taken up in the Division have mostly failed due to biotic factor, illicit felling, grazing, browsing and lack of after plantation care. At many places coppice shoots have come up but their growth is stunted.

4.5 AREA ALLOTMENT AND PLANTING SERIES

Range wise distribution of different RF and PRF blocks allotted to this working Circle is furnished below:

Table -13. 1 Area allocation of PWC area

Sl. No.	Name of Forest Blocks (RF/PRF/DPF)	Area as per Divisional record (In Ha.)	Area of Plantation Working Circle (in Ha.)
1	Haldipani RF	9591.39	1999.50
2	Gudiali RF	922.716	300.00
3	Matipahad DPF	542.29	200.00
4	Ghogari RF	812.2329	200.00
5	Chadri RF	251.7234	201.7234
6	Madlia RF	137.1933	137.1933
7	Kamarpahad RF	117.363	117.363
8	Brahmanipahar RF	396.606	100.00
9	Durgapur RF	352.089	352.089
10	Rutukupedi RF	6440.3958	1900.00
11	Barpani RF	95.1045	95.1045
12	Bhalutungri RF	36.423	36.423
13	Beurapahad RF	80.1306	80.1306
14	Lamki RF	12.5457	12.5457
15	Jugsahi RF	67.1802	67.1802
16	Mahipani RF	658.0422	308.0422
17	Santoshpur RF	59.8956	59.8956

18	Bandomunda RF	21.4491	21.4491
	Total		**6,188.6396**

The allotment of different RF Blocks into plantation series and the year of working is mentioned in Annexure - 38(Page-152 to 153, Vol-II).But during the plan holiday period (from2003-2014) total 18171.11 ha has already been planted in the forest blocks allotted to PWC, RWC and the SWC area of the draft working plan till the end of Financial year 2013-14. During the year 2014-15, 4615 ha of plantation has been taken up in the WP area under different WC.

Name of working circle	Area allotted in draft working pan (Ha)	Plantation already taken up during plan holiday (Ha)
Plantation WC	6188.6396	5381.13
Rehabilitation WC	38856.96	10433
Selection WC	9781.59	2357
Total	54977.97	18171.11

As there is no area left out for plantation, in this allotted area for PWC, the plan proposes for management of the old plantations in the prescribed plantation series which will be worked out as tending series (Annexure 38). The list of plantation already taken in the Proposed PWC ,RWC and SWC area is given in the table no. 13.2,13.3 and 13.4

4.6 SILVICULTURAL SYSTEM

The silvicultural operations to be carried out shall include all associated works of plantation. For the plantations which are surviving tending operations shall be taken up which comprises gap planting and thinning operations along with full protection from biotic interference. Soil and moisture conservation measures, fire protection measures shall be taken up depending upon the site specific requirements of the plantation area.

4.7 CALCULATION OF YIELD

The yield shall be regulated in future according to area and exploitable class of trees available for harvesting.

4.8 TABLE OF OPERATION

Divisional Forest Officer will prepare the site-specific Annual plan of operation for management of old plantations in each plantation series.

Table-4.2 Plantation done under different schemes from 2003-04 to 20013-14 In the RF, DPF allotted under PWC

Plantation done under different schemes from 2003-04 to 20013-14 In the RF, DPF allotted under PWC

Name of RF	B. Economic		CAMPA		Comp. Affn.		Bald Hill	OBDP	NREGS	FDA	OFSDP		Total planted area	PWC area
	AR	ANR	AR	ANR	AR	ANR					VSS	Non-JFM		
Haldipani										170	1830		2000	1999.5
Gudialai			25							104		40	169	300
Motipahad DPF											78		78	200
Ghogari	55										145		200	200
Badpani											54		54	95.1045
Bhaludunguri	25												25	36.403
Lamki													0	12.545
Jugsahi											65		65	67.1802
Chadri	37					100						63.5	200.5	201.7234
Madlia							10						10	137.1933
Kamarpahad	7						10				52		69	117.363
Brahmanipahad	30										70		100	100
Rutukupedi	130	100	80	100		24.34		10		483	944	28	1899.34	1900
Beruapahad	15											20	35	80.1306
Durgapur	15				45.292		25		12			16	113.292	352.089
Bandamunda													0	21.4491
Mahipani									99	155	34	20	308	308.0422
Santoshpur	25											30	55	59.8956
Total													**5381.13**	**6188.619**

Table-4.3 Plantation done under different schemes from 2003-04 to 2013-14 in the RF,DPF allotted under Rehabilitation Working Circle.

Plantation done under different schemes from 2003-04 to 2013-14 in the RF,DPF allotted under rehabilitation Circle.																				
Name of RF	**B.Economic**		**CAMPA**		**Comp. Affn.**		**SGRY**		**13th RWC**		**Bald Hill**		**OBDP**	**MGNREGS**		**FDA**	**OFSDP**		**Total planted area**	**Area alloted for RWC**
	AR	**ANR**	**AR**	**ANR**	**AR**	**ANR**	**AR**	**ANR**	**AR**	**ANR**	**AR**	**ANR**		**AR**	**ANR**		**Non-JFM**	**VSS**		
Andhari			50													60	30		140	318.09
Badmarein																		71	71	78.11
Bagdega	20		30													37		199	286	424.12
Banglopahad																	15		15	164.71
Biringahudi																	40		40	55.84
Jharbeda	100																	97	197	508.3
Brahmani																		118	118	296.61
Chadri					8.54											70			78.54	50
Chhatam					77	900										160		976	2113	7527.42
Chudia														50			45	362	457	263.06
Datarampur	40																65		105	82.96
Datni																265	10	103	378	530.16
Dhumaguda																		303.5	303.5	407.13
Ergeda			10															76	86	520.04
Ghoghari																		184	184	612.23
Gudiali																			0	622.72
Haldipani																		1347	1347	7591.8
Harapali																		80	80	304.74
Hatibandha		50									25							125	200	278.03
Jalangbera																20		55	75	196.68
Jatia																		175	175	382.44
Karlakhaman DPF																		76	76	88.62
Kudahundung											15	100						151	266	335.5
Lahanda			50				25										40	75	190	218.94
Lassey																		95	95	101.98
lathikata RF																	50		50	70.82

Name of RF	B.Economic		CAMPA		Comp. Affn.		SGRY		13th RWC		Bald Hill		OBDP	MGNREGS		FDA	OFSDP		Total planted area	Area alloted for RWC
	AR	ANR	AR	ANR	AR	ANR	AR	ANR	AR	ANR	AR	ANR		AR	ANR		Non-JFM	VSS		
Linidiri																		76	76	200.73
Mahipani																		235	235	350
Makadchuan																		60	60	41.35
Motipahad DPF																			0	342.29
Mudra	20																	193	213	385.27
N.Sukda																		120	120	628.09
Olhani DPF																	20		20	19.85
patipahad RF																	30		30	216.91
Purnapani			40						100							90		130	360	327.81
Rion																90		135	225	266.7
RJP Jharbeda			20								17			10			70		117	80.74
Rutkupedi																		732	732	4540
S.Sukuda															133	30		82	245	323.36
Satbhaya																85		239	324	322.14
Sonaparbat		75	125		30													204	434	900.05
Sorda PRF																	20		20	29.62
Tangrani																		80	80	177.66
Vedvyas	6										10								16	18.21
Total																			**10433**	**38856.9**

Table 4.4- plantation done in proposed SWC area of draft working plan

Name of RF	B-Economic	MGNREGA	OFSDP		FDA	Total(Ha)	SWC Area(Ha)
	AR	ANR	NonJFM	VSS			
N. Chirobeda	25	300	20	745	455	1545	3654.84
S. Chirobeda	20	100	99	333	260	812	6126.75
	45	**400**	**119**	**1078**	**715**	**2357**	**9781.59**

4.9 SUBSIDIARY SILVICULTURAL OPERATION

The young plantations need regular attention otherwise if they are left uncared till first thinning. Miscellaneous coppice shoots occurring previously in that area will suppress most of the plantations. The cleaning operations are to be taken up in the sixth year of plantation. It is to be carried out to boost the best pole or tree from undesirable ones of the same age, which are interfering or likely to interfere with their growth. It is also necessary for reducing the competition for light. In case of light demander species like Teak, Gambhar etc. the density of cleaning should be high, while in case of shade demanders it may be low. The thinning shall be carried out in Teak and Gambhar plantations in 7th, 13th, 20th, 30th and 45th year of plantation. The first two thinning shall be mechanical in nature and will be done diagonally. Subsequently thinning shall be silvicultural in nature considering the development of crown. At the time of thinning operation like climber cutting, singling out of shoots and pruning etc are to be taken up.

In the mixed plantations the first thinning will be carried out in 8th year and will be mechanical in nature. The second thinning will be silvicultural ordinary C Grade type and will be carried out in 15th year of the plantation. The 3rd and 4th thinning will be selective in nature and will be carried out in 25th and 40th year of plantation. All the thinning operations are to be carried out under the direct supervision of Range Officer.

4.10 TREATMENT OF EXISTING PLANTATIONS

Cleaning and pruning of the plantations will be taken up along with climber cutting and removal of weeds growth in the entire area. Tending operations including thinning in old plantations may be taken up and only tending operations including climber cutting, singling out of shoots and thinning are prescribed. No formal silvicultural system is prescribed for this working circle. JFM mode is prescribed with the help of local villagers in the area.

For existing plantations tending operations will be taken up which shall comprise of both gap plantations as well thinning operations coupled with strict protection from biotic interference. Soil and moisture conservation measures will also be undertaken. The teak plantations are varying in age and there is need of silvicultural operations to boost their growth. They require pruning, thinning, climber cutting, removal of all dead trees accompanied with gap plantations in the area. The age of old plantations could not be ascertained and detailed thinning regime has not been prescribed here. The DFO should verify the Plantation Journal and confirm the age of all old plantations before taking up any thinning operations.

TREATMENT AND METHODOLOGY

The existing plantations shall constitute the tending series. The growth of existing plantations is not uniform at all places. In some plantations growth and survival is adversely affected by biotic interference whereas in some other cases plantations are being protected by VSS members. Most of the surviving plantations and coppice growth of plantations have not reached harvesting stage. As such uniform treatment for harvesting of all plantations is not possible.

Due to above mentioned factors, no plantations has been divided into annual areas of treatment. The DFO will inspect the area, verify the crop condition and demarcate annual coupes in tending series depending upon availability of mature trees and take up thinning operation. About ten to twenty five hectares of area under plantation shall be taken up every year for the treatments so as to cover entire area within the plan period. The DFO shall prepare site-specific treatment plan of the plantation area and thinning etc. shall be decided and approved every year before taking up operations. The growth of plantations tends to become bushy, irregular and branchy surrounded by climbers and miscellaneous species of natural growth. The tending operations which will be taken up in plantations shall include:

1. Weeding and pruning till 8th year of plantation,
2. Regular climber cutting,
3. Removal of dead and diseased trees,
4. Thinning will be taken up in congested crop on the line of 'A' grade and 'B' grade thinning,
5. Gaps shall be planted with suitable indigenous species.

4.11 MISCELLANEOUS REGULATIONS

4.11.1 GRAZING

The planted area should be strictly protected against grazing for a minimum period of five years till the plantation reaches safe height against browsing.

4.11.2 FIRE PROTECTION.

Complete fire protection is recommended. The fire protection measures shall be regulated as per Orissa Forest (Fire Protection) rules, 1979.

4.12 RIGHTS AND CONCESSION

No rights and concessions shall be allowed in this Working Circle. However usufruct rights may be allowed in accordance with the provision of current policies and programmes of the State Govt. with regard to JFM areas.

4.13 INTERMEDIATE REVISION

Intermediate revision is not anticipated. However, if necessary prescriptions may be reviewed after 5 years jointly by the Conservator of Forests (T) and the Conservator of Forests, Working Plans. Any deviation suggested shall be subject to approval by the competent authority.

PART-II

CHAPTER-V

PROTECTION (OVERLAPPING) WORKING CIRCLE

5.1 GENERAL CONSTITUTION

This overlapping working circle extends to all those forest blocks which need special protection measures from biotic interferences. The blocks and compartments which are existing in the ecologically sensitive pockets are also included in this working circle. After 1990, population in this tract has increased in rapid pace due to speedy industrialization around Rourkela and Rajgangpur town, creating great demand for forest products. This has led to heavy illicit felling. The intense biotic pressure from human and cattle has put a large number of forest blocks of this division under various stages of degradation. Unless proper steps are taken to prevent forest fire, illicit felling, encroachment, illegal mining and poaching, the degradation process cannot be checked. Further, it will be difficult to reverse the process of degradation if suitable remedial measures are not taken in time. It is also essential to see that forest on steep slopes and ecologically fragile areas are not disturbed and are completely protected.

The protection overlapping working circle covers the entire working plan area. Special emphasis has been given to areas requiring very specific silvicultural treatment and administrative measures as under

(i) The ecologically fragile areas of high hills around reservoirs and hilly slopes, which are susceptible to environmental degradation.

(ii) RFs and PRFs, which are under encroachment for cultivation and habitation purposes. This also includes some forest blocks under pernicious practice of shifting cultivation in the past having little vegetation and containing sufficient root stocks for regeneration.

(iii) Areas most prone to illegal timber smuggling

(iv) Areas which are rich from biodiversity point of view, which need protection from any kind of interference.

5.2 GENERAL OBSERVATION AND VEGETATION

The forests of this division are subjected to continuous biotic pressure. Incidence of encroachments is also on the rise. Rural population collect their daily / annual requirement of fire wood, small timber, leaves, bamboos and NTFPs from nearby forests. These regular and continuous biotic interferences has led to decrease in vegetative cover and opening of canopy at places resulting on high run-off, rapid soil erosion. Majority of the forest blocks included in this working circle are those forest blocks which have been badly affected due to regular removal of biomass and also those blocks having valuable high forests which are now becoming targets of timber smugglers. Both these type of blocks need intensive protection measures so that pressure of biomass removal is reduced substantially. This will help to yield desired results through implementation of prescriptions of silvicultural operations of the main working circle. The type and classification of forests included in this circle has already been dealt in Chapter-II of Part – I.

The principal species in these forests are Sal, Asan, Dhaura, Kurum, Kasi, Char, Moi and Sidha etc. Illicit felling survey done in the Division in the past is given in annexure 39(Page-154 to 174, Vol-II).

5.3 SPECIAL OBJECTIVES OF MANAGEMENT

The special objectives of management set for this Working Circle are within the ambit of the general objectives of management of the Working Plan. These are as follow:

(i) To prevent further degradation of delicate and eco-sensitive areas and stabilize these areas as ecologically stable.

(ii) To rehabilitate the forest area subjected to encroachment or shifting cultivation by adequate social, administrative and silvicultural measures.

5.4 AREA STATEMENT AND TREATMENT SERIES

The area allotted to this working circle covers the entire working plan area.

5.5 ANALYSIS AND VALUATION OF CROP

The blocks included in this circle have either degraded forest or high forest which needs intensive protection measures. It is expected that with proper protection and stoppage of illegal removal of biomass from these degraded blocks, the area will quickly rejuvenate and regain its original status. Protection to high forest blocks will ensure check on depletion in forest cover and environmental degradation. Protection from grazing and fire will ensure improvement in the regeneration status of these blocks. All these observations advocate strongly in favour of protection of these forests.

5.6 SILVICULTURAL SYSTEMS

The forest blocks included in this circle are to be protected strictly without any other consideration. No specific silvicultural system is prescribed for the areas included under this Working Circle, except for removal of dead, dying, fallen and uprooted trees. No felling of trees of any kind shall be carried out in the eco-sensitive areas. However, for achieving the special objectives of this circle, the following operations are prescribed:-

i. The forest blocks shall be rigidly protected from illegal biomass removal and allow them to grow under nature's own care and nursing.
ii. Forest cover on steep precipitous slopes and eco-fragile zones would be specially protected to ensure no loss of vegetation and soil cover.
iii. Adequate steps shall be taken to prevent forest fires and grazing.
iv. Boundary of compartments and blocks shall be maintained properly.
v. Forest road network shall be improved for better mobility and supervision.
vi. Communication network – VHF and HF sets shall be used effectively.
vii. Special anti-smuggling squads and fire fighting squads shall be created for each Protection Unit.
viii. Steps shall be taken to create public awareness for protection of forests.

5.7 PROTECTION CYCLE AND UNITS

The principal aim and objective of this circle is to provide special protection to all the Forest blocks of the Division. But certain patch of forests like Chhatam, Rutkupedi, Bhaisamunda, Haldipani, S. Chirobeda and N. chirobeda, etc. where the intensity of human interference on the forest growth like illegal timber smuggling and collection of fire wood is very high, It is prescribed to create different protection units in the Division to achieve the desired end results. Formation of protection units will facilitate implementation of operations like maintenance of boundary to prevent encroachments, repair of existing roads and creation of new road network to ensure regular patrolling in vulnerable and theft-prone forest blocks/compartments, action of anti-smuggling squads to check all illegal activities in a planned and systematic way. It is expected that the aforesaid arrangement will definitely help in tackling protection 'hotspots'. Accordingly, after field verification, area of the working circle has been divided into two protection units as per the blocks and area wise details furnished in the Table.

Since entire working circle area is to be treated within the plan period, the protection cycle of 5 years is prescribed so that the earmarked areas will be treated twice during the plan period.

Chhatam Protection Unit

year	**Forest Block where the protection units will be formed**	**Area to be worked under the protection unit(Ha)**
2014-15	Chhatam RF(Part) Rutkupedi RF(Part)	3764 1516
2015-16	Rutkupedi RF(Part) Bhaisamunda RF	2462 2062.75
2016-17	Rutkupedi RF(Part) Rangamati RF Khindapahad RF Haldipani RF(Part)	2462.39 694.46 80.94 2042
2017-18	Haldipani RF(Part)	3775
2018-19	Haldipani RF(Part)	3774.39
2019-20	Chhatam RF(Part) Rutkupedi RF(Part)	3764 1516
2020-21	Rutkupedi RF(Part) Bhaisamunda RF	2462 2062.75
2021-22	Rutkupedi RF(Part) Rangamati RF	2462.39 694.46

	Khindapahad RF Haldipani RF(Part)	80.94 2042
2022-23	Haldipani RF(Part)	3775
2023-24	Haldipani RF(Part)	3774.39

Chirobeda Protection Unit

year	**Forest Block where the protection units will be formed**	**Area to be worked under the protection unit(Ha)**
2014-15	N. Chirobeda RF(Part) S.Chirobeda RF(Part) Ergeda	730 1225 520.03
2015-16	N. Chirobeda RF(Part) S.Chirobeda RF(Part) Sunaparbat RF(Part)	730 1225 450
2016-17	N. Chirobeda RF(Part) S.Chirobeda RF(Part) Sunaparbat RF(Part)	730 1225 450.05
2017-18	N. Chirobeda RF(Part) S.Chirobeda RF(Part) Jharbeda RF	730 1225 508.3
2018-19	N. Chirobeda RF(Part) S.Chirobeda RF(Part) Ergeda	734.84 1226.75 658.04
2019-20	N. Chirobeda RF(Part) S.Chirobeda RF(Part) Ergeda	730 1225 520.03
2020-21	N. Chirobeda RF(Part) S.Chirobeda RF(Part) Sunaparbat RF(Part)	730 1225 450
2021-22	N. Chirobeda RF(Part) S.Chirobeda RF(Part) Sunaparbat RF(Part)	730 1225 450.05

2022-23	N. Chirobeda RF(Part) S.Chirobeda RF(Part) Jharbeda RF	730 1225 508.3
2023-24	N. Chirobeda RF(Part) S.Chirobeda RF(Part) Ergeda	734.84 1226.75 658.04

In addition to this one Divisional mobile unit will be placed at Division head quarter which will take care of the protection work required in the urban area , Illegal transportation of timber through railway, road network,removing encroachments etc. Besides this it will also move to any area inside the Division as and when required for the purpose of forest protection

5.8 CALCULATION OF YIELD

No yield is prescribed.

5.9 METHODOLOGY AND EXECUTION OF OPERATIONS

For smooth protection purposes forest areas have been divided into Protection units basing upon area of the Ranges. The work programme of the units shall be decided prior to season of treatment of forest blocks. The work programme of the units shall be decided prior to season of treatment and one or more compartments shall be treated in one year. Repairing of forest roads, boundary maintenance, pillar posting and numbering and maintenance of sign boards will be done every year. Sign boards shall depict the name of forest blocks, area, section, beat, compartment and other features with map of the forest block. The action plan shall be prepared by D. F. O. with monthly operation of works taking into consideration various protection measures.

5.10 FOREST PROTECTION MEASURES

(a) Watch and ward of forest block and fencing.

(b) Regular monitoring will be done by staff.

(c) Grazing and browsing shall be checked.

(d) Illegal removal of forest produce shall be stopped.

(e) Full protection shall be given against illicit felling, forest fires and other biotic interferences. Anti-smuggling squads shall be constituted in every unit and adequate man power shall be deployed along with protection watchers.

(f) All the forest check gates shall be strengthened with staff, VHF, arms and ammunitions. Every check gate shall be provided with one vehicle to chase the vehicle of offenders.

(g) The offenders shall be arrested and forest cases shall be sent to court of law for trial.

(h) The field staff shall be rewarded for their courageous works.

(i) The encroachment of forst land shall be discouraged. The efforts of each unit shall be monitored with regard to number and nature of forest offence cases booked, encroachers will be evicted, timber and vehicle will be seized and criminals shall be prosecuted in court.

(j) The staff shall constantly pursue offence cases in the courts of law and ensure higher rate of conviction.

(k) The divisional mobile squad shall be made operational with staff, VHF, arms and ammunitions.

(l) The network of forest roads shall be increased and roads shall be repaired at frequent intervals. The forest roads are important for transportation and supervision of works and shall be maintained properly. To check smuggling, illicit felling, encroachment and poaching etc it is compulsory that forest roads are maintained in good condition.

(m) The forest roads/tracks shall be maintained by providing drains, morrum spreading and boulders filling with chips etc. The cement concrete causeways, culverts, hume-pipe culverts and small bridges shall be constructed in in accessible areas.

(n) The D. F. O. shall prepare plan, estimate for repairs and special repairs of forest roads every year and get the same approved and sanctioned through highers officers in time.

5.11 CONTROL

The journals and other records will be maintained for each protection coupe in accordance with the provisions of Orissa Forest Plantation manual 1972. Necessary entries shall be made in the compartment histories about all the works undertaken inside the annual coupes.

5.12 MISCELLANEOUS REGULATION

5.12.1 Grazing

All the annual protection areas and new plantation shall be closed to grazing for a minimum period of 5 years. However, depending upon the result, the DFO can further extend the closure period. In case, it is decided to open the area for grazing, it shall be regulated as per carrying capacity of the area concerned .The Orissa Forest (Grazing of Cattle) Rules, 1980 should be strictly followed.

5.12.2 Fire Protection

The entire protection area should be rigidly protected from fire hazard. The fire protection measures shall be regulated as per the Orissa Forest (Fire Protection) Rules, 1979 and Chapter-XVIII of Orissa Forest Department Code.

5.13 RIGHTS AND CONCESSIONS

Rights and concessions shall be regulated as per the existing provisions of the relevant Gazette notifications of the respective forest blocks and the Govt. of Orissa policy with regard to JFM.

5.14 Financial Forecast

The working circle covers entire working plan area. The total annual requirement under this Circle will be Rs.99 lakhs per year with subsequent rise of 10 percent every year.

FINANCIAL FORECAST FOR PROTECTION (OVERLAPPING) WORKING CIRCLE

Sl. No.	Particulars of works to be taken up every year	Amount required (in lakhs)
1	Maintenance of forest roads	Rs. 10.00
2	Cement concrete structures for road maintenance.	Rs. 5.00
3	Construction and maintenance of pillars	Rs. 3.00
4	Maintenance of forest crime records	Rs. 2.00
5	Maintenance of sign boards	Rs. 1.00
6	Construction of VHF towers	Rs. 3.00
7	Expenditure on POL	Rs. 6.00
8	Engagement of protection watchers	Rs. 35.00
9	Engagement of fire watchers	Rs. 10.00
10	Construction of temporary sheds	Rs. 5.00
11	Purchase of arms and ammunitions	Rs. 2.00
12	Rewards and incentives	Rs. 2.00
13	Maintenance of check gates	Rs. 5.00
	TOTAL	**Rs. 99.00**

5.15 Recent activities done for Forest Protection

In the recent past forest protection squads, Squads for critically endangered area have been deployed for checking the illegal timber trade. Barracks have been constructed at the most vulnerable points of timber smuggling. Under CAMPA vehicles have been provided to each range on hire basis for easy access to all areas of the Range. Seizure yards, Malkhana have been constructed to store the seized forest produce at rang level. Division wise supply of Jeep and motor cycles is given in annexure 40(page-174, Vol-II) and the communication is given in annexure 41(page-175, Vol-II). The Offence cases booked in the Division is given in the Annexure 42(page-175, Vol-II).

5.16 INTERMEDIATE REVISION

No major changes in the prescription of the Working Circle are anticipated. However, it may the reviewed, if necessary, after 5 years. Any deviations suggested shall be subjected to sanction of competent authority.

PART-II

CHAPTER-VI

BAMBOO (OVERLAPPING) WORKING CIRCLE

6.1 GENERAL CONSTITUTION

This is an overlapping working circle and overlaps all the forest blocks of Division. The reduction in bamboo production in the un-divided Sundergarh Division from 5553 S.U. in 1990-91 to 1966 S.U. in 1997-98 clearly indicates that there is loss in potential of bamboo for exploitation. In the bamboo-working circle of the preceding plan, more than 50 percent of the 9 cutting series are not available for working economically and silviculturaly. This is due to excessive illegal removal of young bamboo shoots as well as culms by the local people and bamboo artisan. In most of the blocks / compartments, the bamboo are confined to middle and up hills while the foothills and valley portion contain very little or no bamboo growth. The bamboo was exploited unscientifically in the past. While easily accessible areas were over exploited, the difficult terrain were either under exploited or left without working. This has adversely affected the growth of bamboo clumps. Degeneration and degradation of bamboos in lower slopes and plains and congestion in upper slopes is the result of haphazard bamboo working in the past. Most of the clumps on an average do not contain minimum number of culms required for healthy growth of rhizomes. Bamboo is not available for exploitation in Rourkela Division and no prescription for cutting of bamboo has been recommended in Rourkela Division.

6.2 CHARACTER OF VEGETATION

Two species of bamboo are found in the forests of this Division. The most important and commonly found species is Salia bamboo (*Dendrocalamus strictus*). The species (*Cephalostachium pergracile*) commonly called Dungi bans occurs in less number along perennial nallas and streams. The forest types in which bamboo occurs are Dry peninsular sal (5B / C/e), Northern dry mixed deciduous sal forest (5 B/C2) and Dry bamboo brakes (5E/9).

6.3 OBJECTIVES OF MANAGEMENT

The special objectives of management set for this Working Circle are within the ambit of the general objectives of management of the working plan.

1. To apply proper silvicultural principles while working bamboo forests in order to secure sustained yield along with improvement of quality and quantity of bamboo clumps.

2. To rehabilitate the degraded bamboo areas through tending, cleaning and bamboo planting etc.

3. To meet the demand of local people.

4. Providing employment to forest dwellers and local people.

6.4 WORKING OF BAMBOO

Treatment Type – A

Area with healthy and well-stocked Bamboo clumps consisting of

Clump Quality – I	Culms height of Bamboos 9 m and up.
Clump Quality – II	Culms height of Bamboos between 6 to 9 m.
Clump Quality – III	Culms height of Bamboos below 6 m.

Treatment Type – B

Areas with well-stocked but degraded, damaged, congested and/or fire burnt clumps. **Treatment Type – C**

Areas where bamboo clumps are sparse and scattered.

The bamboo has reduced in the forests of Division and plantations shall be taken up to improve the forest condition. In future salia bamboo (*Dendrocalamus strictus*) will be worked as per the following prescriptions.

PART –I

Cutting Rules and other rules which are uniformly applicable to all the Treatment Types:

(i) Karadi (culms up to one year of age) and the Bamboo culms over one year but under two years of age will not be cut under any circumstance. Such more than one year old culms and the culms which are older than 2 years but less than 3 years of age are to be retained in the clump and their number should not be less than number of Karadis.

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 follows:

Clump Quality – I	-	20 culms.
Clump Quality – II	-	15 culms.
Clump Quality – III	-	10 culms.

(ii) All bamboo culms of three years and more than three years old should be harvested (except 5 mature culms retained).

(iii) No culm of 2 years and less than 2 years of age will be cut.

(iv) A clump will be distinguished as an independent clump where its periphery is easily discernible; two clumps within one meter distance will be regarded as one.

(v) No clump should be considered fit for harvesting unless it contains more than 10 mature culms (one year as well as two years included).

(vi) 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.

(vii) Following culms shall be removed from all clumps.

(a) All dead, decayed and dry bamboo

(b) Culms whose half or more top part is broken or damaged

(c) Twisted or malformed culms.

(viii) The height above which culms are cut shall nor be less than 15 cm or more than 45 cm. from the ground level and in no case below the first prominent node from the ground.

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

(x) Cleaning will be done in all clumps. It consists of following operations.

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

(b) Climbers shall be cut from all the bamboos clumps during working of the coupes.

(c) The clumps should be cleaned of all debris.

(d) Soil should be heaped around smaller clumps or clumps with no culms or clumps with exposed rhizome.

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

(xii) Bamboo cutting will not be permitted form Ist June to 30th September.

(xiii) In case of sporadic flowering, 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 either for feeding livestock or otherwise is strictly prohibited.

(xvi) Bamboo cutting should be completed by the end of March and extraction from forest 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.

PART – II

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 clump.
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 following.
   (a) Felling of all dead, dry, over-matured, burnt, broken and grossly damaged bamboos.
   (b) Broken or cut bamboos or high stumps in green condition, having length of 2.5 meters or more may be retained, if necessary, to maintain size of the clumps.
   (c) The minimum number of 10 culms to be retained per clumps.
3. 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 the shape of a triangle having apex at the first working. In subsequent cycles, side segments should be felled.

(iii) Treatment Type – C

1. Only cultural operations in the area planted with bamboo will be done as per the standard practice.
2. The bamboo potentiality of such forests will be augmented by raising bamboo plantation. The minimum area to be planted annually will be 10 hectares or one third of the area under this type.
3. Tending and cultural operations in the area planted with bamboo will be done as per the standard practice.

PLANTATION OF BAMBOO IN FOREST AREAS

The financial forecast with regard to bamboo working has been assessed in terms of silvicultural operation and gap plantations. The cost norms to be followed in the scheme are as follows:

(i) Silvicultural operation - 5 MD/ha. = 750.00/ha.

The activities like Serial numerical high stump rectification digging of half moon trench, congestion treatment, climber cutting and soil and moisture conservation will be taken up under silvicultural operation.

(ii) The total cost of gap plantation with bamboo is worked out at Rs. 56660.00 per hectare with subsequent annual rise of 5 percent every year.

The spacing for bamboo plantation is 5 mt. x 5 mt and plantation will be done with 400 rhizomes per ha. The year wise financial requirement for gap plantation is provided in the following table:

Sl. No.	Item of work	Year	Norm per ha for 400 rhizomes per ha.	Nor per ha. for 50 rhizomes per ha.
(1)	(2)	(3)	(4)	(5)
1	Nursery cost (Advance work)	0^{th} Year	13330	2666/-
2	Advance work	0^{th} Year	12500	2500/-
3	Plantation	1^{st} Year	13330	2666/-
4	Maintenance- 2^{nd} year	2^{nd} Year	10000	2000/-
5	Maintenance- 3^{rd} year	3^{rd} Year	7500	1500/-
			56660	**11332**

It is proposed that 500 hectares of area will be planted with bamboo rhizomes every year at an expenditure of 56660 x 500 = Rs.283,30,000/- spread over four years. The requirement for silvicultural operation of bamboo will be assessed by the DFO every year.

6.5 MORPHOLOGICAL CHARACTERS OF THE CULMS

Correct determination of age of each culm is essential for framing cutting rules. The following morphological characteristics may help in determining the age of culm in case of salia bamboos.

Culms Age	**Morphological character**
1. Kardi (First year culms)	Culm sheath present in lower half of culm. Branches present throughout the length of culm. Uniformly green bloom is abundantly present and comes off easily on finger. A fresh cut just under the node shows the same colouration even after one or two minutes.
2. Kasi (2^{nd} year culm)	Culm sheath is mostly absent and only traces of dark colour is seen. Branche present particularly at all nodes. Bloom is patchy and comes out less easily on finger. A fresh cut just under the node shows the same colouration even after one

		or two minutes.
3.	Pakala (3^{rd} year culm)	Culm sheath is absent. Branches are present at all nodes. White bloom disappears and blackish grey blotches appear which comes out on finger on slight rubbing. A fresh cut under the node shows reddish brown colouration after one or two minutes.
4.	Fourth year culm	Culms sheath absent. Dark blotches are more conspicuous and come off on finger easily. A fresh cut made out under the node shows reddish brown colouration after one or two minutes.

6.6 SUBSIDIARY SILVICULTURAL OPERATIONS

6.6.1 SIMULTANEOUS SILVICULTURAL OPERATIONS

Cleaning operation in worked out coupe includes removal of dead and dry culms and debris from the clump. All the left over debris should be removed to safer places to reduce chances of fire hazard. The exposed rhizomes shall be covered with soil from the surrounding area preferably from the uphill side of hilly or undulating terrain. Both these operations shall be done simultaneously along with main cutting operation. No damage shall be caused to rhizomes and rootstock.

6.6.2 IMPROVMENT OF BAMBOO FOREST

Sincere effort should be made to improve bamboo stock in degraded areas by taking up suitable cultural measures like tending and enrichment bamboo plantations etc. Appropriate tending measures like cutting of shrubs and weeds should be taken in the natural bamboo regenerated patches. This will help in establishment of bamboo seedling. In the bamboo degraded areas, measures like bunding and trenching around the clumps, climber cutting, covering of exposed rhizomes with slash and earth should be taken up. Application of fertilizer (NPK) should be taken up for better development of clumps. All these measures should be carried out departmentally under proper supervision.

6.6.3 TREATMENT OF GREGARIOUSLY FLOWERED AREAS

(i) Bamboo seedlings at a spacing of about 4m x 4m will be planted and retained and the rest will be thinned out.

(ii) Cleaning, soil working and weeding will be done around bamboo seedlings up to a radius of 50 cm.

(iii) To maintain continuity, planting of bamboo rhizomes will be done especially in big gaps.

(iv) All the flowered clumps will be worked following the prescriptions of working plan.

(v) The area should be closed for grazing

(vi) Elaborate fire protection measures to be taken.

In selection forest, the age of clump varies alongwith intensity of gregarious/sporadic flowering. The delay in flowering in poor sites is due to the effect of site quality, which is related to storage of starch, sugar and other substances in the clump that helps in flowering. In a well-managed forest intensity of flowering is less as compared to un-worked forest consisting of congested clumps. Intensity of flowering is more in areas having more biotic interference in form of grazing and fire in comparison to protected areas. It is important to identify the character of flowering in salia bamboos to decide appropriate management techniques.

	Sporadic flowering		**Gregarious flowering**
1.	Scattered nature of flowering. Only 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 portion of the clump.
3.	The culm may or may not die after flowering.	3.	All the culms of a clump die after flowering.
4.	The clump does not die.	4.	Flowering is followed by death of the clumps.
5.	It takes place usually/ irregularly almost every alternate year.	5.	It follow a cycle of long interval of 20 to 65 years.
6.	No definite direction of flowering in noticed.	6.	It progresses in a definite direction like an epidemic.
7.	No definite time period for flowering in an area.	7.	It takes 2 to 4 years to complete flowering in the area.

6.7 CONTROL

Necessary entries with regard to works taken up in bamboo coupes must be entered in the compartment history.

6.8 MISCELLANEOUS REGULATIONS AREA TREATMENT

All clumps in worked out coupes shall be covered with soil to induce regeneration of culms. Stone packing shall be done in down hillside of clump to conserve water. This shall be done in the year following coupe work.

GRAZING AND FIRE PROTECTION

The regeneration coupe shall be protected from fire and grazing and it will be governed by the prescriptions of Selection Working Circle with which it overlaps.

6.9 INTERMEDIATE REVISION

Intermediate revision is not anticipated**.** However, if necessary prescriptions may be reviewed after 5 years whenever felt necessary basing on the inspection reports, compartment histories and joint inspection of Conservator of Forests (T) and Conservator of Forests, Working Plans. Any deviation suggested shall be subject to the sanction by the competent authority.

PART-II
CHAPTER-VII

NON-TIMBER FOREST PRODUCE (OVERLAPPING) WORKING CIRCLE

7.1 GENERAL CONSTITUTION

This overlapping working circle includes all the working circles except areas under plantation working circle. The term Non-Timber Forest Produce (NTFP) includes all forest produce except timber, small timbers and fuel wood. NTFP have great potential to support the people's economic development consistent with the principles of sustainable forest management. Rourkela Forest Division having extensive jurisdiction and vast vegetative cover has a considerable potential of NTFP. The tribals, who constitute major part of population along with other rural people, are dependent on such forest produce for their sustenance. Some of the NTFP items supplement their food and other consumable requirements while the collection, transportation and marketing of other NTFP items provides regenerative work to them, especially during lean period.

The National Forest Policy 1988 has spelt out one of its strategies of rural development by associating the tribals and other rural people living in and around forest areas in protection, regeneration and development of forests by ensuring optimum collection of NTFP through them. Institutional arrangement for marketing the same will also be done to safeguard their customary rights and interests and to provide them employment. About 40% of livelihood of rural people including tribal is covered through collection and sale of various NTFP items. These items also contribute significant amount of revenue to the state exchequer. Many NTFP items have commercial importance.

NTFP was neglected in the past and their collection was largely disorganized. Moreover, the present practice of collection of NTFP is not scientific and sustainable. In the light of above facts and with a view to provide avenues of economic development to rural and tribal people by generating employment the constitution of this working circle has been felt essential.

7.2 GENERAL OBSERVATION AND VEGETATION

The collection of NTFP items is not only confined to RF and PRF blocks but also spreads to DPFs , khesra forest, village forest, Govt. waste land and private lands. Sal is the dominant species in majority of forests of this division and forms pure crop in many forest blocks. Sal seeds, sal leaves and sal resin (jhuna) are important NTFP items procured from sal forests of this Division and these items are available in substantial quantities. The primary and secondary associates of sal along with under wood and under growth provide other important NTFP items like char seeds, kusum seeds, myrobalons, mahua flowers and seeds, karanja seeds, babul seeds, siali leaves and fibres, dhatuki flowers, bhuineem, ban haldi, bankulthi, kanta badhuni, phul badhuni, bantulshi, gums and resins etc. Some of these items are exploited at commercial level.

Kendu leaf is another important NTFP item exploited at commercial level in this division. Kendu leaf bushes and shrubs are mostly available in Govt. waste land and private holdings and contribute about 80% of Kendu leaf productions. The mohul trees which yield mohua flowers and seeds are largely available in the village forests and private holdings and contribute more than 60% of mohua flowers and seeds collection. Mohua trees are also available in many RF, PRF and DPFs.

7.3 SPECIAL OBJECTIVES OF MANAGEMENT

The special objectives of management of this working circle are within the scope of general objectives of management prescribed for entire division. They are as follows:

(1) Sustainable collection, extraction and utilization of NTFP in consistence with policy of Govt.

(2) To develop the productivity of various NTFP items available in this Division by taking suitable silviculturual measures.

(3) To protect NTFP trees and promote their regeneration.

(4) To improve existing marketing institutions like NTFP co-operatives and forest marketing co-operative societies for payment of fair prices to primary collectors and save them from exploitation middle men.

(5) To create alternate employment / income regeneration by developing village and cottage industries and using locally available NTFP items as input/ raw material.

(6) To carry out extensive as well as intensive research for utilisation of various NTFP items and to explore their commercial viability.

(7) To develop NTFP based industries.

7.4 UTILITY OF NTFP ITEMS

The NTFP items are useful in many respects to the local inhabitants. Traditionally many edible NTFP items form part of the staple diet of tribal people and are consumed by them. Fruits, seeds, flowers and leaves of many tree species as well as herbs and shrubs are edible and are consumed either raw cooked. The fruits, flowers, seeds, leaves, bark, roots and gum etc of many trees species herbs and shrubs have medicinal values and are used by the local inhabitant for treating and curing various ailments. The oil seeds, fibres, tanin, gums, resin, etc. procured from different tree species are commercially used for many purposes. The commercial utility of various important NTFP items available within Rourkela Division are as follows.

	Species	**Botanical name**	**Usable parts**
1.	Amba	*Mangifera indica*	Fruit, kernel, seeds.
2.	Anla	*Emblica officinalis*	Fruit, root, flowers, leaf
3.	Anantamula	*Hemidesmus indicus*	Stem root
4.	Arakh	*Calotropis gigantica*	Bark, stems
5.	Arjun	*Terminalia arjuna*	Dry bark leaves
6	Asan	*Terminalia tomentosa*	Tassar cocoons
7	Babul	*Acacia arabica*	Seed, bark, gum, leaves, fruit
8.	Bahada	*Terminalia bellerica*	Bark, fruit, seed.
9	Baghnakhi	*Mortynia diandra*	Leaf

7.5 AREA ALLOTMENT : This overlapping working circle covers entire working plan area.

7.6 COLLECTION

Most of the NTFP items available in this division have one year collection cycle. In general collection after the rains (October) and is over by the end of spring (Mar-April). This enables the poor and labour class people to take up NTFP collection after planting seasons and before harvesting season of major agricultural crops.

7.7.1 WORKING OF IMPORTANT NTFP AND PRESCRIPTIONS FOR IMPROVEMENT

7.7.1 KENDU LEAF: Kendu leaf is the most important NTFP items collected in this division and plays significant role in rural economy. The KL trade is regulated under the provisions of the Orissa KL (Control of Trades) Act 1961. Sale and disposal of K.L. is managed by OFDC Ltd. as an agent of the State Govt. The different operations of KL working are spread from February to December of the year and generate employment for the rural as well as tribal people. Not much has been done to improve the crop through appropriate silvicultural practices. There is an urgent need to undertake crop improvement measures, at least on some experimental sites, by concerned kendu leaf Division. There is a pertinent problem of forest fire, deliberately caused to improve the kendu leaf production both qualitatively and quantitatively. This should the avoided at all costs and cases may be booked against the persons violating the same.

7.7.2 MOHUA FLOWERS AND SEED: Mohua flowers and seeds are mostly collected by local inhabitants from Khesra forests and private holding. Though, mohua flowers trade was nationalized in 1991 after one year of operation it was denationalized. At present Gram panchayat is regulating the trade of mohua flowers. Mohua flowers are available during April and May. Usual practice of collection of mohua flowers is to set the ground surrounding the tree on fire for easy collection. This fire often spreads making it uncontrollable and damages valuable surroundings forests. Such practice should be avoided.

7.7.3 SAL SEED: Sal seed is another major NTFP item available in this division. Its trade is regulated under Orissa Forest Produce (Control and Trades) Act 1981. The OFDC Ltd. was appointed as agent for collection of Sal seeds of this division. Sal seed has gained commercial importance as it is used in soap making, manufacture of vanaspati, sweets and chocolates, Sal seeds are raked from forest floor along with leaf litters and humus. During the process of raking all previous years seedlings are either killed or their root systems are damaged. The removal of leaf litter and humus exposes the soil micro flora. Sal growth, which is dependent on growth of mycorrhiza, is adversely affected. Hence, prevailing practice of sal seed collection should be done away with. Collection by picking the seeds from the forest floor shall only be allowed. Burning the forest floor is strictly prohibited.

7.7.4 Earlier the lease of 32 NTFP items was settled in favour of M/s Utkal Forest Product for 10 years from 1989-90 to 1998-99 vide order no 28403/FFAH dt.06-12-89 and 28971/FFAH dt. 14-12-89 and was cancelled vide notification No 10048/FFAH dt.05-05-90 and 10046/FFAH dt. 05-05-90. The lease of 29 NTFP items was again settled in favour of M/s Utkal Forest Product Ltd for 10 years from 1990-91 to 1999-2000 vide Order No.23632/FFAH dt.26.09.90 and 26145/FFAH dt.05-11-90. Out of these 10 items were surrendered by M/s Utkal Forest Product Ltd. At present the NTFP items like, kusum seeds, karanja seeds goba seeds, bankulthi, neem seed, mohua seeds, palas seeds, siali seeds, bena cher, chakunda seeds, babul seeds, basil, sikakai, mango kernel, indrajob, banhaldi, bantulsi, and chiranjidana are being worked by gram panchayat. The collection of NTFP items is generally done through traditional means, e.g., cutting of trees, lopping, putting fire around trees and removal of bark, tuber and corm etc. This can be substituted by scientific method of exploitation without disturbing the trees and forest growth.

7.7.5 MEDICINAL PLANTS

The plantations of medicinal plants will be taken up under Plantation Working Circle and rare and endanged species will be protected. The collection of NTFP items will be done without destroying the trees and forest cover.

7.8 STATISTICS OF GROWTH AND YIELD

From study of collection figures of different NTFP items of Rourkela Division it is observed that annual production for most of the NTFP items including sal seeds, mohua seeds, mohua flowers, siali leaves etc varies from year to year and shows highly fluctuating trend. However, the official production figures neither indicate the optimum collection nor reflect the exploitable potential of different NTFP items of this division. This is because collection of different NTFP items depends upon various factors like agency of collection, procurement price, market demand, availability of alternate employment to the local inhabitants and natural production cycle. If these factors are favourable, then the collection of NTFP item will be on higher side and if the same are not favourable, then the collection and production will show declining trend. Many of these items are consumable and are sold only when available in surplus quantity. Therefore, the official production figures do not reflect the actual production of various NTFP items.

Due to the factors mentioned above as well as due to the fact that NTFP yielding plants do not have uniform distribution and have scattered type of distribution, it is difficult to assess the actual periodical yield of different items. It is difficult to assess the production potential of different NTFP items. For these reasons, it is not possible to prescribe any regulation of yield.

7.9 INCIDENCE OF SMUGGLINGS

Local inhabitants at times illicitly store some of the NTFP items in quantity more than their bona fide requirement for the purpose of trading with unscrupulous traders. The illicitly smuggled NTFP items do not contribute to revenue of the Division.

7. 10 FUTURE MANAGEMENT

For improving the productivity of non-wood Forest produce and for their scientific management following measures are prescribed.

7.10.1 Collection of NTFP items by scientific methods

Many times, while collecting NTFP items, the local inhabitants do not use proper scientific method. The setting fire in the forest floor for collecting Sal seed, cleaning beneath Mohua trees by setting fire for collecting Mohua flowers, lopping of branches bearing seeds and fruit uprooting the plants bearing useful roots and tubers, complete debarking of trees having barks of commercial importance etc are the examples of unscientific explotation. The items shall be collected without causing any harm to the trees and plants yielding them. Following scientific methods are suggested for collection of various NTFP items.

7.10.2 (a) Seed Based

The burning of forest floor for easy collection of Sal seeds and setting fire for getting wing less sal seed shall be strictly prohibited as its poses fire hazard. For collecting mohua flowers and seeds, the floor beneath the tree should be cleared without setting fire. For collecting seeds, lopping of branches shall be strictly avoided and seeds will be collected in natural condition without branches and twigs.

7.10.3 (b) Leaf based

Only the usual scientific method of cutting bushes above ground shall be for production of kendu leaves. While pluckingand collecting kendu leaves care should be taken not to damage buds, branches and shoots. As per the Govt. order number 2957/F&E dt.11.02.91, sal leaves are not to be plucked from silvicultural point of view.

7.10.4 (c) Bark based

The debarking of trees yielding bark of commercial importance, viz, lodha, medha, phenfena, arjun etc is to be done at least foot above the ground so as to prevent injuries from fire, microbes and white ants. The debarking should be confined to the arms reach only for preventing damage to tender barks and juvenile buds. It is to be confined to one face only and should not exceed more than 40% of surface of the bole. The remaining portion of bole should be left untouched so as to maintain continuity of the cambium. However, in view of the instruction of PCCF, Orissa vide memo No. 10144(31) dt.24-04-91 the lease for barks is to be discontinued on silvicultural grounds.

7.10.5 (d) Gum and resin based

While collecting gums and resins, no shall be done to the trees yielding them. Artificial incision made over trunk should not be too large and deep to adversely affect the growth of trees. Intensive tapping for

gums and resins is to be avoided as it may lead to damage and death of trees. The blazing will be done in staggered manner and not haphazardly. The shape of blaze should be triangular with angles pointing towards the ground. The initial blaze should be given at the breast height.

7.10.6 (e) Root based

The roots and tubers of plants like Satabari, Dioscorea, Rauwolfia having commercial and medicinal importance are to be exploited in such a manner that least damage is caused to the plant. For this purpose, only some portion of peripheral roots and tubers are to be extracted. In no case, plants are to be uprooted. The exploitation of endangered plants species like *Dioscorea deltoides* (Herbaceous climbers) Dioscorea indica (Herb), *Rauwoelfia serpentina* and some species of Entada (Gila) is to be discouraged.

7.11 MEASURES TO IMPROVE PRODUCTION OF NTFP ITEMS

In all the rehabilitation areas NTFP yielding species are to be given due importance. Efforts are to be made to improve regeneration of NTFP yielding species in all forest blocks. As per the site requirement, the proportion of fruit bearing and NTFP yielding species are to be encouraged. The growth of existing NTFP yielding species is to be boosted by taking suitable silvicultural measures. The NTFP yielding species are not to be felled unless dead and uprooted. The collection of Sal seeds is to be strictly prohibited for five years after main felling in the worked out coupes. Over exploitation of seeds of various important NTFP, yielding species is to be prevented for encouraging natural regeneration.

Wherever possible, sisal plantation is to be taken up along the boundaries of RF and PRF blocks Sisal plantation will not only facilitate clear demarcation of boundary lines on the ground but also act as barrier against grazing by domestic animals. It will also yield valuable fibers, which are to be used commercially for making mats and ropes etc.

7.12 EXTENSIVE RESEARCH AND STUDY RELATING TO NTFP ITEMS

Till date, hardly any effort has been made to study and assess potential, and production of various NTFP items. Similar is the case on exploring the significance and utility in the field of trade, commerce and medicine. Even the use of various NTFP items by local communities who are familiar with a number of plant species have not been. Such study and research would be much useful socially, economically and silviculturally for the forest management in particular and for the people in general. A comprehensive programme of identifying various forest produce assessing their potential uses and feasibility of their marketing etc. needs to be formulated. For this purpose, the required assistance from Indian Council of Forest Research and Education (ICFRE) Dehra Dun, Forest Survey of India (FSI), Botanical Survey of India (BSI) and Resource Survey unit of State forest department should be solicited.

7.13 MEASURES FOR ENSURING PROPER PAYMENT TO PRIMARY COLLECTORS

For most of the NTFP items including sal seed, kendu leaves mohua flowers etc. the procurement price is fixed by government and as per market and other conditions, the same is revised annually. The primary

collectors of this division are mostly tribals. Almost all the inhabitants are illiterate and vulnerable to cheating by the procuring agent (intermediaries). At times when they are aware about current price, they are compelled to sell NTFP items at low price to the agents due to their poverty and poor marketing facilities. These people do not get adequate remunerations, which they are supposed to get and in the process get exploited.

It should be responsibility of the field staff of this division to supervise and monitor the mode of payment to the primary collectors and to ensure that they are not exploited by the intermediaries. They should keep primary collectors aware of latest procurement prices. The Tribal Development Co-operative Corporation Ltd (TDCC) and State Tassar and Silk Co-operative Society Ltd. (STSC Ltd) are few agencies under State Government which are operating in this division and have been entrusted duty of collection and marketing of few NTFP items. These agencies due to various constraints are not able to function to desired level. Most of the surplus NTFP items are sold by primary collectors to the designated or private traders for which they do not get full price.

7.14 WORKING OF MAJOR NTFP AND SUGGESTIONS FOR IMPROVEMENT

7.14.1 Kendu leves: The major source of earning for local and tribal people is through Kendu leaves. The production of Kendu leaves can be improved through bush cutting by sharp weapons, spray of insencticides on leaves, proper storage and binding etc. For this purpose, local people may be trained by Kendu leaf wing.

7.14.2 Sal seed: Sal seeds became commercially viable and found many alternative uses in soap making, manufacture of vanaspati, sweets and chocolates etc. M/s TDCC Ltd. is the authorized agent to collect sal seeds in the division. It is necessary that not more that 30% of the total sal forest area, should be worked out at a time. Rest of the seeds should be left on the forest floor. To facilitate regeneration as well as to conserve the soil moisture leaf litter should be retained. This can be achieved if burning of forest floors, in the specified areas is banned.

7.14.3 Siali leaves and fibre: Siali leaves and fibre (leaves and fibre of Bauhinia vahlii) are largely used in making leaf plates, donas and food wrappers in hotels, parties, functions and ceremonies. The quality of siali leaves varies according to their size. Siali leaves have a high market potential throughout India. To ensure proper collection in different areas of the division, the field staff should intensify their supervision during the collection season. Siali leaf is a major source of income for the tribals. It is available in the month of February and March of the year. Most tribal families are engaged in collection of leaves. They collect the leaves and then stitch 5-6 leaves into a plate with the help of thin bamboo straws and then sell them in bundles. Each bundle contains 80 leaf plates. The bundles are sold at very low price. Panchayats and FDAs should be encouraged to provide stitching and pressing machines for value additions. The skills of the poor collectors may also be up-graded through training, demonstrations and other extension methods.

7.14.2 Myrobalans: The fruits of *Terminalia chebula, Terminalia bellerica* and *Emblica officinalis* (collectively known as myrobalans) are used for medicinal purposes. The best time for collection is January. Myrobalan tan is usually blended with other quickly penetrating tans to produce good leather colour. Preliminary training should

be given to primary collectors to use collection and processing methods which are not injurious to fruit-producing trees as well as to the produce. They will also help local processing and thus provide opportunities for local value-addition. These opportunities to primary collectors, for adding value at local level, shall help them get better price. This will also diversify and develop local economics. The skills of these poor collectors may also be up-graded through training, demonstrations and other extension methods. VSS and NGO may also be involved in this venture.

7.14.3 Genduli gum and other gums: Genduli gum or gum karaya is the most important of all gums. This is extracted from the bark of *Sterculia urens*. Matured trees of 120 cm. and above should be tapped. The skills of these poor collectors may also be up-graded through training, demonstrations and other extension methods. VSS and NGO may be involved in this venture.

7.14.4 Hill-brooms: Hill-brooms are prepared out of grass, *Thysanoleana maxima*. The collection time varies from March to June. Men, women and children are engaged in collection. Hill-brooms, however, need very simple processing. The brooms, which are generally 3 to 4 feet in length after cutting, are dried in sun for two to three days are separated into equal lengths. There is a considerable scope for value-addition at local level and to raise the income levels of poor collectors. The DFO shall provide preliminary training to primary collectors for collection and processing methods. They will also help local processing and thus provide opportunities for local value-addition. These opportunities to primary collectors, for adding value at local level, shall help them get better remuneration. VSS may also be involved in this venture. Fire is injurious to forests as well as to the produce. The areas should be protected from fire.

7.14.5 Mahua flowers and seeds: Mahua flowers and seeds are collected privately. Mahua flower is very popular among tribals for liquor. The villagers eat the dry corolla by frying and making cakes. They also use it as feed cattle. Mahua flower is available during April and May. Flowers fall down at night. People go early in the morning and collect them in Bamboo baskets. Fire should not be allowed during collection time. Awareness training shall be given for getting proper price in the market. To improve potentiality seeds should be allowed to regenerate through protection from fire, grazing etc.

7.14.6 Tamarind: *Tamarindus indica* occurs frequently in natural forests. Tamarind fruits generally become ripe for collection during March-April. Tamarind is used mainly as preservative and an important ingredient in pickles, juices and tamarind concentrates. Training should be imparted to the local people through Horticulture Department for value added products e.g. tamarind pickle, squash, etc.

7.14.7 Amba: Mango is abundantly found, the fruits are collected for consumption as well as the pulp of ripe fruit is dried in the sun to form mats known as amba sada.

7.14.8 Kochila (Nux vomica): It is generally available in all forest blocks and is widely used in Homeopathy. The trees should be protected from lopping.

7.14.9 Cashew: It is a very important NTFP item of the local people. It is usually collected from forest blocks.

Calendar of operations of major NTFPs

A tentative period of collection of a number of major NTFPs is provided in Table. No systematic study has been done till now to assess the potential of various NTFP items and it is required to be done.

Sl. No.	NTFP	Collection Time	Sl. No.	NTFP	Collection Time
1	Kendu leaves	February – June	23	Semal cotton	March- May
2	Sal Seed	May – June	24	Honey	January
3	Siali leaf	October- May	25	Khajuri leaves	October-May
4	Siali fibre	October-May	26	Sabai grass	October-April
5	Harida	November-January	27	Sunari	September-April
6	Bahada	January-April	28	Tentuli	March – April
7	Cashew nut	April-May	29	Neem seed	June-July
8	Amala	May-June	30	Genduli gum	October-May
9	Cha seed	April-May	31	Kurei fruit	December-February
10	Mango	May-June	32	Hill broom	March- June
11	Bel	December-March	33	Khair	October- May
12	Marking nut	January-February	34	Sal resin	January-April
13	Lac (Maghsiri)	June-July	35	Broom grass	October- May
	Lac (Jestha)	October to March	36	Siali fibre	October- May
14	Gum	April to May	37	Lemon grass	March-April
15	Mahua flower	April to June	38	Kamal gundi	February-March
16	Mahua seed	May to June	39	Bana tulsi seeds	November-March
17	Kusum seed	May to June	40	Lodha bark	October-May
18	Karanja seed	December-January	41	Dantari bark	October-May
19	Kochila seed	December-January	42	Phenphena bark	October-May
20	Kendu fruits	April to May	43	Mango kernel	June- July
21	Dhakti flower	January to April	44	Thatch grass	January
22	Arrow root	December to January	45	Honey-wax	January

7.15 MISCELLANEOUS REGULATIONS

Most of the NTFP items are not collected due to of lack of marketing. The DFO should contact various co-operative agency and other organizations for marketing of NTFP available in the Division. The V.S.S and Gram panchayats should be given information about marketing prospects of various NTFPs. The Divisional staff should play a role of facilitation rather than regulation in the marketing of NTFPs and act as link between consumers and the primary suppliers. The awareness among masses regarding value of NTFP should be publicised by regular meeting and use of audio visual aids. Collection of NTFP should not be allowed beyond the carrying capacity and regeneration potential of the forests.

7.16 Result of NTFP Survey and analysis done in Rourkela Forest Division

Sample survey has been conducted in 100 sample plots in desired format for easy handling and analysis. Biodiversity enumerated in the sample plots have been categorized in to four different categorizes viz. Trees, Shrubs, Herbs, & Climbers and attempt has been made to list out the Non-

Timber Forest Produces (NTFPs) from each categories into potential NTFP species and traditionally used NTFP Species. Apart from this, the prioritized species (As recommended by NMPB, New Delhi) have been enlisted in respective categories. The coppicing and regeneration ability of NTFPs have been analyzed in respective categories vis-à-vis their percentage distribution.

1. NTFPs Inventory Data (Tree) of Rourkela Forest Division:

A total of 77 trees species with a total no. of 3770 have been enumerated in 100 sample plots out of which the maximum number per ha has been recorded for Sal (951) followed by Chara (494), Sidha (388) and Asan (283) etc. and the lowest being represented by Barang,Genduli , Barakoli , chitra(1). Accordingly, the percentage distribution per ha is highest for Sal (25.22%) followed by Chara (13.1%), Sidha (10.2%) ,Asan (7.5%), Bheru(6.6%) so on soforth.

2.NTFPs Inventory Data (Climber) of Rourkela Forest Division:

A total of 19 climber species have been enumerated in 100 sample plots out of which the maximum number per ha has been recorded for Atundi(147) followed by dudhia (131), Budhilaha (65) etc. and the lowest being represented by Kirkichi, Kaincha kunduru each being 1. Accordingly, the percentage distribution per ha is highest for Atundi(32.7%) followed by dudhia (29.18%), Budhilaha (14.4%)

3.Potential NTFP Inventory Data (Tree) of Rourkela Forest Division :

7 trees species out of total enumerated tree species of 77 have been categorized as potential NTFP species which are having potential to play a pivotal role in the livelihood of Forest fringe dwellers. A close look on the statistical result reveals that total potential NTFP trees species contributes 71.3 % of total trees species enumerated per ha basis. Sal is the predominant Tree NTFP contributing 95.1 stems per ha out of the total 377 stems per ha of all trees species. Next to Sal comes Chara, Sidha,Asan,bheru etc.

BIO-DIVERSITY INDEX OF POTENTIAL NTFP SPECIES (TREE) OF ROURKELA FOREST DIVISION.

Sl. No.	Local Name	Botanical Name	Total No. of Trees in Sample Plot (n)	no.of stems per Ha	% distribution	n(n-1)	P=n/N	lnP	P*lnP
1	Asana(POS)	***Terminalia alata***	283	28.3	7.51	79806	0.075066	-2.58938	-0.19438
2	Amla(prs)	***Emblica officinalis***	2	0.2	0.05	2	0.000531	-7.54168	-0.004
3	Acacia	***Acacia auriculoformis***	17	1.7	0.45	272	0.004509	-5.40162	-0.02436
4	Bahada(prs)	***Terminalia belerica***	19	1.9	0.50	342	0.00504	-5.29039	-0.02666
5	Bija	***Pterocarpus marsupium***	35	3.5	0.93	1190	0.009284	-4.67948	-0.04344
6	Benimanz	***Strychnos rotatarum***	9	0.9	0.24	72	0.002387	-6.03761	-0.01441
7	Baranga	***Albizzia odoratiseima***	1	0.1	0.03	0	0.000265	-8.23483	-0.00218
8	Bela	***Aegle marmelos***	23	2.3	0.61	506	0.006101	-5.09934	-0.03111
9	Bhalia	***Semecarpus anacardium***	2	0.2	0.05	2	0.000531	-7.54168	-0.004
10	Bheru(POS)	***Chlorixylen swieteria***	250	25	6.63	62250	0.066313	-2.71337	-0.17993
11	Chara(POS)	***Buchanania lanzan***	494	49.4	13.10	243542	0.131034	-2.03229	-0.2663
12	Chauli	***Cassine glauca***	2	0.2	0.05	2	0.000531	-7.54168	-0.004
13	Chakunda	***Cassia occidentalis***	39	3.9	1.03	1482	0.010345	-4.57127	-0.04729
14	Dhaura	***Holoptellia integrifolia***	102	10.2	2.71	10302	0.027056	-3.60986	-0.09767
15	Gambhari	***Gmelina arborea***	12	1.2	0.32	132	0.003183	-5.74992	-0.0183
16	Genduli	***Sterculia urens***	1	0.1	0.03	0	0.000265	-8.23483	-0.00218
17	Ghantakoli	***Zyzyphus xylopyra***	2	0.2	0.05	2	0.000531	-7.54168	-0.004
18	Gangasiuli(prs)	***Nyctanthes arbortristis***	4	0.4	0.11	12	0.001061	-6.84854	-0.00727
19	Harida(prs)	***Terminalia chebula***	21	2.1	0.56	420	0.00557	-5.19031	-0.02891
20	Jamukoli	***Syzygium cumini***	12	1.2	0.32	132	0.003183	-5.74992	-0.0183
21	Karada	***Cleistanthus collinus***	98	9.8	2.60	9506	0.025995	-3.64986	-0.09488
22	Karanja	***Pongamia pinnata***	10	1	0.27	90	0.002653	-5.93225	-0.01574
23	Kantakoli	***Ziziphus Oenoplia***	2	0.2	0.05	2	0.000531	-7.54168	-0.004
24	Kasi	***Bridelia retusa***	29	2.9	0.77	812	0.007692	-4.86753	-0.03744
25	Kendu	***Diospyros melanoxylon***	223	22.3	5.92	49506	0.059151	-2.82766	-0.16726

26	Mai	***Lannea coromondelica***	105	10.5	2.79	10920	0.027851	-3.58087	-0.09973
27	Kusuma	***Scleichera oleosa***	19	1.9	0.50	342	0.00504	-5.29039	-0.02666
28	Kurdu	***Gardenia gummifera***	20	2	0.53	380	0.005305	-5.2391	-0.02779
29	Kumbhi	***Careya arborea***	4	0.4	0.11	12	0.001061	-6.84854	-0.00727
30	Kurum	***Haldinia cordifolia***	24	2.4	0.64	552	0.006366	-5.05678	-0.03219
31	Mahula	***Madhuca indica***	102	10.2	2.71	10302	0.027056	-3.60986	-0.09767
32	Neem	***Azadiricta indica***	14	1.4	0.37	182	0.003714	-5.59577	-0.02078
33	Palas	***Butea monosperma***	29	2.9	0.77	812	0.007692	-4.86753	-0.03744
34	Ratangaura	***Cedrela toona***	16	1.6	0.42	240	0.004244	-5.46224	-0.02318
35	Sidha (POS)	Lagerstromia Parviflora	388	38.8	10.29	150156	0.102918	-2.27382	-0.23402
36	Dhatki	Woodfordia Fructicose	55	5.5	1.46	2970	0.014589	-4.2275	-0.06167
37	Kurei	Halorhena antidysentrico	46	4.6	1.22	2070	0.012202	-4.40619	-0.05376
38	Sal (POS)	Sorea robusta	951	95.1	25.23	903450	0.252255	-1.37732	-0.34743
39	Rohini	Soumida febriguga	23	2.3	0.61	506	0.006101	-5.09934	-0.03111
40	Eucalyptus	Eucaliptus hybrid	23	2.3	0.61	506	0.006101	-5.09934	-0.03111
41	Kaju	Anacardium occidental	5	0.5	0.13	20	0.001326	-6.62539	-0.00879
42	Sunari	Cassia fistula	17	1.7	0.45	272	0.004509	-5.40162	-0.02436
43	Sirish	***Albezia lebek***	46	4.6	1.22	2070	0.012202	-4.40619	-0.05376
44	Khakhada	***Caseria tomentosa***	16	1.6	0.42	240	0.004244	-5.46224	-0.02318
45	Atta	***Annona squamosa***	7	0.7	0.19	42	0.001857	-6.28892	-0.01168
46	Khair	***Accaica catechu***	7	0.7	0.19	42	0.001857	-6.28892	-0.01168
47	Putri	***Croton oblongifolius***	23	2.3	0.61	506	0.006101	-5.09934	-0.03111
48	Barkoli	***Zizyphus mauritania***	1	0.1	0.03	0	0.000265	-8.23483	-0.00218
49	Salai	***Browsolia seretta***	12	1.2	0.32	132	0.003183	-5.74992	-0.0183
50	Amba	***Mangifera indica***	3	0.3	0.08	6	0.000796	-7.13622	-0.00568
51	Kair		3	0.3	0.08	6	0.000796	-7.13622	-0.00568
52	Simuli	***Bombax ceiba***	15	1.5	0.40	210	0.003979	-5.52678	-0.02199
53	Ruchmuchia		6	0.6	0.16	30	0.001592	-6.44307	-0.01025
54	Simaruba	***Simaruwa gluca***	5	0.5	0.13	20	0.001326	-6.62539	-0.00879
55	Sisoo	***Dalvergia latifolia***	24	2.4	0.64	552	0.006366	-5.05678	-0.03219
56	Karikanda		7	0.7	0.19	42	0.001857	-6.28892	-0.01168
57	Galgalia	***Cochlospermum gossypium***	5	0.5	0.13	20	0.001326	-6.62539	-0.00879

58	Chitra		1	0.1	0.03	0	0.000265	-8.23483	-0.00218
59	Tentra	***Albizzia odoratiseima***	6	0.6	0.16	30	0.001592	-6.44307	-0.01025
60	Chauli	***Cassine glauca***	2	0.2	0.05	2	0.000531	-7.54168	-0.004
61	Patuli	***Stereospermum suaveolens***	2	0.2	0.05	2	0.000531	-7.54168	-0.004
62	Phasi	***Anogaisus acumineta***	3	0.3	0.08	6	0.000796	-7.13622	-0.00568
63	Pijuli	***Psidium guajava***	1	0.1	0.03	0	0.000265	-8.23483	-0.00218
64	Bandhan	***Ojenia ojeninensis***	2	0.2	0.05	2	0.000531	-7.54168	-0.004
65	Patmauna		4	0.4	0.11	12	0.001061	-6.84854	-0.00727
66	Phan Phana(prs)	***Oroxylum indicum***	1	0.1	0.03	0	0.000265	-8.23483	-0.00218
67	Tnetuli	***Tamarindus indica***	5	0.5	0.13	20	0.001326	-6.62539	-0.00879
68	Dhelkata		3	0.3	0.08	6	0.000796	-7.13622	-0.00568
69	Arjuna	***Terminalia arjuna***	1	0.1	0.03	0	0.000265	-8.23483	-0.00218
70	Teak	***Tectona grandis***	14	1.4	0.37	182	0.003714	-5.59577	-0.02078
71	Samarsingha		1	0.1	0.03	0	0.000265	-8.23483	-0.00218
72	kaitha	***Limonia acidissima***	1	0.1	0.03	0	0.000265	-8.23483	-0.00218
73	Chatian	***Alostrania scolaris***	1	0.1	0.03	0	0.000265	-8.23483	-0.00218
74	Bamboo	***Dendrocalamus strictus***	4	0.4	0.11	12	0.001061	-6.84854	-0.00727
75	Salia	***Boswelliea seretta***	3	0.3	0.08	6	0.000796	-7.13622	-0.00568
76	Dumer	***Ficus glumirata***	1	0.1	0.03	0	0.000265	-8.23483	-0.00218
77	Kanchan	***Bauhinia variegata***	1	0.1	0.03	0	0.000265	-8.23483	-0.00218
		Total	**3770**	377	100.00	1548274		-459.958	-2.86298

SHIMPSON'S INDEX= SUM n(n-1)/ N(N-1) . Where,
n= no. of individual sp. In a sample plot
N=no. of total sp. In the total no. of sampleplots
SHIMPSON'S INDEX= 1528474/ (3770-3769)= 0.10896
SHANNON'S INDEX= - SUM(P*lnP)= -(-2.86298) = 2.86298

BIO-DIVERSITY INDEX OF POTENTIAL NTFP SPECIES (SHRUB) OF ROURKELA FOREST DIVISION.

Sl. No.	Local Name	Botanical Name	Total No. of Trees in Sample Plot (n)	no. of stems per ha	% distribution	n(n-1)	P=n/N	lnP	P*lnP
1	Dhatuki(POS)	***Woodfordia fruticosa***	880	88	49.41	773520	0.494104	-0.70501	-0.34835
2	Kurei(POS)	***Hollarrhena antidysenterica***	333	33.3	18.70	110556	0.186974	-1.67679	-0.31352
3	Putus(POS)	***Lantana camara***	152	15.2	8.53	22952	0.085345	-2.46105	-0.21004
4	Pokasunga	***Eupotorium oderatum***	25	2.5	1.40	600	0.014037	-4.26605	-0.05988
5	Modimidica	***Helicteris Ixora***	32	3.2	1.80	992	0.017967	-4.01919	-0.07221
6	Putri (POS)	***Croton oblongifolius***	254	25.4	14.26	64262	0.142617	-1.9476	-0.27776
7	Bankapasia	***Kydia calycina***	10	1	0.56	90	0.005615	-5.18235	-0.0291
8	Kurdu	***Gardenia gummifera***	19	1.9	1.07	342	0.010668	-4.54049	-0.04844
9	Ghantakoli	***Zyzyphus xylopyra***	1	0.1	0.06	0	0.000561	-7.48493	-0.0042
10	Karda	***Cleistanthus collinus***	8	0.8	0.45	56	0.004492	-5.40549	-0.02428
11	Girli		2	0.2	0.11	2	0.001123	-6.79178	-0.00763
12	Bhuin Kusum(PRS)		4	0.4	0.22	12	0.002246	-6.09864	-0.0137
13	Bhdul		4	0.4	0.22	12	0.002246	-6.09864	-0.0137
14	Kantakoli	***Zizithus numularis***	16	1.6	0.90	240	0.008984	-4.71234	-0.04233
15	Chilli	***Capsicum annum***	10	1	0.56	90	0.005615	-5.18235	-0.0291
16	Ruchmuchia		10	1	0.56	90	0.005615	-5.18235	-0.0291
17	Ranikathi(PRS)	***Flemingia chaper***	6	0.6	0.34	30	0.003369	-5.69317	-0.01918
18	Gangasiuli	***Nyctanthes arbortristis***	15	1.5	0.84	210	0.008422	-4.77688	-0.04023
		Total	**1781**	178.1	100.00	974056			-1.58274

SHIMPSON'S INDEX= SUM n(n-1)/ N(N-1) . Where,
n= no. of individual sp. In a sample plot
N=no. of total sp. In the total no. of sampleplots
SHIMPSON'S INDEX= 0.3072557
SHANNON'S INDEX= - SUM(P*lnP)= -(-1.5827) = 1.5827

BIO-DIVERSITY INDEX OF POTENTIAL NTFP SPECIES (HERB) OF ROURKELA FOREST DIVISION .

Sl. No.	Local Name	Botanical Name	Total No. of Trees in Sample Plot (n)	no.of stems per Ha	% distribution	n(n-1)	P=n/N	lnP	P*lnP
1	Jhadu (POS)	***Aristida setacea***	216	21.6	5.68	46440	0.057	-2.86853	-0.16288
2	Dhatki	***Woodfordia fruticosa***	12	1.2	0.32	132	0.003	-5.7589	-0.01817
3	Bana kulthi(POS)	***Atylosia scarabaeoides***	672	67.2	17.67	450912	0.177	-1.73355	-0.30624
4	Bana Tulsi (POS)	***Ocimum canum***	1238	123.8	32.54	1531406	0.325	-1.12256	-0.36533
5	Bhuin neem(POS)	***Andrographis paniculata***	771	77.1	20.27	593670	0.203	-1.59612	-0.3235
6	Kurei	***Hollorrhena antidysenterica***	6	0.6	0.16	30	0.002	-6.45205	-0.01018
7	Putus	***Lantana camara***	104	10.4	2.73	10712	0.027	-3.59942	-0.09841
8	Bankapacia	***Kydia calycina***	8	0.8	0.21	56	0.002	-6.16437	-0.01296
9	Ghantakoli	***Zyzyphus xylopyra***	1	0.1	0.03	0	0.000	-8.24381	-0.00217
10	Apamaranga	***Achyranthes aspera***	11	1.1	0.29	110	0.003	-5.84591	-0.0169
11	Satabari (PRS)	***Asparagus racemosus***	3	0.3	0.08	6	0.001	-7.1452	-0.00564
12	Bhuin Kuanri	***Pueraria tuberosa***	2	0.2	0.05	2	0.001	-7.55066	-0.00397
13	Bhuin anal	***Phyllanthus niruri***	53	5.3	1.39	2756	0.014	-4.27352	-0.05954
14	Satganthia	***Pentapetes phoenicea***	63	6.3	1.66	3906	0.017	-4.10067	-0.06791
15	Kheer grass		44	4.4	1.16	1892	0.012	-4.45962	-0.05158

16	Bajramuli (PRS)	***Sida cordata***	4	0.4	0.11	12	0.001	-6.85751	-0.00721
17	Latlatia		1	0.1	0.03	0	0.000	-8.24381	-0.00217
18	Bhadul		5	0.5	0.13	20	0.001	-6.63437	-0.00872
19	Madranga(PRS)	***Alternanthera sessilis***	2	0.2	0.05	2	0.001	-7.55066	-0.00397
20	Bhendi jat		161	16.1	4.23	25760	0.042	-3.1624	-0.13385
21	Dehasarei		7	0.7	0.18	42	0.002	-6.2979	-0.01159
22	Dand putna		6	0.6	0.16	30	0.002	-6.45205	-0.01018
23	Ruchmuchia		4	0.4	0.11	12	0.001	-6.85751	-0.00721
24	Basbasa		119	11.9	3.13	14042	0.031	-3.46468	-0.10839
25	Putri	***Croton oblongifolius***	22	2.2	0.58	462	0.006	-5.15277	-0.0298
26	Pudina	***Mentha viridis***	20	2	0.53	380	0.005	-5.24808	-0.02759
27	Muli grass		11	1.1	0.29	110	0.003	-5.84591	-0.0169
28	Duba grass	***Cynodon dactylon***	17	1.7	0.45	272	0.004	-5.4106	-0.02418
29	Chabri Grass		21	2.1	0.55	420	0.006	-5.19929	-0.0287
30	Samseer		9	0.9	0.24	72	0.002	-6.04658	-0.01431
31	Bisalyakarni	***Tridax procumbence***	7	0.7	0.18	42	0.002	-6.2979	-0.01159
32	Bismaru		106	10.6	2.79	11130	0.028	-3.58037	-0.09977
33	Bhuinchampa	***Kaempferia rotunda***	40	4	1.05	1560	0.011	-4.55493	-0.0479
34	Machia		5	0.5	0.13	20	0.001	-6.63437	-0.00872
35	Pok Sungha	***Vernonia Cinerea***	33	3.3	0.87	1056	0.009	-4.7473	-0.04118
		Total	**3804**	380.4	100.00	2697474	1.000		-2.14931

SHIMPSON'S INDEX= SUM n(n-1)/ N(N-1) . Where,
n= no. of individual sp. In a sample plot
N=no. of total sp. In the total no. of sampleplots
SHIMPSON'S INDEX= 0.186462
SHANNON'S INDEX= - SUM(P*lnP)= -(-2.149) = 2.149

BIO-DIVERSITY INDEX OF POTENTIAL NTFP SPECIES (CLIMBER) OF ROURKELA FOREST DIVISION.

Sl. No.	Local Name	Botanical Name	Total No. of Trees in Sample Plot (n)	no. of stems per ha	% distribution	n(n-1)	P=n/N	lnP	P*lnP
1	Atundi(POS)	***Combretum decandrum***	147	14.7	32.74	21462	0.327394	-1.11659	-0.36557
2	Muturi	***Smilax macrophylla***	19	1.9	4.23	342	0.042316	-3.16258	-0.13383
3	Palas Laha(POS)	***Butea suprava***	3	0.3	0.67	6	0.006682	-5.00841	-0.03346
4	Satabari	***Asparagus Racemosus***	8	0.8	1.78	56	0.017817	-4.02758	-0.07176
5	Siali(POS)	***Bauhinia vahlii***	6	0.6	1.34	30	0.013363	-4.31526	-0.05766
6	Gulchi (PRS)	***Tinospora cordifolia***	2	0.2	0.45	2	0.004454	-5.41388	-0.02412
7	Kirkichi		1	0.1	0.22	0	0.002227	-6.10702	-0.0136
8	Thapa laha		6	0.6	1.34	30	0.013363	-4.31526	-0.05766
9	Dudhia (POS)		131	13.1	29.18	17030	0.291759	-1.23183	-0.3594
10	Akan bindhi	***Cissam pebus paveira***	2	0.2	0.45	2	0.004454	-5.41388	-0.02412
11	Kaincha(PRS)	***Abrus precatovius***	1	0.1	0.22	0	0.002227	-6.10702	-0.0136
12	Getulaha		8	0.8	1.78	56	0.017817	-4.02758	-0.07176
13	Lalari		21	2.1	4.68	420	0.046771	-3.0625	-0.14323
14	Kujuri		21	2.1	4.68	420	0.046771	-3.0625	-0.14323
15	Kundru laha		1	0.1	0.22	0	0.002227	-6.10702	-0.0136
16	Baidank		4	0.4	0.89	12	0.008909	-4.72073	-0.04206
17	Budhi laha		65	6.5	14.48	4160	0.144766	-1.93264	-0.27978
18	Nirmuli	***Cuscuta reflexa***	2	0.2	0.45	2	0.004454	-5.41388	-0.02412
19	Chiromaro		1	0.1	0.22	0	0.002227	-6.10702	-0.0136
		Total	**449**	44.9	100.00	44030			-1.88616

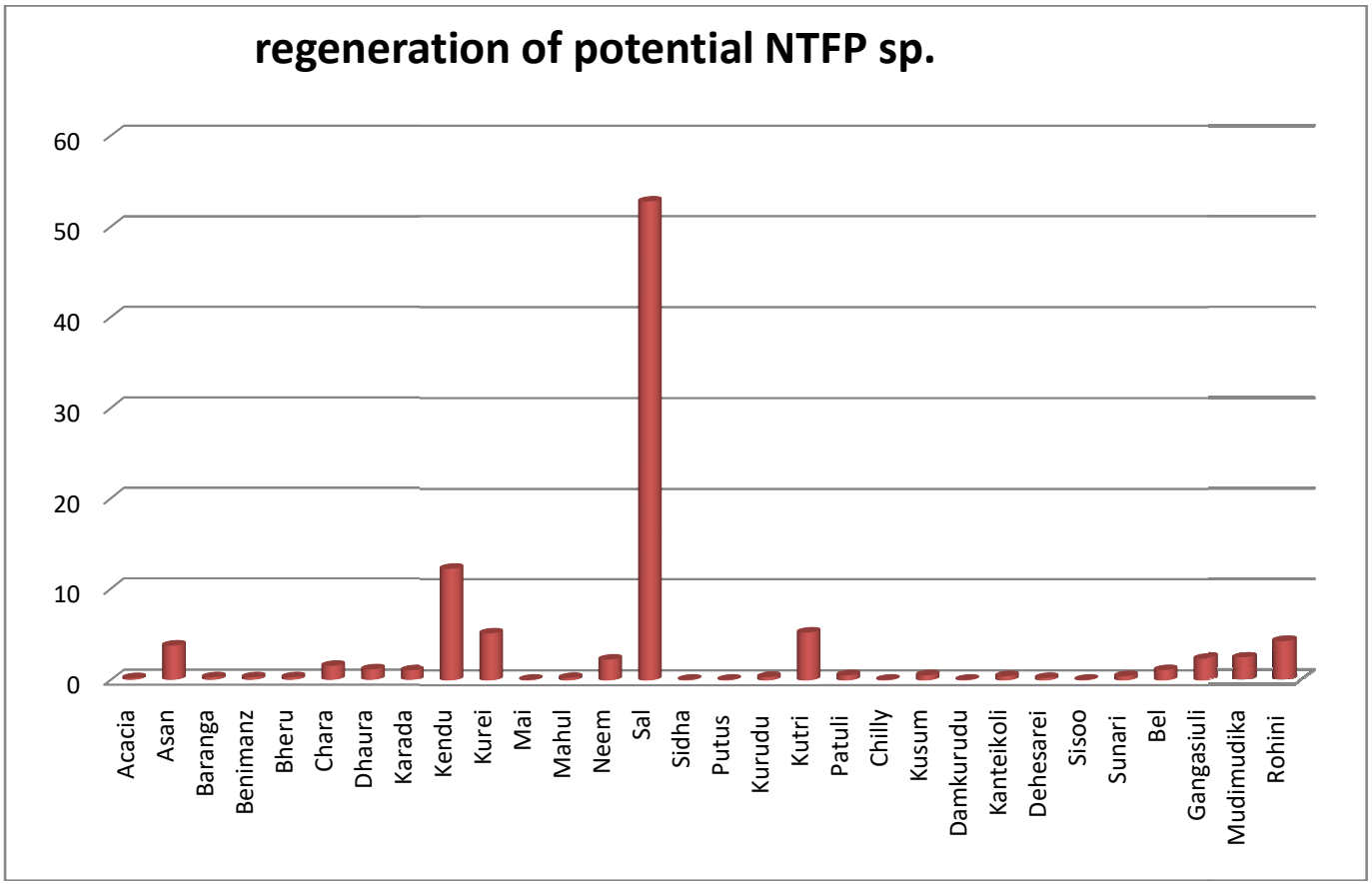
SHIMPSON'S INDEX= 0.218889198
SHANNON'S INDEX= - SUM(P*lnP)= -(-1.8862) = 1.8862

BIO-DIVERSITY INDEX OF POTENTIAL NTFP SPECIES (REGENERATION) OF ROURKELA FOREST DIVISION

Sl. No.	Local Name	Botanical Name	Total No. of Trees in Sample Plot (n)	No. of stems per Ha	n(n-1)	P=(n/N)	lnP	P*lnP	% regen
1	Acacia	***Acacia auriculoformis***	2	0.2	2	0.001914	-6.25862	-0.01198	0.19
2	Asan	***Terminalia alata***	39	3.9	1482	0.037321	-3.28821	-0.12272	3.73
3	Baranga	***Albizzia odoratiseima***	3	0.3	6	0.002871	-5.85316	-0.0168	0.29
4	Benimanz	***Strychnos rotatarum***	3	0.3	6	0.002871	-5.85316	-0.0168	0.29
5	Bheru	***Chlorixylen swieteria***	3	0.3	6	0.002871	-5.85316	-0.0168	0.29
6	Chara	***Buchanania lanzan***	16	1.6	240	0.015311	-4.17918	-0.06399	1.53
7	Dhaura	***Anogeisus latifolia***	12	1.2	132	0.011483	-4.46687	-0.05129	1.15
8	Karada	***Cleistanthus collinus***	11	1.1	110	0.010526	-4.55388	-0.04794	1.05
9	Kendu	***Diospyra melanoxylon***	128	12.8	16256	0.122488	-2.09974	-0.25719	12.25
10	Kurei	***Hollorrhena antidysenterica***	54	5.4	2862	0.051675	-2.96279	-0.1531	5.17
11	Mai	***Lannea coromondelica***	1	0.1	0	0.000957	-6.95177	-0.00665	0.10
12	Mahul	***Madhuca indica***	3	0.3	6	0.002871	-5.85316	-0.0168	0.29
13	Neem	***Azadiricta indica***	24	2.4	552	0.022967	-3.77372	-0.08667	2.30
14	Sal	***Shorea robusta***	551	55.1	303050	0.527273	-0.64004	-0.33747	52.73
15	Sidha	***Lagerstromia parnflora***	1	0.1	0	0.000957	-6.95177	-0.00665	0.10
16	Putus	***Lantena camara***	1	0.1	0	0.000957	-6.95177	-0.00665	0.10
17	Kurudu	***Gardenia gummifera***	4	0.4	12	0.003828	-5.56548	-0.0213	0.38
18	Kutri		55	5.5	2970	0.052632	-2.94444	-0.15497	5.26
19	Patuli	***Stereospermum suaveolens***	6	0.6	30	0.005742	-5.16001	-0.02963	0.57
20	Chilly		1	0.1	0	0.000957	-6.95177	-0.00665	0.10
21	Kusum	***Scleichera oleosa***	6	0.6	30	0.005742	-5.16001	-0.02963	0.57

22	Damkurudu	***Gardenia latifolia***	1	0.1	0	0.000957	-6.95177	-0.00665	0.10
23	Kanteikoli	***Ziziphus Oenoplia***	5	0.5	20	0.004785	-5.34233	-0.02556	0.48
24	Dehesarei		3	0.3	6	0.002871	-5.85316	-0.0168	0.29
25	Sisoo	***Dalvergia latifolia***	1	0.1	0	0.000957	-6.95177	-0.00665	0.10
26	Sunari	***Cassia fistula***	5	0.5	20	0.004785	-5.34233	-0.02556	0.48
27	Bel	***Aegle marmelos***	12	1.2	132	0.011483	-4.46687	-0.05129	1.15
28	Gangasiuli	***Nyctanthes arbortristis***	25	2.5	600	0.023923	-3.7329	-0.0893	2.39
29	Mudimudika	***Helicteris Ixora***	25	2.5	600	0.023923	-3.7329	-0.0893	2.39
30	Rohini	Soumida febriguga	44	4.4	1892	0.042105	-3.16758	-0.13337	4.21
		Total	**1045**		**331022**			-1.90621	

SHIMPSON'S INDEX= SUM n(n-1)/ N(N-1) . Where,
n= no. of individual sp. In a sample plot
N=no. of total sp. In the total no. of sampleplots
SHIMPSON'S INDEX= 0.303417111
SHANNON'S INDEX= - SUM(P*lnP)= -(-1.90621) = 1.90621

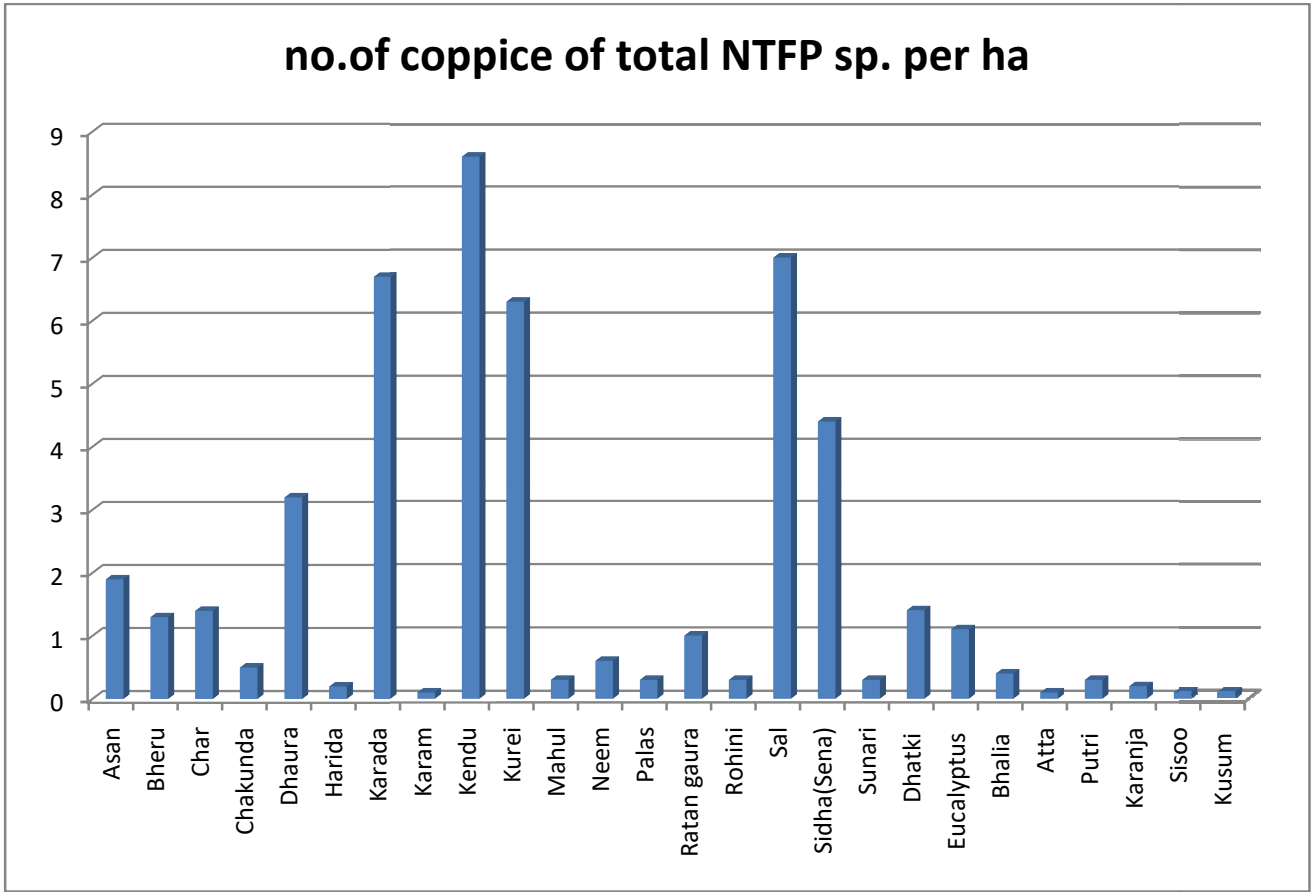

regeneration of potential NTFP sp.
60
50
40
30
20
10
0
Acacia
Asan
Baranga
Benimanz
Bheru
Chara
Dhaura
Karada
Kendu
Kurei
Mai
Mahul
Neem
Sal
Sidha
Putus
Kurudu
Kutri
Patuli
Chilly
Kusum
Damkurudu
Kanteikoli
Dehesarei
Sisoo
Sunari
Bel
Gangasiuli
Mudimudika
Rohini

BIO-DIVERSITY INDEX OF POTENTIAL NTFP SPECIES (COPPICE) ROURKELA FOREST DIVISION

Sl. No.	Local Name	Botanical Name	Total No. of Trees in Sample Plot (n)	no. of stem per ha	n(n-1)	P=(n/N)	lnP	P*lnP
1	Asan	***Terminalia alata***	19	1.9	342	0.039501	-3.23143	-0.12764
2	Bheru	***Chlorixylen swieteria***	13	1.3	156	0.027027	-3.61092	-0.09759
3	Char	***Buchanania lanzan***	14	1.4	182	0.029106	-3.53681	-0.10294
4	Chakunda	***Cassia fistula***	5	0.5	20	0.010395	-4.56643	-0.04747
5	Dhaura	***Holopteilia integnitolia***	32	3.2	992	0.066528	-2.71013	-0.1803
6	Harida	***Terminalia chebula***	2	0.2	2	0.004158	-5.48272	-0.0228
7	Karada	***Cleistanthus collinus***	67	6.7	4422	0.139293	-1.97117	-0.27457
8	Karam	***Cleistanthus collinus***	1	0.1	0	0.002079	-6.17587	-0.01284
9	Kendu	***Diospyros melanoxylon***	86	8.6	7310	0.178794	-1.72152	-0.3078
10	Kurei	***Hollarrhena antidysenterice***	63	6.3	3906	0.130977	-2.03273	-0.26624
11	Mahul	***Madhuca indica***	3	0.3	6	0.006237	-5.07725	-0.03167
12	Neem	***Azadiricta indica***	6	0.6	30	0.012474	-4.38411	-0.05469
13	Palas	***Butea monosperma***	3	0.3	6	0.006237	-5.07725	-0.03167

14	Ratan gaura	***Cedrela toona***	10	1	90	0.02079	-3.87328	-0.08053
15	Rohini	***Soyamida Fabrifuga***	3	0.3	6	0.006237	-5.07725	-0.03167
16	Sal	***Shorea rubusta***	70	7	4830	0.14553	-1.92737	-0.28049
17	Sidha(Sena)	***Lagerstroemia parviflora***	44	4.4	1892	0.091476	-2.39168	-0.21878
18	Sunari	***Cassia fistula***	3	0.3	6	0.006237	-5.07725	-0.03167
19	Dhatki	Woodfordia Fructicose	14	1.4	182	0.029106	-3.53681	-0.10294
20	Eucalyptus	***Eucalyptus hybrid***	11	1.1	110	0.022869	-3.77797	-0.0864
21	Bhalia	***Semecarpus anacardium***	4	0.4	12	0.008316	-4.78957	-0.03983
22	Atta	***Annona squamosa***	1	0.1	0	0.002079	-6.17587	-0.01284
23	Putri	***Croton oblongifolius***	3	0.3	6	0.006237	-5.07725	-0.03167
24	Karanja	***Pongamia pinnata***	2	0.2	2	0.004158	-5.48272	-0.0228
25	Sisoo	***Dalvergia latifolia***	1	0.1	0	0.002079	-6.17587	-0.01284
26	Kusum	***Scleichera oleosa***	1	0.1	0	0.002079	-6.17587	-0.01284
		Total	**481**		**24510**			-2.5235

SHIMPSON'S INDEX= SUM n(n-1)/ N(N-1) . Where,
n= no. of individual sp. In a sample plot
N=no. of total sp. In the total no. of sampleplots
SHIMPSON'S INDEX= 0.106159044
SHANNON'S INDEX= - SUM(P*lnP)= -(-2.5235) = 2.5235



4. Potential NTFP Inventory Data (Shrub) of Rourkela Forest Division

In the category of Shrub, 4 potential shrub species have been identified out of total of 18 shrubs. Among these highest nos of stems per ha is represented by Dhatki(88.0), kurei(33.3) and putri (25.4) and Putus(15.2). These 4 potential shrub species contribute 91.41% of total shrubs enumerated per ha .

5. Potential NTFP Inventory Data (Herb) of Rourkela Forest Division:

In the category of Herb, 4 potential Herb species have been identified out of total of 35 Herbs. Among these, highest nos of stems per ha is represented by Banatulasi(123.8), Bhuin neem(77.1), Banakulthi(67.2) and Jhadu(21.6). These potential Herbs species contribute 76.15% of total Herbs enumerated per ha

6. Potential NTFP Inventory Data (Climber) of Rourkela Forest Division :

In the category of Climber, 4 potential Climbers species have been identified out of total of 19 Climbers. Among the 4 species, highest nos of stems per ha is represented by Atundi (14.7) followed by Dudhia (13.1), Palas (0.8), Siali (0.6). These 4 potential Climbers species contribute 65.03% of total Climbers enumerated per ha.

7. Traditionally Utilized NTFP Inventory Data (Tree) of Rourkela Forest Division :

Keeping the local use of NTFP in view, a list of NTFPs have been categorically enlisted as traditionally utilized NTFPs species. In the category of tree NTFPs, 5 no of trees have been chosen out of the total list of 77 enumerated species. These represent 54.45% of total trees species per ha. Highest of stems per ha is recorded by Sal (95.1) followed by Char (49.4), asan (28.3), Kendu (15.3),Mahul(10.2) etc. These Species contribute to 205.3 nos. of stems per ha. Out of total 377.

8. Traditionally Utilized NTFP Inventory Data (Shrub) of Rourkela Forest Division :

In the category of Shrub NTFPs, 5 no of Shrubs have been chosen out of the total list of 18 enumerated species. These represent 71.31% of total Shrubs species per ha. Highest of stems per ha is recorded by Dhatki (88) followed by Kurei (33.3), kurudu (1.9), Kantakoli(1.6) and gangasiuli(1.5).

9. Traditionally Utilized NTFP Inventory Data (Herb) of Rourkela Forest Division :

In the category of Herb NTFPs, 6 no of Herbs have been chosen out of the total list of 35 enumerated species. These represent 80.33% of total Herbs species per ha. Highest of stems per ha is recorded by Banatulasi (123.8), Bhuineem (77.1) and Banakolthi (67.2). The lowest number stems per ha is represented by Bhuinamla (5.3).

10. Traditionally Utilized NTFP Inventory Data (Climber) of Rourkela Forest Division

In the category of Climber NTFPs, 6 no of Climbers have been chosen out of the total list of 19 enumerated species. These represent 65.7% of total Climber species per ha. Highest of stems per ha is recorded by Atundi (14.7) followed by Dudhia (13.1). . The lowest number stems per ha is represented by kaincha 0.1per ha.

11. Prioritized species Inventory Data (Tree) of Rourkela Forest Division:

In the category of Tree, a total no of 5 trees species have been enlisted as prioritized species which represents a total of 4.7 stems per ha out of the Grand Total of 377 stems per ha of all tree species. Among these, highest number is recorded by Harida (2.1) followed by Bahada (1.9),Gangasiuli (0.4), Amla(0.2),Phanphana(0.1). These prioritized species represents 1.24% of total trees per ha.

12. Prioritized species Inventory Data (Shrub) of Rourkela Forest Division:

In the category of Shrub, a total no of 2 Shrub species have been enlisted as prioritized species which represents a total of 1 stems per ha out of the Grand Total of 177 stems per ha of all shrub species. Among these, highest number is recorded by Ranikathi(0.6) stems per ha.

13. Prioritized species Inventory Data (Herb) of Rourkela Forest Division

In the category of Herb, only 3 Herb species has been enlisted as prioritized species which represents a total of 0.9 stems per ha out of the Grand Total of 380.4 stems per ha of all Herb species. This prioritized species represents 0.23% of total Herbs per ha. Among these Bajramuli contributes highest (.4) per ha followed by satabari(0.3).

14. Prioritized species Inventory Data (Climber) of Rourkela Forest Division

In the category of Climber, a total no of 2 Climbers species have been enlisted as prioritized species which represents a total of 0.3 stems per ha out of the Grand Total of 44.9 stems per ha of all Climber species. These prioritized species represents 0.66% of total Climber per ha.

15. Distribution Pattern of Potential NTFP, Traditionally used NTFP and Prioritized species.

Over and above, the distribution pattern of potential and traditionally used NTFP species along with prioritized species reveal that potential NTFP and traditionally NTFP species by the Forest fringe dwellers represent 76% and 68% of total nos of stems per ha of all species while the prioritized species contribute 0.7%. Out of top 15 NTFP species recorded in Biramitrapur Range, Sal represents the highest percentage stems (25.23%) to total stems of trees species, among shrubs, Dhatki(49.41%) contribute the most. Among herbs and climbers the percentage distribution Banatulasi (32.54%) and Atundi (32.74%) respectively contributes highest. Similarly, the trend of percentage coppice shoots to

total coppice shoots of same category of species per ha is highest for Kendu (17.88%), where as the percentage regeneration to total regeneration is highest for Sal (52.73%).

16. Coppicing NTFP species Inventory Data of Rourkela Forest Division :

The study of data related to coppicing of potential NTFP species shows that Kendu has highest no of coppice shoots per ha(8.6%) followed by Sal (7%). Species like Kusum and Sissoo represents the lowest coppice shoot per ha (0.1).

17. NTFP species Regeneration Inventory Data of Rourkela Forest Division :

The regeneration inventory of NTFP species shows that Sal regeneration is highest in all the sample plots, which contributes to 52.73% of the total regeneration, followed by Kendu(12.25%).Among shrubs the regeneration of Kurei is highest. The analysis of total regeneration per ha unveil that in almost all the categories the regeneration is very poor .

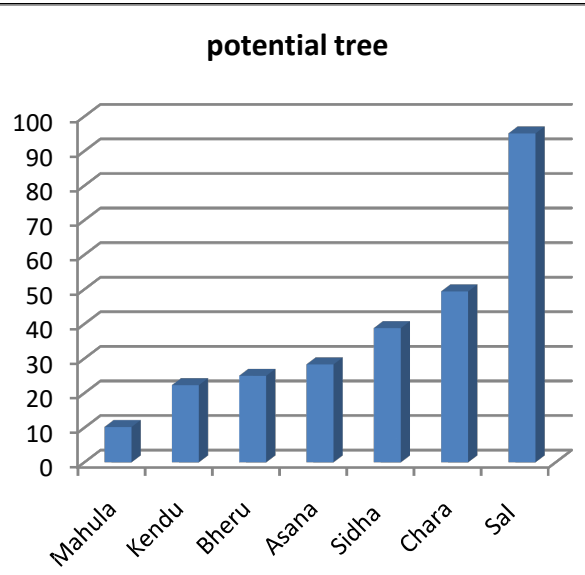
18. NTFP Marketing Inventory Data of Rourkela Forest Division :

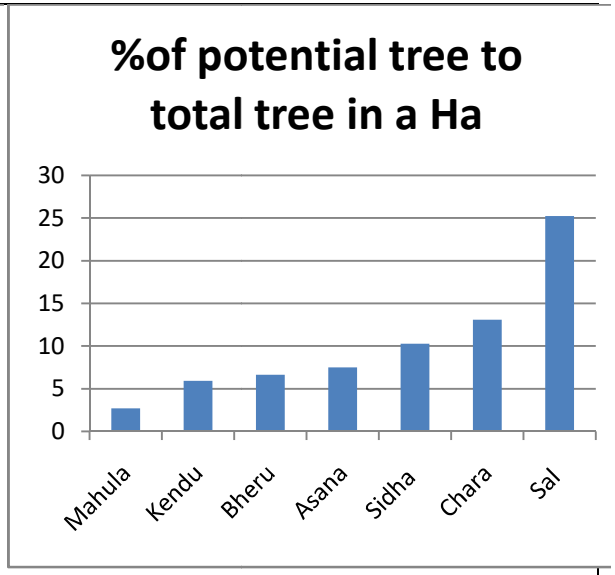
NTFP marketing inventory has been conducted where in, statistical data pertaining to quantity of NTFP collected, consumed and marketed have been analyzed so as to better appreciate the pivotal role of NTFP in tribal livelihood.

It is evinced from the analysis that a total of 23901.52 qtls. of NTFP involving all categories i.e. Tree, Shrub, Herb, and Climber by 8240 collecting households in 51 villages. Out of the total quantity collected, house hold consumption represents 18% and NTFP sold by Forest fringe dwellers contributes 82% of total collection.

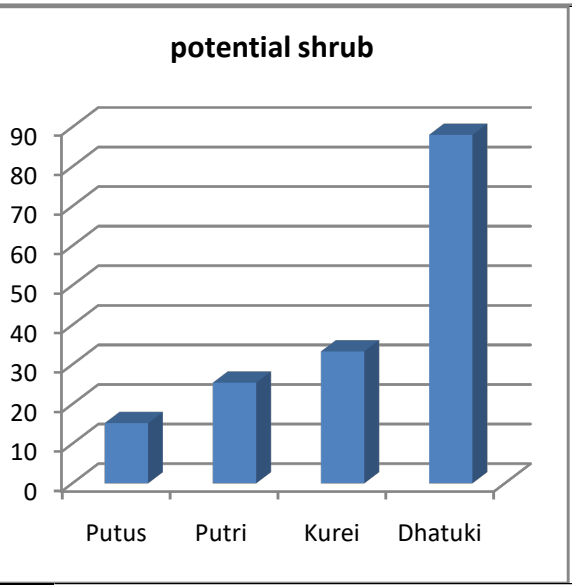
It is found that species like Mahua, Sal,Kendu and broom stick are usually collected in large by the villagers. Out of the econonomic contribution of total 35.7 lakhs, from these NTFP 29.7 lakhs is from the NTFP sold in the market ,where as 5.9 lakhs is consumed in household.From the data analysis it is found that per household monetary gain is Rs.434.09, which is not sustainable to support the livelihood of the tribals. The trade in NTFP is mostly restricted primary market only with distress sale. They are forced to sale NTFP at a low price, had there been secondary market and collective approach trough cooperative society the monetary gain would have been far more than the existing one.

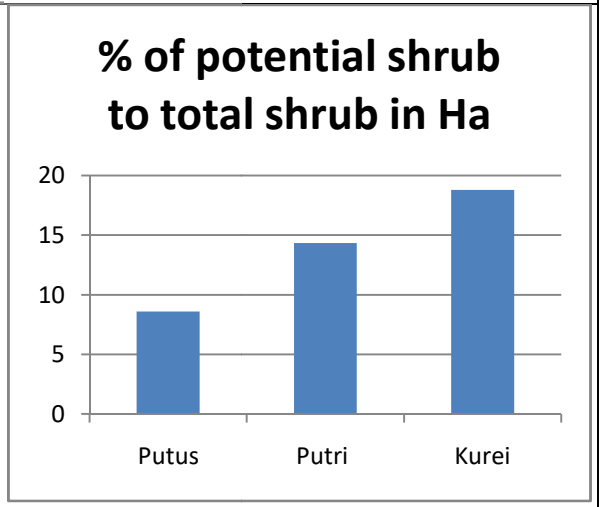
POTENTIAL TREE	No/ha	%
Mahula	10.2	2.70557
Kendu	22.3	5.915119
Bheru	25	6.6313
Asana	28.3	7.506631
Sidha	38.8	10.29178
Chara	49.4	13.10345
Sal	95.1	25.22546
TOTAL	**269.1**	71.37931
total tree	377	
%	71.37931	



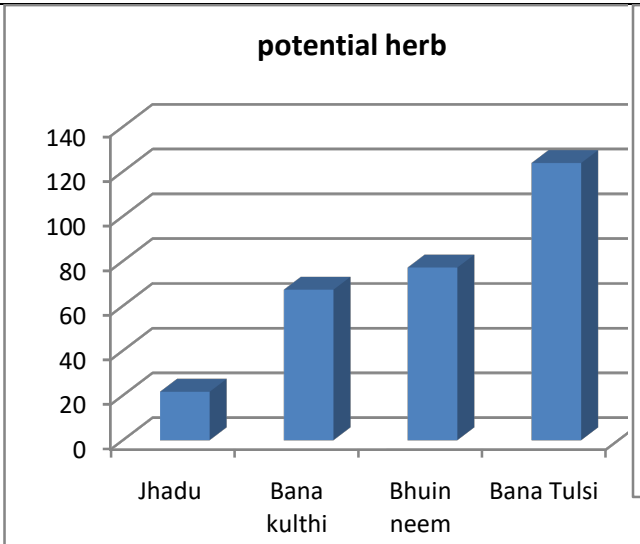


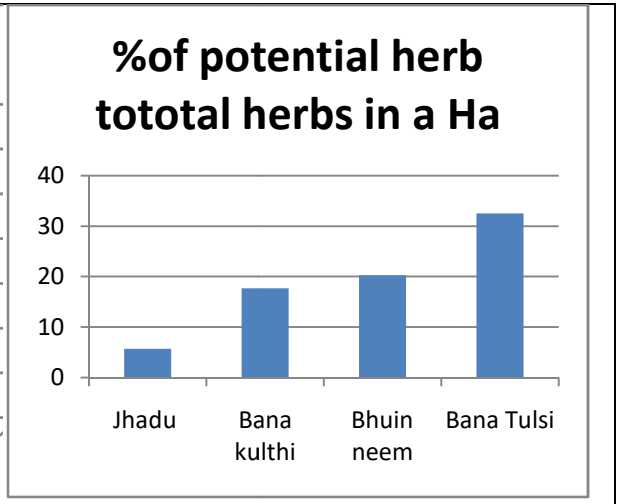
POTENTIAL SHRUB		%
Putus	15.2	8.582722
Putri	25.4	14.34218
Kurei	33.3	18.80294
Dhatuki	88	49.68944
	161.9	91.41728
total shrub	177.1	
%	91.41728	



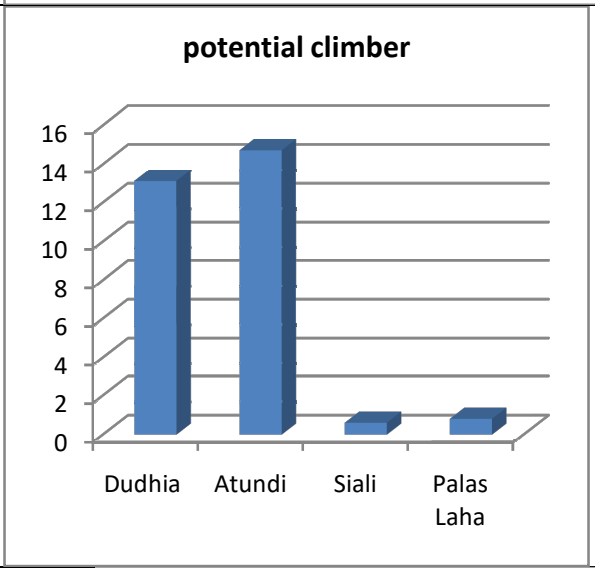


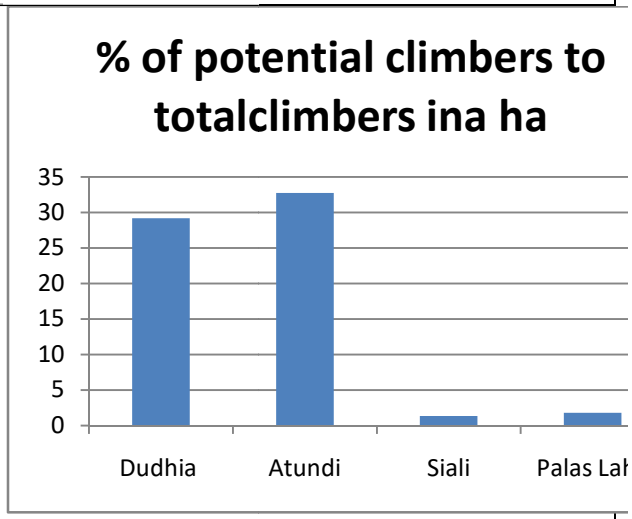
POTENTIAL HERB		%
Jhadu	21.6	5.678233
Bana kulthi	67.2	17.66562
Bhuin neem	77.1	20.26814
Bana Tulsi	123.8	32.54469
TOTAL	**289.7**	76.15668
total shrub	380.4	
%	76.15668	





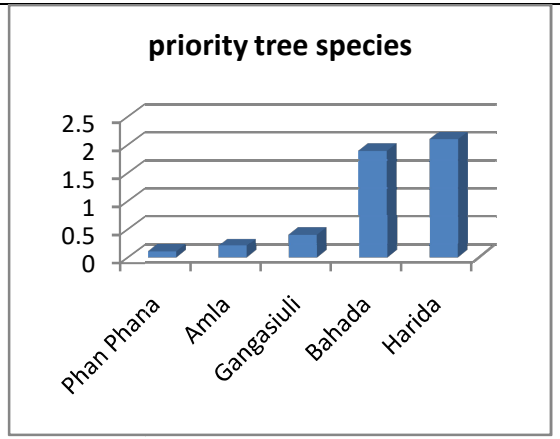
POTENTIAL CLIMBER		%
Dudhia	13.1	29.17595
Atundi	14.7	32.73942
Siali	0.6	1.336303
Palas Laha	0.8	1.781737
TOTAL	**29.2**	65.03341
total climber	44.9	
%	65.03341	

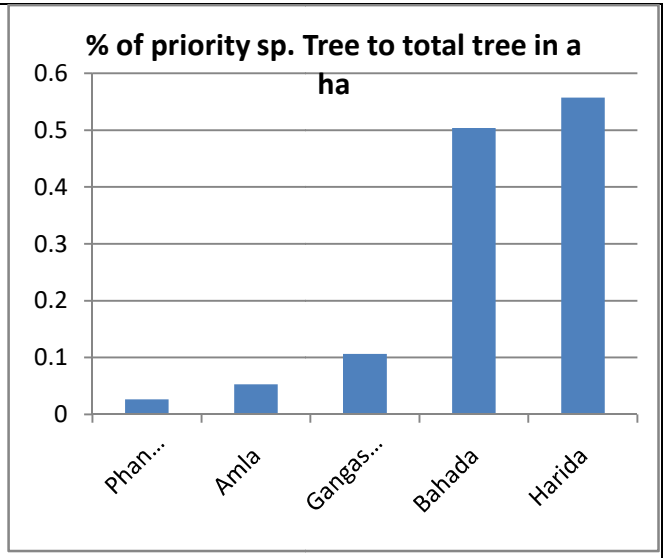




priority species /ha

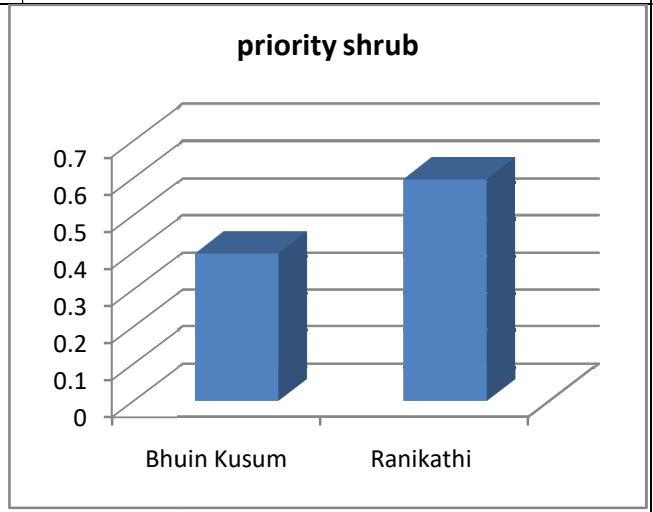
Tree	No/ha	% of total
Phan Phana	0.1	0.026525
Amla	0.2	0.05305
Gangasiuli	0.4	0.106101
Bahada	1.9	0.503979
Harida	2.1	0.557029
total	**4.7**	1.246684
total tree	377	
%	1.246684	

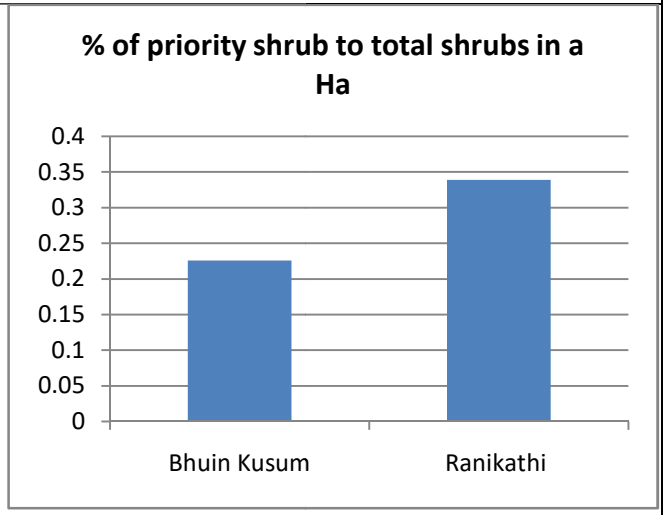




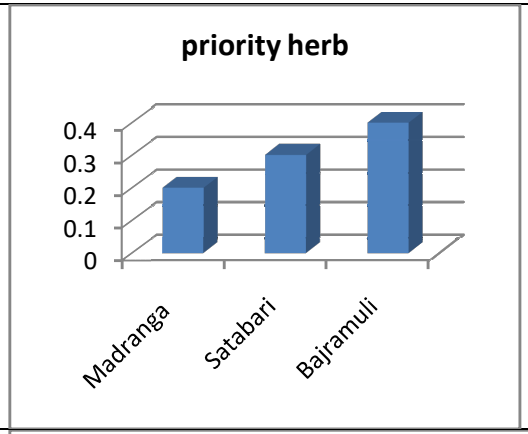
Priority sp. Shrub/ha

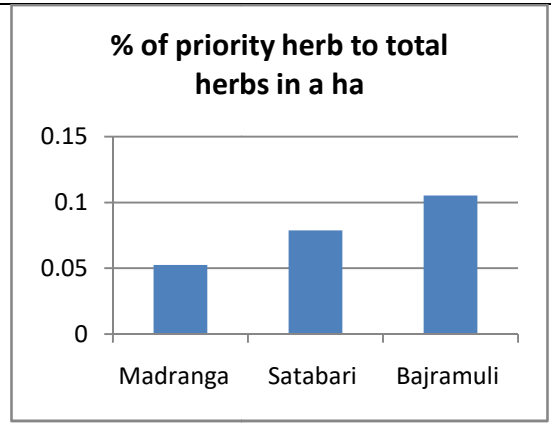
Shrub	No/ha	%
Bhuin Kusum	0.4	0.225861
Ranikathi	0.6	0.338792
total	**1**	0.564653
total shrub	177.1	
%	0.564653	



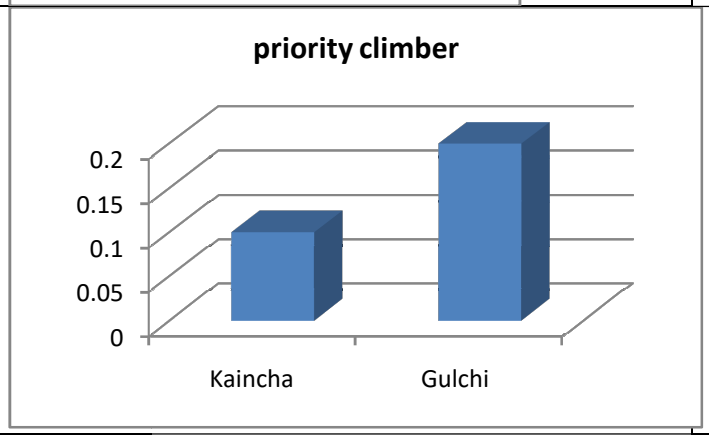


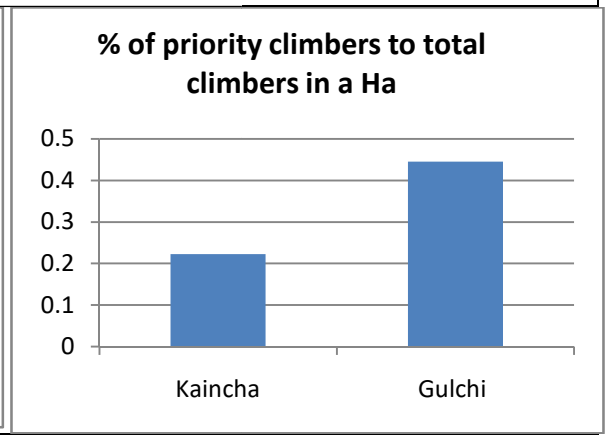
Herb	No/ha	%
Madranga	0.2	0.052576
Satabari	0.3	0.078864
Bajramuli	0.4	0.105152
total	**0.9**	0.236593
total herb	380.4	
%	0.236593	





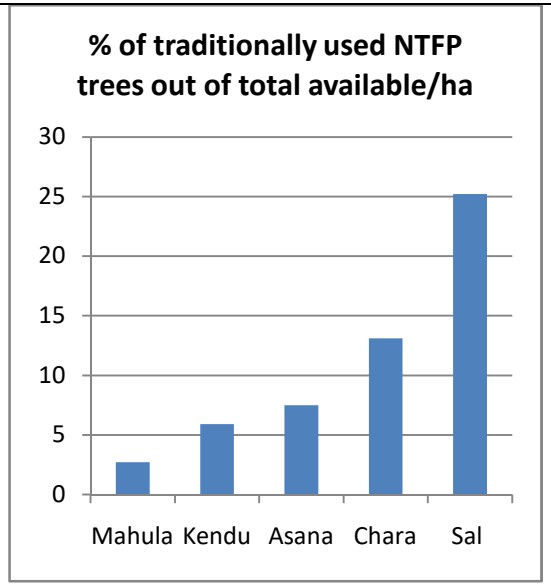
Climber	No/ha	%
Kaincha	0.1	0.222717
Gulchi	0.2	0.445434
total	**0.3**	0.668151
total climber	44.9	
%	0.668151	



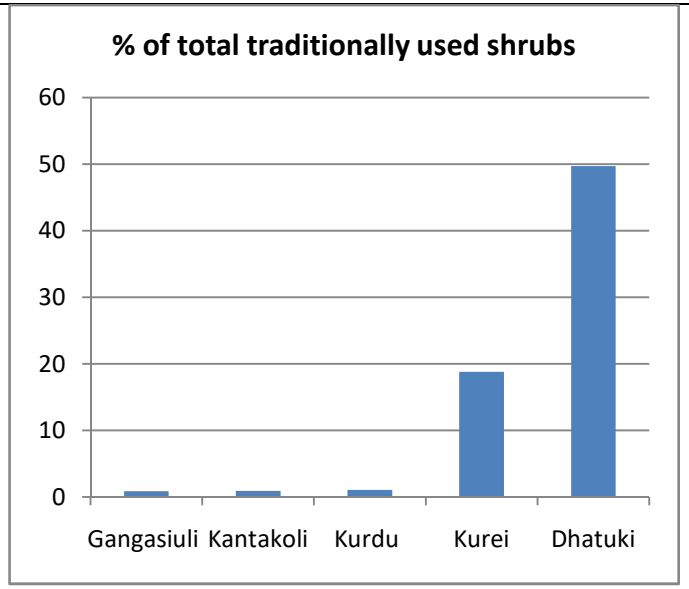


Traditionally used sp

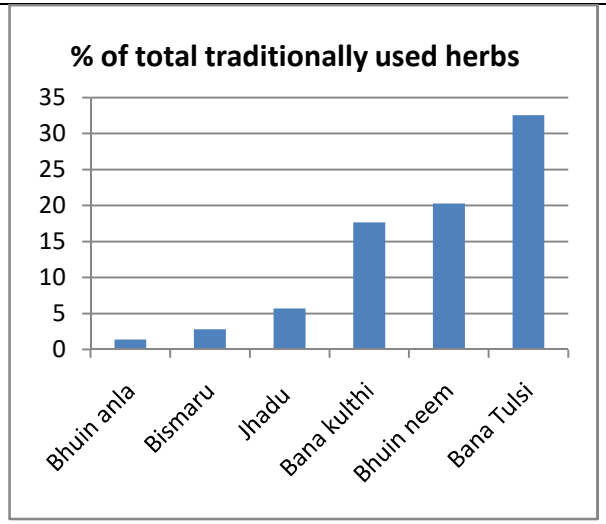
Tree	no/ha	% of total
Mahula	10.2	2.70557
Kendu	22.3	5.915119
Asana	28.3	7.506631
Chara	49.4	13.10345
Sal	95.1	25.22546
	205.3	54.45623
total/ha	377	



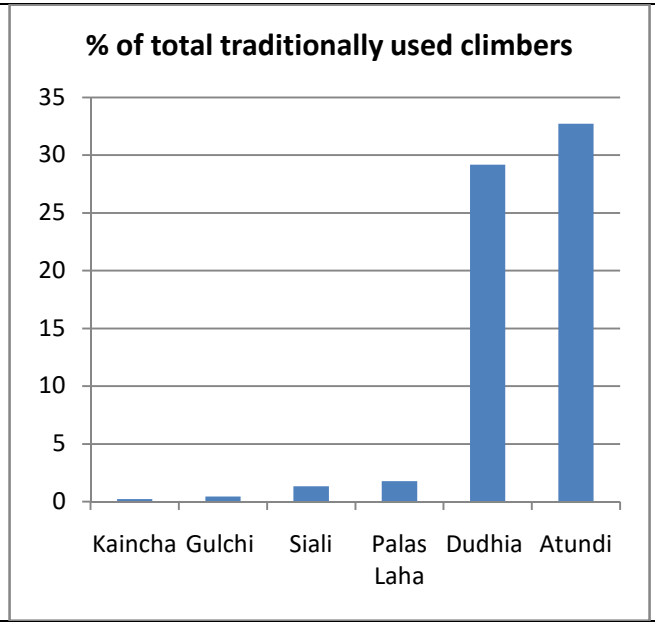
Shrub	no/ha	% of total
Gangasiuli	1.5	0.846979
Kantakoli	1.6	0.903444
Kurdu	1.9	1.07284
Kurei	33.3	18.80294
Dhatuki	88	49.68944
	126.3	71.31564
total/ha	177.1	



Herb	no/ha	% of total
Bhuin anla	5.3	1.39327
Bismaru	10.6	2.78654
Jhadu	21.6	5.678233
Bana kulthi	67.2	17.66562
Bhuin neem	77.1	20.26814
Bana Tulsi	123.8	32.54469
	305.6	80.33649
total/ha	380.4	

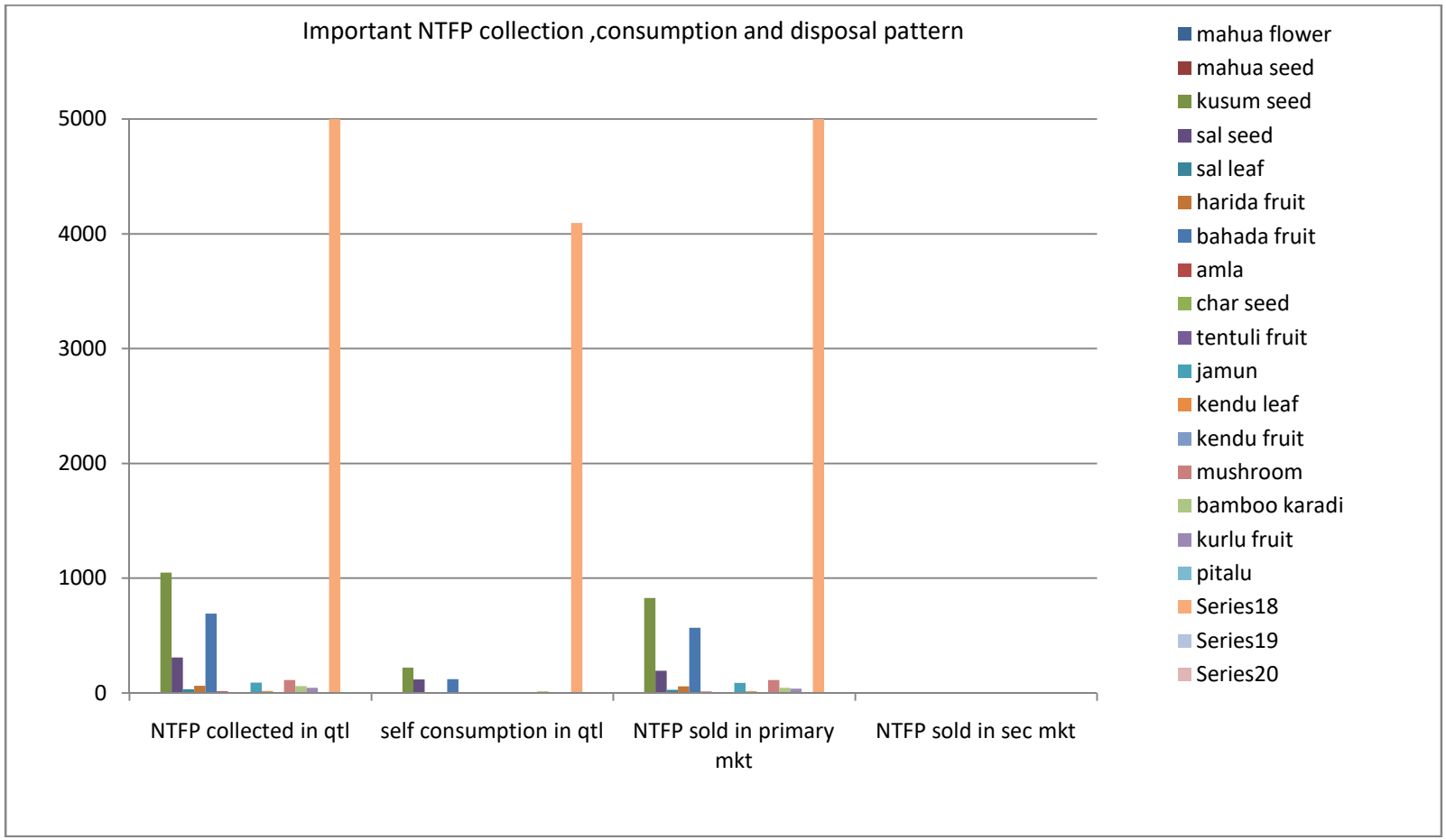


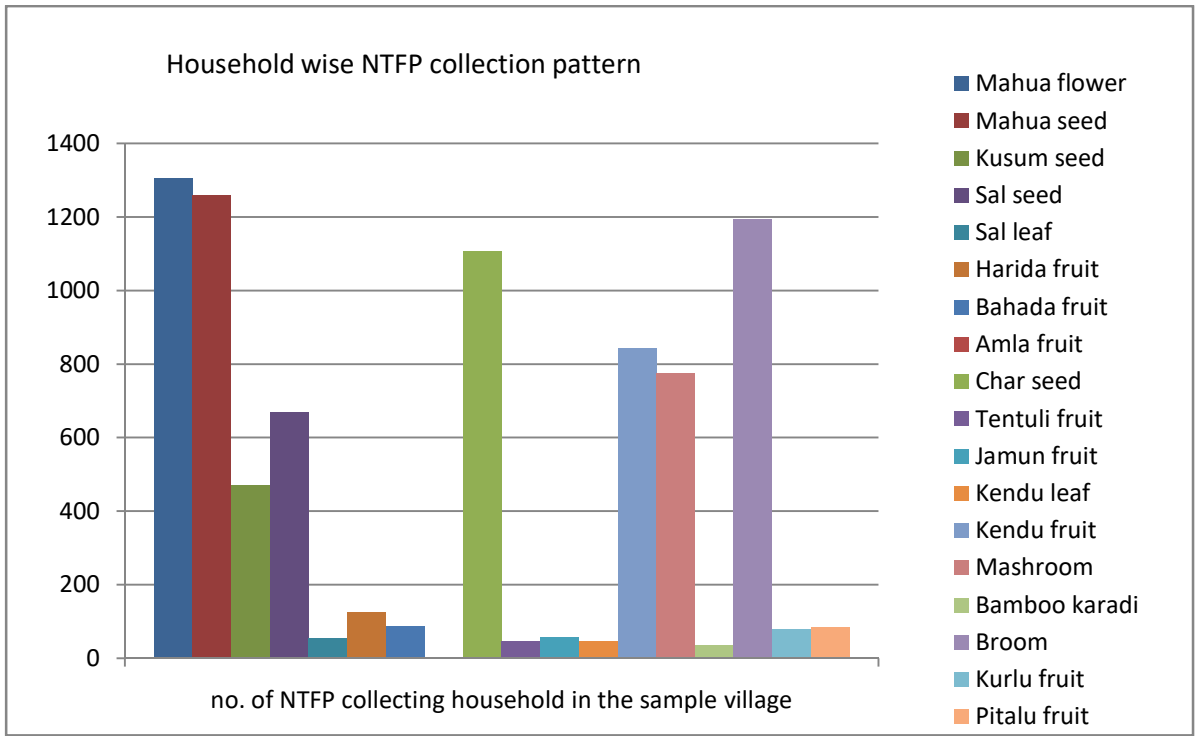
Climber	no./ha	% of total
Kaincha	0.1	0.222717
Gulchi	0.2	0.445434
Siali	0.6	1.336303
Palas Laha	0.8	1.781737
Dudhia	13.1	29.17595
Atundi	14.7	32.73942
	29.5	65.70156
total/ha	44.9	



Marketing Inventory Data of major NTFP

NTFP Species Utilized By forest fringed Village	Part/Item of NTFP Spices Utilized by the forest fringed Villages	No of NTFP collecting House hold in the Sample Village	Total Quantity of NTFP collected in Sample Village (in Qntl)	Total Quantity of NTFP used for self consumption in the Sample Village (in Qntl)	Total Quantity of NTFP sold at Primery market (in Qntl)	Total Quantity of NTFP sold at Secondary market	Total Quantity of NTFP sold (in Qntl)	Unit price (Per Qntl)	Value of Self consumed NTFP (in Rs.)	Value Sold NTFP (In Rs.)	Total Value of NTFP (In Rs.)
1	2	3	4	5	6	7	8	9	10	11	12
Mahua	Flower	1305	1048.63	220.8	827.83	0	827.83	1000	220800	827830	1048630
Mahua	Seed	1260	310.54	117.57	192.97	0	192.97	1000	117570	192970	310540
Kusum	Seed	472	34.2	7	27.2	0	27.2	2000	14000	54400	68400
Sal	Seed	670	63.15	5.9	57.25	0	57.25	1000	5900	57250	63150
Sal	Leaf	54	692	122	570	0	570	10	1220	5700	6920
Harida	Fruit	126	14.63	0.6	14.03	0	14.03	500	300	7015	7315
Bahada	Fruit	88	7.06	0.6	6.46	0	6.46	500	300	3230	3530
Amla	Fruit	0	0	0	0	0	0	0	0	0	0
Char	seed	1106	91.23	2.73	88.5	0	88.5	10000	27300	885000	912300
Tentuli	Fruit	45	19.1	3.75	15.35	0	15.35	5000	18750	76750	95500
Jamun	Fruit	58	1.8	0.8	1	0	1	1000	800	1000	1800
Kendu	Leaf	46	115	0	115	0	115	40	0	4600	4600
Kendu	Fruit	843	61.59	14.48	47.11	0	47.11	2000	28960	94220	123180
Mashroom	Chhotu	775	45.09	6.65	38.44	0	38.44	6000	39900	230640	270540
Bamboo	Karadi	35	0.55	0.15	0.4	0	0.4	2000	300	800	1100
Broom	Broom	1195	22199	4094	18105	0	18105	30	122820	543150	665970
Kurlu	Fruit	78	4.4	1.2	3.2	0	3.2	1000	1200	3200	4400
Pitalu	Fruit	84	0.55	0.15	0.4	0	0.4	1000	150	400	550
Total		**8240**	**23901.52**	**4476.4**	**19425.1**	**0**	**19425.14**	**34030**	**599050**	**2977855**	**3576905**


Important NTFP collection ,consumption and disposal pattern
5000
4000
3000
2000
1000
0
NTFP collected in qtl
self consumption in qtl
NTFP sold in primary mkt
NTFP sold in sec mkt
mahua flower
mahua seed
kusum seed
sal seed
sal leaf
harida fruit
bahada fruit
amla
char seed
tentuli fruit
jamun
kendu leaf
kendu fruit
mushroom
bamboo karadi
kurlu fruit
pitalu
Series18
Series19
Series20



7.17 RIGHTS AND CONCESSIONS

The tribals and local inhabitants have right to collect all NTFP item for their own consumption and overall right of collection vests with Gram Panchayat. Traders have no right to collect and sell NTFP from forest floor.

7.18 WORKING NORM

Working norm as fixed by Govt. for unskilled labour will be the norm for collection of NTFP from forest areas.

7.19 NECESSITY FOR INTERMEDIATE REVISION

Intermediate revision is not anticipated. However if necessary prescriptions may be reviewed after five years jointly by the Conservator of Forests, Working Plans and Conservator of Forests (Territorial). Any deviation suggested shall be subject to sanction of the competent Authority.

PART-II
CHAPTER-VIII

VILLAGE FOREST WORKING CIRCLE

8.1 GENERAL CONSTITUTION

All the plantations raised by Social Forestry Project, Sundargarh Division have been declared as Village Forest by the State government as per Section-30 (i) of Orissa Forest Act, 1972. The second PWPR emphasizes inclusion of all these Village Forest into newly constituted Village Forest Working Circle in this plan for intensive scientific management of these forests.

8.2 AREA

19 number of village forests of this division cover an area of 125.468 hectares, the details of which have been furnished in the table.

8.3 SPECIAL OBJ ECTIVES OF MANAGEMENT

The basic objectives of village forest management are as follows

(1) To protect, improve and regenerate the village forest areas.
(2) To provide benefits from such forest such as forest produce and fodder to village community.
(3) To manage village forest in accordance with resolution on Joint Forest Management as formulated by Government of Orissa.

8.4 METHOD OF MANAGEMENT

For smooth and effective management of village forests, Government has formulated the framework of operation in their resolution and it will be followed meticulously.

LIST OF VILLAGE FOREST OF SUNDERGARH DISTRICT

Sl. No.	Name of the Village Forest	Name of the Grampanchyat	Area in Ha.	Notification No. & Date
1	Ranganiabahal	Tarkera	18	No.Aaffn(SIDA)19/93-2667 DT.8.12.93
2	Mandiakudar	Chungimati	12.8	No.Aaffn(SIDA)19/93-2667 DT.8.12.93
3	Jamankira	Raibega	4.5	No.AFFN(SIDA)89/91-29566 DT.9.12.92
4	Lanjiberna	Kuarmunda	15	-do-
5	Dalposh	Jamsara	10	-do-
6	Lanjiberna	Kuarmunda	5	-do-
7	Gobira	Dumerjhor	7	-do-
8	Gobira	Dumerjhor	1.67	-do-
9	Raidihi	Bargaon	1.5	-do-
10	Lanjiberna	Kuarmunda	4.9	-do-
11	Sahilata	Hatibari	5	-do-
12	Jharbeda(Khariadhipa)	Katang	5	-do-
13	Jharbeda	Katang	4	-do-
14	Mandiakudar	Chungimati	7.2	-do-
15	Kansbahal	Laing	5	-do-
16	Nuagaon	Nuagaon	15	-do-

17	Sunakhardi	Kutunia	10	No.AFFN(SIDA)89/91-1723 dt.25.1.92
18	Dumermunda(Ulhani)	Hatibari	9.81	-do-
19	Hatibari	Hatibari	1.25	-do-

(**Source: D.F.O.Sundergarh)**

8.5 TREATMENT SERIES: Most of the plantations have either been illicitly felled or available in scattered patches with coppice shoots coming up from stumps.

8.6 ANALYSIS AND VALUATION OF CROP: Due to inappropriate management in the past and severe biotic pressure in the form of illicit felling, overgrazing, fire hazard, encroachment etc., most of areas covered under this Working Circle are in various stages of degradation. At many places, the original vegetation has been replaced by a series of secondary flora comprising of inferior bushy and scrubby species which are capable to withstand regular felling, grazing and annual fires. The available crop shows poor, stunted growth and contains irregular age and dia class-wise trees distributed irregularly. The floristic diversity index shows that regeneration of different species is coming up well and all forest blocks will gain normalcy within a period of ten years. These blocks were not subjected to any regular silvicultural system in the past. The existing crop cover in these blocks is in irregular form.

8.7 SILVICULTURAL SYSTEM

The area should be planted as RDF with 200 seedlings per hectare and no tree felling should be allowed. The first and foremost concern of management is to protect and improve the existing growth through rehabilitation measures. No exploitation will be done in natural vegetation area except removal of dead, dying, diseased and moribund trees. Hence, no formal silvicultural system is prescribed.

8.8 CHOICE OF SPECIES

Miscellaneous species with medical plants species will be planted, e.g. *Acacia, Eucalyptus,* Amla, Harida, Bahada, Teak, Bamboo, Sissoo, Gambhari, Chakunda and Mango etc. The areas to be rehabilitated are in general sparsely vegetated with average stock density less than 0.4 and for that reason improvement, thinning and fencing operations are not required. However, in the clusters of dense growth, tending and thinning operations are required for improving the growth of vigorous species. For that purpose Sal, Asan, Kusum, Dhaura, Kurum, Kasi, Gambhar will be taken as principal species and the rest will be treated as secondary species. While carrying out these operations, it should be kept in mind that no undesirable gap is created in the canopy.

The choice of species will also depend upon the needs and requirements of local inhabitants. The plantations raised should be of mixed type and the species planted should be site specific. In the areas subjected to uncontrolled grazing, non-browsable species like *Cassia siamea, Agave sisalana,* Karanj,

Euphorbia species etc. are to be given priority for plantation. In the area effected with annual fire, species like *Dalbergia sissoo, Cleistanthus collinus, Tectona grandis* and *Gmelina arborea* may be preferred.

SPECIES SUITABLE FOR PROBLEMATIC SITES

Site	Measures to be taken	Species to be planted
Ravine	1. Soil & water conservation measures 2. Full protection from g razing and fire. 3. Safe disposal of run-off. 4. Grassland development. 5. Afforestation.	*Dalbergia sisoo, Albizzia lebbek, Acacia catechu, Acacia nilotica, Azadirachta indica, Agave americana, Agave hybrid, Agave sisalana and Eulaliopsis binata* and soil binding grasses.
Laterite soil	1. Soil and water conservation measures 2. Full protection from grazing and fire. 3. Application of fertilizer. 4. Afforestation.	*Eucalyptus hybrid, Dendrocalamus strictus, Acacia auriculiformis, Madhuca indica, Bombax ceiba, Soymida febrifuga, Cleistanthus collinus, Albizzia lebbek, Anacardium occidentale, Agave* species and soil binding grasses.
Water logged areas	1. Preparation of mounds. 2. Planting of tall plants. 3. Application of anti-termite chemicals. 4. Early planting. 5. Drainage.	*Eucalyptus robusta, Anthocephalus chinensis, Syzygium cumini, Terminalia arjuna, Bombax ceiba, Legerstroemia speciosa, Sisoo, Derris indica, Acacia nilotica.*

Depending upon the local factors, particularly soil condition, the species to be raised shall be selected carefully for gap plantation. Since the primary objective is to restock this area and to improve the existing forest growth, preference shall be given to local indigenous species that have the best potential to adapt to these sites. A list of species that can be grown for treatment of different sites in this Working Circle is presented in the following table. The areas to be rehabilitated are in general sparsely vegetated with average stock density less than 0.4 and for that reason improvement, thinning and fencing operations are not required. However, in the clusters of dense growth, tending and thinning operations are required for improving the growth of vigorous species. For that purpose Sal, Asan, Kusum, Dhaura, Kurum, Kasi, Gambhar will be taken as principal species and the rest will be treated as secondary species. While carrying out these operations, it should be kept in mind that no undesirable gap is created in the canopy.

The choice of species will also depend upon the needs and requirements of local inhabitants. The plantations raised should be of mixed type and the species planted should be site specific. In the areas subjected to uncontrolled grazing, non-browsable species like Cassia siamea, Agave sisalana, Karanj, Euphorbia species etc. are to be given priority for plantation. In the area effected with annual fire, species like *Dalbergia sissoo, Cleistanthus collinus, Tectona grandis* and *Gmelina arborea* may be preferred.

Species	Fodder/ Non-fodder	Habitat factors	Successional status
1. *Aristida setacea*	Fodder	Soil having brown sandyloam with gravel, pH 7.0 soluble salt content. 0.028 percent medium in potash, very low in phosphate and devoid of $CaCO_3$	Retrogression Sehima/ Dicanthium cover as a result of grazing
2. *Arundinella benghalensis*	Fodder	Soil colour yellowish brown, sandy loam pH 6.2	Themada/Arundinella cover
3. *Arundinella nepalensis*	Fodder	Slopes having good drainage and permeability, soil sandy loam, pH 6.5	Themada/Arundinella cover
4. *Bothriochloa intermedia*	Fodder	Level sites but extends in hilly topography too, Grows in variety of soil in subtropical condition.	Themada/Arundinella cover
5. Bothriochloa pertusa	Fodder	Variety of soil, pH ranges from 5.8 to 7.5 fine-textured soils.	Sehima / Dicanthium & Themda/ Arundinella cover**.**
6. *Cenchrus ciliaris*	Fodder	Grasses of Semi-arid zone. Dry sandy soil, pH 7.6 to 7.75	Dicanthium, Cenchrus lasiurus
7. *Cenchrus setigerus*	Fodder		Dicanthium, Cenchrus lasiurus
8.*Chrysopogon aciculatus*	Fodder	It has creeping rhizome and prefers sandy loam, acidic soils on level or moist slopes, pH 5.1 to 6.1. This is one of the few grasses, which can withstand heavy grazing. Cannot survive on dry stones or sandy soils, Promising species for stabilization of embankments etc.	Pharagmites/ Saccharum imperata cover.
9. *Chrysopogon f ulvus*	Fodder	Hilly gravely soils, black cotton soils, red soil with low level of moisture.	Sehima/ Dicanthium & Themeda/ Arundinella covers**.**
10. *Chrysopogon gryllus*	Fodder	Strong acidic soil on high hills, pH 4.2	Themeda/ Dicanthium thin cover on burning.
11.*Cymbopogon coloratus*	Non-fodder	Occurs on a variety of sites in dry areas (Rain fall 500 to 1000 mm) having gravelly to sandy loam, exposed rocks, acidic to neutral soil on hill and plains.	Sehima/ Dicanthium thin cover on burning
12.*Cymbopogon iwarancusa*	Non-fodder	Level to hilly topography, sandy and rocky soil, pH 6.5 to 7.5	Sehima/ Dicanthium thin cover on burning.
13.*Cymbopogon*	Non-fodder	Very wide distribution below tropic of cancer,	Sehima/ Dicanthium

martini		pH 5.2 to 7.0	thin cover on burning
14.*Cynodon dactylon*	Fodder	All type of soil on level land prefers moist area and stands moderate grazing and trampling.	Dicanthium, Cenchrus cover.
15.*Dactyloctenium sindicum*	Fodder	Dry area, level terrain, first colonizer of freshly deposited alluvial sands, Prefers slightly alkaline soil.	Dicanthium/ Cenchrus lasiurus cover.
16. *Demostachys bipinnate*	Fodder	A grass of semi-arid and arid region, tolerates pH as high as 9.5	Dicanthium/ Cenchrus lasiurus cover
17. *Dicanthium species, Dicanthium annulatum, Dicanthium caricosum*	Fodder	A species of level land prefers sandy loam to loamy soil, moist areas**.**	Dicanthium/ Cenchrus lasiurus cover
18.*Dimeria uscescens*	Fodder	A grass of North-east, prefers good drainage and permeability, pH 4.2	Themeda/ Arundinella cover
19.*Elesine compressa*	Fodder	A grass prefers good drainage and permeability, pH 4.2	Themeda/Arundinella cover
20. Eragrostis coarctata	Fodder	A xerophytic grass	Sehima/Dicanthium cover
21.*Eremopogon foveolatus*	Fodder	A grass for deep soil, high calcium and low land of north east.	Sehima/Decanthium cover
22. *Eulalia trispicata*	Fodder	A grass for deep soil, high calcium and low land of north east	Sehima/Decanthium cover
23.*Eulaliopsis binata*	Non-fodder	Can grow in slopes up to 50%, hot dry localities withstands forest fire	Sehima/Decanthium cover
24.*Heteropogon contortus*	Non-fodder	Shallow eroded,black or red soil, pH 6.8 to 7.00	Sehima/Decanthium cover
25. *Imperate cylindrica*	Fodder	Wide range of soil moist to swampy areas, pH 4.00 to 7.5	Sehima/Decanthium cover
26. Ischaemum indicum	Fodder	Low lying wet ground on black soil, pH 7.00 to 8.5	Sehima/Decanthium cover
27. *Sporobolus narginatu*s	Fodder	Level sandy tract of arid zone	Sehima/Decanthium cover
28. Themeda quadrivalvis	Fodder	A grass of western Himalaya above 2000 M and RF 1100 mm	Sehima/Decanthium cover
29. *Themeda quadrivalvis*	Fodder	Rainfall 500 to 1250 mm foothill, kankar belts, pH 7 to 8.5, stands on dry sal forests, fairly gregarious.	Sehima/Decanthium cover
30.*Themeda triendra*	Fodder	Gravelly soil on hills, pH acidic to neutral, Rainfall 1000 mm and above.	Sehima/Decanthium cover
31. Vetiveria zizanoides	Non-fodder	Low lying ill drained land where water table is high. Soil sandy loam to clay pH 4.0 to 7.5, prefers neutral soil.	Sehima/Decanthium cover

8.9 CYCLE

10 years cycle is prescribed.

8.10 CALCULATION OF YIELD

Yield will be controlled and regulated by village committee.

8.11 TABLE OF OPERATION

The plantations are not successful at many places and any operation is not required. However climber cutting, singling of shoots and other site specific improvement measures may be taken up.

8.12 METHOD OF EXECUTION OF OPERATIONS

No operation is required.

8.13 MANAGEMENT PRESCRIPTION

All the village forest is managed according to Village Forest Rules, 1985. The village forest committees will up-date and modify their old Micro Plans according to present day requirements. According to site of plantation, survival percentage and requirement of local people new Micro Plan will be prepared in consultation with DFO, Ranger, Forester and Forest Guard. The prescription in the revised Micro Plan will incorporate the needs of the Village Committee for future planning.

8.14 CONTROL

The journals and other records will be maintained for each village forest coupe in accordance with the provisions of Orissa Forest Plantation manual 1972. Necessary entries shall be made in the compartment histories about all the works undertaken inside the annual coupes.

8.15 MISCELLANEOUS REGULATIONS

8.15.1 Grazing

All the plantation area shall be closed to grazing for a minimum period of 5 years. However, depending upon the result, the DFO can further extend the closure period. In case, it is decided to open the area for grazing, it shall be regulated as per carrying capacity of the area concerned .The Orissa Forest (Grazing of Cattle) Rules, 1980 should be strictly followed.

8.15.2 Fire Protection

The entire area should be rigidly protected from fire hazard. The fire protection measures shall be regulated as per the Orissa Forest (Fire Protection) Rules, 1979 and Chapter-XVIII of Orissa Forest Department Code.

8.15 RIGHTS AND CONCESSIONS

Rights and concessions shall be regulated as per the existing provisions of the relevant Gazette notifications of the respective village forest blocks and the Govt. of Orissa policy with regard to JFM.

8.17 WORKING NORMS

The cost norm that will be followed in working circle will be Rs. 1000/- per hectares approximately. The total annual requirement under this Circle will be Rs.1.18 lakhs per year with subsequent rise of 10 percent every year.

8.18 INTERMEDIATE REVISION

No major changes in the prescription of the Working Circle are anticipated. However, it may the reviewed, if necessary, after 5 years jointly by the CF (T) and the CF (WP). Any deviation suggested shall be subjected to sanction of competent authority.

PART-II
CHAPTER-IX

WILD LIFE (OVERLAPPING) WORKING CIRCLE

9.1 GENERAL CONSTITUTION

This Working Circle includes Wildlife (Overlapping) Working Circle and Recreation Working Circle of the out going plan. This Working Circle shall include forest areas having importance of Wildlife and recreation. Like wild flora, wild fauna also has genetic pool, which can be utilized for the future welfare of humanity. Wild animals and their products have great commercial value and due to excessive and illegal exploitation of this resource in the past, depletion of wild life has taken place. For recreation of city dwellers and industrial workers, a biological park has been developed named "INDIRA GANDHI PARK" in Sector 4 area of Rourkela Steel Township and a deer park has been created near Rourkela Steel town ship along the ring road running from "Amba-Bagan" to Rourkela Steel Plant.

This will create awareness among the visitors and increase their concern for the cause of protection, preservation and propagation of flora and fauna for bio-aesthetic purposes. It is however observed that there is lack of adequate and concentrated wild fauna in this division. The wildlife are dependent on forests for their survival and are an integral part of forests. The forests of the division are very rich in wild animals. This Working Circle overlaps all the forest blocks of the division .

9.2 OBJECTIVES OF MANAGEMENT

Keeping the above stated facts in view the specific objectives of the Working Circle shall be:

(a) To improve the habitat of Wildlife by reducing biotic interference,

(b) To create more water sources and salt licks to support the dwindling wild life population.

(c) To conserve and preserve the diversity of flora and fauna within natural eco-system,

(d) To educate and create awareness among masses about the importance of wild fauna in the forest eco-system.

(e) To conserve and develop the existing important wildlife habitats and pre-historic sites including caves for the purpose of eco-tourism.

9.3 STRATEGIES

9.3.1 Despite overwhelming protection given to the conservation of biodiversity and wildlife during recent years, forest patches of Rourkela Division are highly degraded. Wild life is an integral part of the forests and performs important functions in the ecosystem. Most of the forest areas, both reserved

and unreserved are prone to mining activities and therefore it is proposed that one Sanctuary may be declared to save endangered and precious wild lives of Rourkela.

Though there has been general decline in the forests and wildlife habitat, the Rourkela Forest Division continues to have rich wildlife resources as stated in Part-I. In fact different studies in Sundergarh have indicated that Reserved Forests in general contain a substantial number of floral and faunal species, and level of biodiversity is at par or often exceeding that of many PAs. Therefore, for protection of the existing wildlives, improvement of their habitat and conservation of bio-diversity, this overlapping Working Circle has been constituted that extends to entire Division.

9.4 GENERAL CHARACTER OF VEGETATION

The biotic pressure by humans and domestic cattle has adversely affected the biodiversity of flora and fauna due to degradation of forests over the years. No systematic biodiversity survey has been made in the Division in the past, barring some qualitative observations. Formal floral-diversity surveys have been taken for the first time during the revision of this plan and by the Forest and Ecology Division of NRSA, which has been reported in chapter 2 of part I of this plan. This will provide a benchmark for future comparisons. Detailed description of the composition and diversity including fauna of the forests, allotted to this Working Circle, has been discussed in Chapter 2 of Part I of this Plan. Further, all the blocks allotted to this overlapping circle have been briefly described in Part I.

9.5 SPECIAL OBJECTIVES OF MANAGEWMENT

The special objectives of management set for this working circle are within the general objectives of management. These include:

i. To conserve, protect and improve wild life habitat with special emphasis on the proposed sanctuary area and corridor for elephants.
ii. To promote wildlife in general and endangered species in particular.
iii. To create awareness among the local people regarding necessity to conserve and protect the wildlives and their habitat.
iv. To conserve and develop important wildlife habitat for the purpose of eco-tourism.
v. To increase biodiversity and wildlife population.
vi. To help prevention of wildlife related crimes.

9.6 ANALYSIS AND EVALUATION

Wildlife census has been carried out at intervals for different species of wildlife but no formal analysis and valuation of all data has been done at the Divisional level except for statistical purpose. Due to degradation of the forest cover and habitat the number and type of wild animals in the forest is reducing. Wildlife habitat continues to degrade which results in wild animals coming out of the forests leading to man-animal conflicts. The causes for habitat destruction and loss in wildlife are:

i. Increasing incidences of encroachment and shifting cultivation.
ii. Increasing demand for fuel wood, timber, fodder and other NTFPs.

iii. Poaching for sport and meat. Mass hunting associated with festivals.

iv. Inadequacy of the forest staff to combat poaching.

v. Lack of awareness among the people.

vi. Less focus of management for improvement of habitat for wildlife.

vii. Habitat destruction and fragmentation, which affects wild life population.

In spite of fewer inputs for wildlife and habitat improvement in the past, the Division still has rich variety of wild animals which has been described in details in Chapter 2.

9.7 AREA AND ALLOTMENT

All the forest blocks, included in the Plan have been allotted to this Overlapping Working Circle. The circle covers entire geographical area of the Division as far as protection of the wildlife is concerned.

9.8 SPECIES STRUCTURE

Most of the forest blocks of the Division support miscellaneous / deciduous types of forest. The top canopy includes species like *Shorea robusta, Pterocarpus marsupium, Terminalia tomentosa, Bombax ceiba, Mitragyna parviflora, Anogeissus latifolia* and *Gmelina arborea* etc. The middle storey consists of *Bridellia retusa, Dalbergia sissoo, Desmodium oojeinensis, Lannea coromandelica, Lagerstroemia parviflora, Buchanania lanzan, Aegle mermelos, Terminalia bellerica, Terminalia chebula, Semicarpus anacardium, Syzygium cumini, Diospyros melanoxylon, Schleichera oleosa, Madhuca indica, Cleistanthus collinus, Morinda tinctoria, Sterculia urens, Dillenia pentagyna, Emblica officinalis, Tamarindus indica, Anogeissus acuminata, Mangifera indica, Bauhinia variegate, Mallotus philippinensis* and *Pongamia pinnata* etc. Undergrowth like *Woodfordia fructicosa, Holorrhena antidysenterica, Indigofera pulchela, Andrographis paniculata, Phoenix acaulis, Tridax procumbens, Eupatorium odoratum* and *Clerodendron infortunatum* etc. are also noticed in forest. Interspersed amongst the wood land are grasslands which are in small patches and are very important for the herbivores in the forests. The species structure of major heterotroph communities is as follows:

a) Primary heterotrophs are Sambar (*Cervus unicolor*), Cheetal (*Axis axis*), Braking deer (*Muntiacus muntjak*), Mouse deer (*Tragullus memina*) etc.

b) Secondary heterotrophs are Tiger *(Panthera tigris),* Leopard *(Panthera* pardus), Jungle cat (*Felis chaus*), Civet cat (*Vivericula indica*), Leopard cat *(Felis bengalensis*) etc.

c) Scavengers and other animals are Hyaena (*Hyaena hyaena*), Jackal (*Canis aureus*), Wild dog (*Cuon alpinus*), Sloth bear (*Melursus ursinus*), Mongoose (*Herpestes edwardsii*), Large Indian squirrel (*Ratufa indica*) and otters (*Lutrogale perspiciclata*), Pangolin (*Manis crassicaudata*), Wild boar (*Sus scrofa*) etc.

d) The primates are represented by the common Langur (*Presbytis entellus*) and the common Pati (*Macaca mullata*).

e) Amongst the snakes, Dhamana (*Zamaris nucosus*), Cobra (*Naja tripudians*), Viper (*Vipera russelii*) and Krait (*Bungarus candidus*) are found throughout the Division with Python (*Python molurus*).

f) The avifauna includes peafowl, red jungle fowl, common quail, green pigeon, imperial pigeon, doves, hill mynas, red-vented bulbuls, pied wood-peckers, koels, crow pheasants, large Indian parakeets and common king fisher, etc.

9.9 POACHING AND WILDLIFE CRIME

Wildlife crime comprises of poaching of wild animals, capture, possession, transport and trade of live animals and plants or their parts, products and derivatives. It also includes damaging or destroying the habitat besides mass hunting, which is associated with local festivals in different parts of the State as a customary practice. In fact, this crime is one of the fastest growing crimes in the world and is said to be next to narcotic trade due to the huge financial returns. A wildlife criminal may be a villager or a poor tribal or he may be a smuggler operating from towns/cities, depending on the level at which he is operating in the trade link starting from poaching within a locality to international border smuggling. The extent of poaching and wildlife crimes detected in the Division is reflected in Chapter 8.

Methods of poaching wild animals vary from place to place depending upon the type of animal being poached. Shooting is common method for all kinds of mammals and birds. However, poisoning of big cats, birds and large herbivores, trapping mammals like deer and reptiles and netting small mammals, small birds and butterflies are frequently resorted to. Stick and glue, insecticides and pesticides for killing fast flying birds and taking young hatchlings from birds' nest holes on trees are commonly practiced. Digging out of snakes, porcupines, lizards etc. from underground pits is commonly seen and it should be stopped.

Poaching of herbivores is frequently reported for meat and trophy. Important herbivores include spotted deer, sambhar, wild boar, mouse deer, barking deer and hare etc. During summer months when natural streams become dry and rabi or other crop has ripened, these animals generally enter agriculture field near villages and are killed by the villagers. These animals are also killed by laying traps and snares on the jungle paths. Wire nooses for hare are common sight in most of the tribal dominated forest areas. Tribals use bows and arrows to kill deer and sambar. Most of them are expert in trekking wild animals and they follow them for two to three days accompanied by hunting dogs and finally kill the animals using arrows. Other traps to kill deer and other herbivores are also used. 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. However, organized poaching for trade is negligible. Poaching takes place for livelihood or as local custom, incidental kill or killing in retaliation. The extent of different animals poached and reported during the outgoing plan and intervening period is reflected in Chapter 8 on wildlife of the plan.

9.10 MAINTAINING SPECIAL HABITATS

Special habitats are biological in origin and provide habitat functions for small wild animals. They include snags, snag recruit, den trees, down wood, isolated large old trees, trees with fluting boles, buttresses, lianas, significant species of fruit bearing trees and shrubs. These special habitats have been neglected in the past. Care should be taken while implementing the plan to maintain these special habitats especially in the areas coming under Selection Working Circle and Bamboo (Overlapping) Working Circle.

Snags: In the forest at least five tallest and largest diameter snags per hectare should be maintained in a well distributed manner. Retained snags should be mentioned in the compartment history. These are vital for a variety of primary hole-nesting birds like Woodpeckers and Barbets, which are colonized by Hill Mynas, Owl etc. during subsequent years.

Snag recruits: In the similar manner five snag recruits per hectare should be maintained. These are dying trees, mostly affected by heart rot fungus but not 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, especially of genus *Dendrobium*.

Down wood: During felling operations large size irregularly shaped hollow logs are often obtained during conversion. Being uneconomical, they usually remain on site, or are converted into fire wood. Such large size woody materials serve critical ecological function in support of maintenance of vegetation and animals' diversity besides serving the function of cover and micro-habitat for several species. The large size hollow logs or rejected logs need to be maintained at the rate of three logs per hectare and as far as practicable should be evenly distributed. These should find place in the compartment history.

Large old trees: They occur generally in low density areas. The Ficus species should not be counted because Ficus is a fruit bearing tree and serves the purpose of nesting of variety of birds. Large old trees of different species as and when encountered need to be preserved in any felling/tending operation. These trees (2 to 4 per ha.) need to be entered in the compartment histories and they will serve as daytime roosts/nesting sites for large owls and other species.

Trees with fluting boles ad buttresses and holes at the base: These trees occur in very low densities represented by a small number of species. They provide significant microhabitat functions for small mammals like Mouse Deer and Reptiles. One such tree needs to be retained per hectare and entered in the marking list.

Lianas and Climbers: Climber cutting operation is a standard practice and prescription given in all working circles. However, lianas provide significant functions in support of mobility of

arboreal animals and depending on animal species serve as resting and escape cover for primates. They are equally important for arboreal small carnivores, rodents and lizards. A climber with tangles is especially important. It is recommended that at least two old climbers per hectare be retained and recorded in compartment histories.

Fruit bearing trees and shrubs: All fruit bearing tree species should be retained. Marking rules need to be specific on this point.

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. This is crucial especially with reference to vultures, which are critically endangered along with Eagles.

9.11 DEVELOPMENT OF HABITAT

Habitat shall be developed with the cooperation of local people using sound silvicultural techniques. The aim should be to provide more food, water and shelter to the wild lives and reduce man-animal conflict.

Improving the cover: Providing adequate cover to wild animals within their habitat is necessary for shelter and protection from adverse weather, predators and enemies. Keeping in view this aspect, it has been prescribed in Selection Working Circle not to fell those mature trees, which create a lasting gap in the canopy. It is also prescribed not to fell trees near water holes, wallows and saltlicks to maintain cover. In case of Rehabilitation Working Circle mixed plantations have been prescribed instead of pure plantations to create ground flora and middle storey to provide cover for different types of wild animals. Tree cover around the stream, water holes and salt licks shall be maintained and improved.

Improving availability of Food: The adequacy of food in wild life habitat depends upon the quality and quantity of food produced and the animal population living therein. Keeping in view this aspect of wild life management, the exploitable diameter of various species has been kept on higher side and the percentage of removal of exploitable size trees have been properly regulated and safe guarded. Similarly, under various subsidiary silvicultural operations like opening of canopy, thinning of congested parches, improving the general availability of food shall always be taken into consideration. For these reasons and also, for their utility as NTFPs, the fruit bearing trees have been prohibited from felling under the respective working circles. Further, the species as discussed in the following paragraphs will be part of any plantation/ retention operation taken in forest areas.

i. Food availability in a habitat changes with the season. Herbivores depend on plant materials like leaves, barks, twigs, flowers, fruits and seed of species like *Mallotus plilippinensis, Dendrocalamus strictus, Adina cordifolia, Albizzia lebbek, Aegle marmelos, Cassia fistula, Ficus bengalensis, Ougeinia ougenensis, Shorea robusta, Syzygium cumini, Terminalia alata, Terminalia bellerica, Zizyphus mauritiana, Bombax ceiba* etc.

ii. Deer, Monkey, Langur, Rats and Hare feed on wild fruit of plants like Ficus species, *Terminalia belerica, Buchanania lanzan, Aegle marmelos, Syzygium cumini, Emblica officinalis, Zizyphus mauritiana, Diospyros melanoxylon, Grewia hirsute* etc. These animals help in dispersal of fruits and seeds in the forests.

iii. 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 should be raised in the wild life concentrated areas to meet the food requirement of herbivores.

Distribution of natural salt licks: There are many natural salt licks scattered on sides of nallahs and in foothills. These shall be maintained and improved. New salt licks will be created in areas where better protection can be provided to the wildlife like near anti-smuggling/poaching camps, beat houses, rest houses etc. To improve the general wildlife condition it is proposed to improve administration and management**.**

(i) Water holes and saltlicks should be provided as per the requirement.

(ii) The poaching incidence should be investigated and the ranges vulnerable for poaching such as Kuarmunda, Panposh and Bisra should be given special protection by creation of anti - poaching squad.

(iii) The census of wild animals should be conducted periodically in association with Wildlife wing of the Forest Department.

(iv) Local N.G.O. should also be involved. The awareness on wildlife conservation should be stressed among the general public. No conservation is possible without people's participation. Wildlife week and other forestry related day should be celebrated and high publicity should be done.

(v) The field staff of the division should be given training in wildlife management.

9.12 CLASSIFICATION OF HABITAT

The habitat can be divided into three types depending upon degree of deterioration.

(A) Habitat with lesser degree of deterioration, e.g., Rajgangpur and Bisra Ranges. Most of forest blocks of these ranges have been placed under Selection Working Circle and few in Rehabilitation Working Circle. In these areas forest cover will be enriched by gap planting in blanks and by suitable soil and water conservation measures in eroded areas.

(B) Habitat having deterioration of higher degree are seen in Kuarmunda and Rajgangpur Ranges. Most of the forest blocks of these ranges come under protection and rehabilitation working circle where there will be no felling and only removal of dead, diseased, dried, hollow trees shall be allowed. The crop cover will be improved by gap planting and soil conservation measures to conserve moisture of the soil.

(C) Barren blocks: This category consists of barren blocks of Kuarmunda range and Rajgangpur range. These areas are highly degraded and are kept under rehabilitation and plantation working circles to protect the existing crops and to improve condition in future. Extensive plantations under different schemes have been taken up in these areas and several blocks have been assigned to VanaSamarakshan Samities (VSS) for protection. As these areas are close to town ships, creating awareness among the children and public about the importance of wild life is required.

9.12.1 DEVELOPMENT OF HABITAT

Habitat shall be improved with the cooperation of local people by using sound silvicultural techniques. The aim should be to provide more food, water and shelter to wild life. The area under category 'A' is quite extensive to provide wilderness and should be managed as extended buffer of the sanctuary. Food availability in a habitat changes with the season, Herbivores depend on plant materials like leaves, barks, twigs, flowers, fruits and seeds of species like *Mallotus philippinensis, Dendrocalamus strictus, Adina cordifolia, Albizzia lebbek, Albizzia procera, Aegle marmelos, bauhinia purpurea, Cassia fistula, Ficus benghalensis, Ficus religiosa, Ougeinia ougenensis, lannea coromandelica, Shorea robusta, Syzygium cumini, Terminalia alata, Terminalia belerica, Zizyphus mauritiana, Bombax ceiba, Careya arborea* etc.

Wild elephants feed on bark and leaves of species like *Ficus benghalensis, Ficus religiosa, Mallotus philippinensis, Dendrocalamus strictus, Ougeinia ougenensis, bambax ceiba, Kydia calycina* and *Shorea robusta.* Deer, Money, langur, Rats and hare feed on wild fruits of plants like *Ficus species, Terminalia belerica, Buchanania lanzan, Aegle marmelos, Syzygium cumini, Emblica officinalis, Zizyphus mauritiana, Diospyros melanoxylon, Grewia hirsute* etc. These animals help in dispersal of fruits and seeds in the forest areas. Among the plant materials grasses constitute major portion of the herbivore food. Grasses, which are highly preferred and consumed by herbivores, have been furnished in the following table. Theses gasses should be raised in the wild life concentrated areas to meet the food requirement of herbivores.

Sl. No.	**Grass Species**	**Name of the herbivores, which consume/prefer.**
1	*Axonopus compresses*	All grazing herbivores
2	*Centottheca lappacea*	Deer
3	*Digitaria longiflora*	Smaller herbivores
4	*Eragrostis pilosa*	All grazing small herbivores
5	*Oryza granulata*	Deer

6	*Panicum flarescens*	All wild herbivores
7	*Saccharum spontaneous*	All larger herbivores
8	*Setaria glauca*	All smaller herbivores
9	*Setaria palmifolia*	All herbivores

9.12.2 AVAILABILITY OF WATER

Generally, there is no dearth of water from July to December. However, scarcity is felt from January to June, when most of the nallas and streams dry up. Hence, it is necessary to create waterholes and check dams on the higher slopes along nallas to improve water availability during pinch period. There are a few natural salt licks scattered throughout the division, mostly on sides of nallas and in foothills.

9.12.3 WILD LIFE IMPROVEMENT MEASURES

In general following measures should be taken up.

(1) Special emphasis and attention should be paid for protection of endangered, rare and vanishing species from extinction. Necessary data should be collected on the above species and their populations should be closely monitored.

(2) The fire lines should be cleared and material removed should be dumped in such a way that it facilitates rodents, insects, jungle fowl and other birds to build their nests for breeding.

(3) No felling should be carried out in the areas having crown density of 0.4 and less.

(4) All hollow trees and the trees supporting nesting dens of wild animals shall not be removed because that would adversely affect their growth. 2-3 such trees per hectare will be retained.

(5) In the plantation areas creation of ground flora and middle storey should be encouraged by mixed type of plantations including fruit bearing trees. Emphasis should be given on improvement of floral composition and density.

(6) No fruit-bearing tree like Harida, Bahada, Aonla, zizyphus, Kendu, Mahula, and Ficus etc. should be felled.

(7) Planting of grasses and trees favorable to wildlife should be taken up in blanks and in the eroded areas to meet the food requirement of wild animals.

FIRE PROTECTION MEASURES

Fire lines should be cleared and maintained regularly. As most of the forest fires are man-made, it can be prevented to a large extent by motivating and educating the local people. Adequate field staff should be stationed with necessary infrastructure in fire prone areas to control and suppress the fire menace during summer season.

GRAZING

It shall be regulated depending upon the carrying capacity of the area and without disturbing the requirements of the wild animals.

RIGHTS AND CONCESSIONS

No rights are allowed unless admitted and prescribed in this plan or specifically granted by government.

VHF SETS

Fast communication is the key for protection of forests and wild lives. For better communication, divisional headquarter, all range headquarters, Section headquarters, beats and check gates should be provided with VHF sets.

9.13 ANIMAL DEPREDATION

Depredation of animals is increasing day by day. Crop damage by elephants during harvesting season is very high in Rajgangpur, Biramitrapur, Kuarmunda and Birsa Ranges. The reason for this conflict is shrinkage of the habitat of Elephants and conversion of common land adjacent to forest into agricultural lands through encroachments. There is no immediate solution except driving away the elephants to their habitat during the harvesting season by traditional methods like beating of drums, using fire crackers etc. Creation of low cost corridor with sufficient food and water by raising plantations of bamboos and other palatable species may control the migration of elephants. To mitigate miseries of people due to wild animals, the compensation for crop damage, house damage, injuries and death, should be disbursed to them as quickly as possible. Delay makes people lose faith in the department/ govt. and they tend to take revengeful self-protection measures even at the cost of safety of animals.

9.14 RESEARCH

Though scope of research at Divisional level remains limited, efforts can be made to encourage some organization to take up research work in the division. A systematic collection of data of occurrence, dynamics and movements of wild animals at regular intervals or every year for five consecutive years will provide population estimate, variation in population structure with vegetation cover, breeding behavior, mortality rates etc. Following scientific studies can be taken up.

(a) Migration pattern of wild animals.

(b) Study on general health and diseases of wild animals and steps that can be taken for treatment.

(c) Scientific study on food and feeding habits of important target species.

(d) Scientific study on intra and inter-specific relations.

(e) Scientific study on population dynamics of important target species.

(f) Life cycle study of different wild life in species habitat matrix, rare and endangered species and extinction etc.

9.15 COMMON WILD LIFE

Common wild animals	Common wild birds
Leopard	Babblor
Hyaena	Bulbul
Sambar	Blue joy
Spotted deer	Dove
Barking deer	Jungle fowl
Sloth bear	Pea fowl
Mongoose	Common myna
Common langur	Golden oracle
Wild boar	Rose ringed pigeon
	Cuckoo

9.16 SANCTUARIES AND NATIONAL PARK

There is no Sanctuary or National Park existing in this Division and in North-Western part of Orissa.

9.17 WILD LIFE RULES

Prior to enactment of Wild Life (Protection) Act, 1972, the following legislations of the Ex-Rulers and State Government were in operation in Rourkela Division.

1. The Reserved Forests Shooting Rules.
2. The Elephant Preservation Act, 1879.
3. The Wild Birds and Animals Protection Act.

The rules and laws were comprehensive in nature but there was no provision for controlling trade, imposing penalties on poachers and enforcing wild life protection rules among masses. The Wild Life (Protection) Act 1972 enacted by the Central Government and subsequent Wild life (Protection), Orissa Rules, 1974 brought some changes. As a result, poaching and trade of wild animals reduced subsequently. The Divisional Forest Officer, Rourkela (T) has been declared as Ex-officio Wild Life Warden in respect of Rourkela (T) Division.

9.18 WORKS OF IMPROVEMENT

Following measures are required for development of wild life.

1. Fencing of important wild life area.

2. Creation of the Game Tanks .

3. Creation of the Salt Licks

4. Development of awareness Centers, Signage, Posters, Sign Boards, Nature's trail, Tourist huts etc.

5. Development of Administrative Buildings including staff Quarters, Roads and Caves and old monuments etc.

6. Plantations of fruit bearing trees in core and buffer areas including bananas (About 100 ha. for ten years.)

The plan for improvement of wild life is required to be prepared which will lay emphasis on following aspects:

1. Provision of corridors.

2. It is proposed to create one game tank and one salt lick in every territorial range.

3. Grazing by domestic cattle needs to be stopped.

4. Forest fire needs to be controlled with demarcation of fire line, use of fire swatters, water sprinklers and mass education.

5. Elephant menace.

The movement of elephants from Jharkhand and Chhatishgarh to Orissa and their regular migration are commonly seen in all forest blocks of Gopalpur Range, Hemgir Range and Bisra Range. The movement of elephants, nos. of calves, breeding among elephants in all forest blocks of all Ranges and elephant dungs shows that habitat is highly suitable for elephants. The following development measures are needed.

(a) Establishment of corridors in different forest blocks of Rajgangpur, Kuarmunda and Bisra Range.

(b) Plantation of fruit bearing trees, e.g., Zizyphus, Banana, Mango, Jack fruit, Mohua and Kendu etc.

(c) Plantation of grass species in open patches.

(d) Improvement of bamboo forest by silvicultural means.

(e) Provision of clean and fresh water.

(f) Re-location of villages and villagers from dense forest blocks.

Unique habitats provide special functions not provided by successional stages and special habitats. They are geomorphic in origin. Large mammals like the tiger, leopard, bear and hyena use caves as shelter and for rearing cubs. In limestone formations caves may have stalactites and stalagmite, some of which can be significant for visitors. Caves have spring and small streams. They are important for amphibians, reptiles, fishes and many species of birds. Several species of bats live in colonies inside caves. Caves need complete protection, even while located inside a worked area. Inventory of available caves in various forest blocks and their mention in compartment histories should be taken up during this plan period.

When soft rock underlying hard rock weathers away, an arch is formed which serves as a shelter for bee hives (pollinators), nesting colonies for swallows etc. such sites need to be protected. Survey of available overhangs in various forest blocks and entering them in compartment histories should be taken up during this plan period. These are much smaller and distinct from caves, usually dug in soft rock or earth cutting by animals such as wild dogs, hyena, wolves, foxes, porcupines, for the purpose of shelter and breeding. They are used by a variety of taxa such as small mammals and reptiles. Porcupines and pythons are known to share the same underground chambers. Dens are subject to human disturbance. Dens need to be protected. Inventory of available dens in various forest blocks and mentioning them in compartment histories should be taken up during this plan period.

Natural saltlicks are important for all herbivores and such sites need to be protected from disturbance such as road alignment, soil conservation or any other engineering work. Setting up labour camps or cattle camps in their vicinity etc.should be discouraged. In summary, the unique habitats are vulnerable for a variety of reasons. Depending upon the existing and anticipated situation, the DFO needs to prescribe appropriate protection strategies. Some of the prescriptions may be generic, while some need to be site specific with reference to critical sites that come into notice during the survey conducted. Tribals are often residing in old growth stands or groves and there are specific periods of pilgrimage. People follow several forest routes to go to holy sites. DFO need to have full information on the average number of people, activities on the pilgrimage site, travel routes needs of pilgrims etc. From the time pilgrims enter the forest area to the time of departure, their movements and activities are required to be regulated. They would enroute need fuelwood, camping sites and other requirements of forest resources.

The distribution of wildlife in different forest blocks shall be studied and their occurrence in different habitats in different seasons shall be recorded. Census of wild animals shall be done every alternate year in consultation with the Chief Wildlife Warden to assess the prey-predator base. Wildlife habitats of endangered species shall be identified and mapped. Presence of natural waterholes, saltlicks and natural meadows shall be recorded and their adequacy shall be assessed with reference to their population estimates. Watch towers shall be constructed near crucial waterholes and saltlicks.

Migration routes for wild animals shall be identified and preventive measures shall be taken to protect and improve corridors. The areas vulnerable to poaching shall be protected from all sorts of biotic interference. The fire lines shall be cleared and material removed shall be dumped in such a way that it facilitates rodents, insects, jungle fowl and invertebrates for safe breeding. Throwing of unutilized food material in plastic, tin, poly bags and other containers should be strictly prohibited since this will ruin the aesthetic value of the site and may turn some wild animals to become scavengers. In order to spread conservation message among tourists, attempts should be made for use of proper signage, way side

exhibits, Do's and Don'ts, interpretive ideas, selling of wildlife posters, photograph, literature, interpretive natures trail and interpretive stall should be developed.

Provision of safe drinking water and public toilet is essential. Interpretation centre and visitor centre should be constructed near Kuarmunda. Use of loudspeaker should be banned strictly. The staff should be trained. Habitat improvement, plantation of ornamental trees and medicinal plants garden lawns, small park etc are required to be developed below the dam site in tourism zone. The planned tourism management increases number of tourist in the area. It helps the tourists in developing awareness, appreciation and conservation education package. It generates public support for conservation of wildlives by providing enlightened wilderness experience and visitor's satisfaction. The management should collect proper feed back from the tourists of all classes of people including students, low and high-income group people. The management must regulate tourism in such a manner that habitat is not degraded due to excessive tourist pressure. The D.F.O. must generate employment for local people in the form of guides and other services and create a sense of involvement in management. The tourist movement must be limited with in the tourism zone. Special staff must be deployed for tourism purpose. Visitor book must be maintained. Infrastructure viz. tourist complex, dormitory, boats, information centre, camping equipment should be provided to tourists.

9.19 MIGRATION OF ELEPHANTS AND REVIVAL OF HABITAT CORRIDOR

Rourkela Division is close to some important elephant ranges of Chhatisgarh and Jharkhand states. Stringent protection and rehabilitation measures are required for forest protection and linking the corridors of two similar habitats, which are used by the elephants during migration. If we loose this link, it will lead to fragmentation and ultimately extinction of this long ranging animal. It is suggested to link the entire distributional range of population of elephants by revival of habitat corridors. During pinch period the elephants go for house raid and eat away the stored paddy, grains and country liquor etc.. Land use planning should recognize established migration routes and protect them from incompatible forms of development and settlement of people. Elephants and tigers are large bodied animals. Surviving in the fragmented habitats would force them to cross human occupied landscapes. Securing the corridors of elephant and other species for migration between habitats is crucial for their survival. Developmental plans in these regions must take elephant and other species into consideration. This will ensure species survival, reduce conflict and ensure holistic conservation of all wildlife.

9.19.1 Corridor: Bamra Division to Rajgangpur Range and Bargaon Range of Sundargarh Division.

This corridor connects Bamra Forest Division with Rajgangpur and Ujalpur Forests. Human settlement and anthropogenic pressure is slowly degrading and fragmenting the habitat.

Length: 25-30 K.M Width: 3 K.M.

Forest Type: Tropical deciduous Sal forest.

Legal status: Major forest blocks include Kurei R.F., Kiralaga R.F.,Gurubasa R.F., Mahulgaon R.F., Tikilipara R.F., Kharikamunda R.F., Raidihi R.F., Panchara North and South R.F., Banglapahad R.F., Kusumura, Kukuda R.F., Bankidihi R.F., Tildega Dunguri R.F., Runga R.F., Satparlia R.F., Athakosia A R.F., Dhangergudi R.F.,D.P.F. and Revenue land. Athakosia R.F. and Kiralaga R.F. were the original home ranges of elephants in this area.

Major land use: Forest, Agriculture and settlement.

Frequency of use by elephant: Regular, used by herds of 20-25 elephants and bulls

Threats: 1. Expansion of settlement and encroachment.
2. Degradation of corridor forest.
3. Conversion of forestland into the agricultural land.

9.19.2 Corridor: Bamra Division to Kurmunda Range of Rourkela (T) Division.

This corridor connects forests of Bamra with forests of Kuarmunda Range.

Length: 20-25 K.M Width: 3-4 K.M.

Vegetation: Tropical deciduous sal forest.

Legal status: Major forest blocks include Bhainsamunda R.F., Rangamatia R.F., Kuradihi R.F., Dhanger R.F., Haldipani R.F., Khindapahar R.F., Churiapahar R.F., South Champajharan, North Champajharan R.F., Rutkupidi R.F., P.F., D.P.F. and revenue lands.

Major land use: Forest, Agriculture and settlement.

Human artifacts on corridors: Mines, industrialization and urbanization.

Frequency of use by elephant: Regular, used by small herds of 20-25 elephants with bull.

Threats: 1. Increasing human settlement because of mines and encroachment.
2. Continuous movement of heavy vehicles and removal of ores.
3. Degradation of corridor forests.
4. Expansion of agricultural activities.

9.19.3 Corridor: Bonai Division to Banki Range of Rourkela (T) Division.

This corridor connects forest of Bonai with Banki Range and Bisra Range of Rourkela Division.

Length: 10-20 K.M Width: 2-2.5 K.M.

Vegetation: Tropical deciduous sal forest.

Legal status: Major forest blocks include Brahmanipahar R.F., Mudrapahar R.F., Kalighat R.F., Kokerama R.F., Barpani R.F., Patipahar R.F., Kuradihi R.F., Dhanghar R.F. , South Champajharan, North Champajharan R.F.,P.F., D.P.F. and revenue lands.

Major land use: Forest, Agriculture and settlement.

Human artifacts on corridors: Mines and industries.

Frequency of use by elephant: Regular, used by small herds of 20-25 elephants with bull.

Threats:

1. Increasing human settlement because of stone quarries and encroachment.
2. Continuous movement of heavy vehicles.
3. Degradation of corridor forests.
4. Expansion of agricultural activities.

9.19.4 Corridor: Jharkhanda State to Banki Range and Bisra Range of Rourkela (T) Division

This corridor connects Jharkhand State with forests of Bisra and Banki Range.

Length: 30-40 K.M Width: 5-6 K.M.

Vegetation: Tropical deciduous sal forest.

Legal status: Major forst blocks include North Sukuda R.F., South Sukuda R.F., Silkuta R.F., Jharbeda R.F., Mahura R.F., Mahipani R.F., Loaram R.F., Kudahudang R.F., Ergeda R.F., Lathikata R.F., Hathibandha R.F., Sonaparbat R.F., North Chirobeda, South Chirobeda R.F.,P.F., D.P.F. and revenue lands.

Major land use: Forest, Agriculture and settlement.

Human artifacts on corridors: Mines and encroachment.

Frequency of use by elephant: Regular, used by small herds of 25-30 elephants with bull.

Threats: 1. Increasing human settlement because of stone quarries and encroachment.

2. Continuous movement of heavy vehicles.
3. Degradation of corridor forests.
4. Expansion of agricultural activities.

Conservation Plan

1. Declaration, demarcation and legal protection to corridors under various laws appropriate for the state.

2. Preparation of a detailed land use and environmental management plan for mining areas.

3. Improving forest cover in corridor forest

4. Eco-development activities in village in the foot hills to reduce dependency on corridor forest and to improve cover.

5. Prevent expansion of agricultural land near corridors.

9.20 WILDLIFE PROTECTION MEASURES

The immediate need is to collect and tabulate all available spatio-temporal information about incidence of wildlife crime including identity and modus operandi of the criminals. The second step is to analyze the information and prepare a strategy and action plan while third step is to take action against poachers. The staff deployed for anti-poaching operations shall be alert, in good health with high motivation. They should be trained in handling arms and ammunition and in identification of wildlife species and their parts. They should be armed and provided with VHF sets for communication. Satisfactory maintenance of fixed and mobile VHF sets is a pre-requisite for efficient operation. The staff involved in the entire operation shall be well conversant with the basics of litigation and court procedure with regard to wildlife crime.

Further, the patrolling party/anti-poaching squads must be well acquainted with the terrain. Patrolling paths should be planned in advance and such paths should not always follows tracks but should be doifferent based on specific information. As information collection is vital for prevention and detection of wild life crime, both covert and overt information shall be gathered. The officer who is handling the full time informers and information inflow should ensure proper follow up of the said information.

Lack of proper prosecution is leading to low rate of conviction in wildlife cases. The success of protection efforts can not be assessed on number and nature of wildlife offence cases booked but also on the effectiveness with which such offence cases are investigated and contested in courts of law. In most cases the offenders booked in wildlife offence cases are released on bail and/or acquitted and they commit crime again. Hence, appropriate training of staff in wildlife crime investigation methods and techniques is urgently required. It is vital that proper evidence is recorded at every stage of investigation and case records are build up meticulously. Moreover, the prosecution report shall be thoroughly scrutinized by the ACF/DFO before being filed in the court. The cases shall be pursued regularly in the court so as to ensure greater rate of conviction. These measures will have lasting effect on the forest and wildlife protection in the Division. Anti-poaching camp should be set up in vulnerable pockets where there is greater concentration of wildlives. During the fire season, these forest blocks should be given priority in protection from fire. There shall be inventory of all the gun license holders within 10 Km radius of Forrest blocks rich in wildlives. This inventory should be regularly posted up to date.

9.21 MISCELLANEOUS REGULATIONS

9.21.1 Control of Grazing: The wildlife rich areas shall be closed for grazing. However, grazing may be controlled as per the provisions of the Orissa Forest (Grazing of Cattle) Rules, 1980. The local people and the VSS may be motivated to immunize their cattle, which graze inside the forests.

9.21.2 Fire protection measures: Fire line should be cleared and maintained regularly. As most of the forest fires are man-made, it can be prevented to a large extent by motivating and educating the local people. Adequate field staff should be stationed with infrastructure in fire prone areas to control and suppress the fire menace during summer season.

9.21.3 Incentives and Rewards: There shall be provision for rewards and incentives to the staff and public including the informers whose efforts lead to detection of wildlife crime and arrest of the offenders. Moreover, they shall be given publicity in the locality as well as recognition on the occasions like Wildlife Weak and World Forestry Day.

9.21.4 Rights and Concessions: Rights and concessions under this Working Circle shall be regulated in accordance with the provisions of the Orissa Forest Act; Wildlife (Protection) Act 1972 and further rules and policies of Government in force.

9.22 FINANCIAL FORECAST

The Wild Life (Overlapping) Working Circle requires improvement of corridors, maintenance of roads, VHF, arms and ammunitions, protection squad, provision for plantation of fruit bearing trees and control of poaching. For this purpose Rs. 85.00 lakhs are required during the plan period and about Rs.9.00 lakhs are needed every year.

Year	Items of work	Amount of expenditure
2014-15	Improvement of corridors and other wroks	Rs.18.00 lakhs
2015-16	-do-	Rs.06.00 lakhs
2016-17	-do-	Rs.06.00 lakhs
2017-18	-do-	Rs.07.00 lakhs
2018-19	-do-	Rs.07.00 lakhs
2019-20	-do-	Rs.07.00 lakhs
2020-21	-do-	Rs.08.00 lakhs
2021-22	-do-	Rs.08.00 lakhs
2022-23	-do-	Rs.09.00 lakhs
2023-24	-do-	Rs.09.00 lakhs
	Total	**Rs.85.00 lakhs**

A regular database shall be maintained at Divisional level comprising of details like;

- Schedule species found in the area,
- Pictorial directory of all identified poachers to be prepared and circulated in the locality,
- List of traders in cattle and goatskins as well as tanneries,

- List of eating houses alleged to be serving bird/deer meat and,
- Timely and proper documentation of all the incidences of man-animal conflicts including poaching.

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. Depredation by wild animals is gradually increasing and the main reason for this conflict is shrinkage of their habitat and shortage of food. There are several reports of killings and injury of the human beings and damage to the crops in the division. The DFO should develop short-term and long-term measures to combat this problem. To mitigate miseries of people due to wild animals, the compassionate amount for crop damage, house damage, injuries and death, should be disbursed as quickly as possible. Delay makes people lose faith in the forest department and they tend to take revengeful self-protection measures even by resorting to killing and poisoning of wild animals.

9.23 Wild life depredation and measures taken to tackle it during the last few years in Rourkela Division:

During the last five years the damage due to elephant in different Ranges has been increased significantly. The Elephants from the neighboring states are migrating to the Division and causing a great loss to human life and property. Besides this there are 29 no. of elephants in two groups of 12 and 17 are permanently residing in the Division. The damage due to elephants in the Division since 2003 is given in following table.

Category of Damage	Year	Nos. of affected villages	No. of persons affected	Area damaged in Ac.
Crop Damage	2003-04			
	2004-05	15	67	58.97
	2005-06	12	69	135.7
	2006-07	8	121	217.31
	2007-08	23	314	691.70
	2008-09	15	107	238.12
	2009-10	29	316	889.34
	2010-11	95	575	118.99
	2011-12	78	768	928.626
	2012-13	108	983	798.95
	2013-14	158	172	383.11
	2014-15 up to July 2014	53	145	35.06

Year	Human death	House damage		Injury	
		Temporary	Permanent	Partial	Complete
2003-04	--	-	-	-	-
2004-05	3	-	-	-	-
2005-06	1	-	-	1	-
2006-07	6	-	-	-	1
2007-08	3	-	37	-	-
2008-09	4	-	6	-	-
2009-10	4	-	-	-	-
2010-11	4	-	80	-	2
2011-12	2	-	33	-	-
2012-13	4	-	56	-	-
2013-14	6	-	156	1	-
2014-15 up to July 2014	2	-	139	1	-

To mitigate the human and elephant conflict each Range has been provided with 10 person squads and elephant trackers, who are engaged day and night to drive away the elephants from the human habitation. Hired vehicles are engaged in Ranges. Besides this Search light,siren, crackers are being provided to the affected village. Solar fencing is being done around the Rourkela City along the bank of river Brahmani to prevent the elephant enter in to the town area. Compassionate grant to the victims are being provided promptly to avoid any conflict. Regional Wildlife Management Plan has been prepared for the Division to deal with the specific issues of wild life. The detail of the provisions and financial outlay of wild life management plan is given in Annexure-42 A(Page-176 to 179, Vol-II).

9.24 INTERMEDIATE REVISION

No intermediate revision is anticipated. However, if so required, the Conservator of Forests (territorial) in consultation with the Conservator of Forests (Working Plans) will send a proposal for amendment of prescriptions to the competent authority for necessary approval.

PART-II

CHAPTER-X

ECO-RESTORATION (OVERLAPPING) WORKING CIRCLE

This Working Circle includes Wildlife (Overlapping) Working Circle and Recreation Working Circle of the out going plan. Eco-restoration will be taken up throughout the Division under different schemes and local inhabitants will be provided regular employment opportunities. Eco-tourism is responsible travel to natural areas that conserves environment and sustains the well being of local people. Tourism involves traveling to relatively undisturbed areas with the specified object of studying, admiring and enjoying the scenery and wild plants and animals as we1ll as existing cultural heritage (both of past and present) found in the area. Eco-tourism promises benefits for conservation and development. It can generate economic benefit at local and national level and provide incentives for action to conserve the resources on which it is dependent. It is also a tool to gain public support for conservation and encourage private sector conservation efforts at a time when traditional conservation through enforced protection of natural areas is being questioned for its effectiveness.

Strategies such as eco-tourism offer considerable potential for integrating conservation with development. Interpretation and nature education is a big tool for eliciting public support for conservation. It is also an educational activity, which aims to reveal meanings and relationship through use of original objects by experience and illustrative media rather than by communicating factual information.

10.1 OBJECTIVES

Rourkela Division has considerable potential to provide positive contribution to conservation and development at many levels through eco-tourism which can generate revenue also and that can be reinvested for conservation and for providing income generating opportunity to remote and marginal communities. The objectives of Eco-Restoration Circle are as follows:

(1) To help the local inhabitants develop awareness, understanding and appreciation of the area.
(2) To provide adequate employment opportunities to people especially the weaker section so that they can get round the year employment.
(3) To evoke positive response towards conservation of natural, historical and cultural sites.
(4) To restore the forest to normalcy by various plantation schemes.
(5) To build up public support for the biodiversity of area.

10.2 STRATEGIES

Constitution of Eco-Development Committees in forest areas of Bisra, Kuarmunda and Panposh Ranges may be taken up to make above mentioned concepts self-sustaining. Nature guides and

interpreters may be recruited in close consultation with committees and they must be educated and made conversant with the flora, fauna and other natural, historical and cultural heritage of the area. Visitors' book may be maintained in all eco-tourism sites for self education and future vision. Special staff may be deployed to deal with the tourists. Concept of Eco-hotel, eco-sporting and eco-adventures may be encouraged among local people and private sector enterprises.

10.3 SELF-GUIDED TRAILS

It is a device of natural history interpretation, which places the visitors in direct contact with forest resources. S.G.T. is a means by which visitors attention is drawn towards interesting features that might otherwise be overlooked or not fully appreciated. All caves can be developed as S.G.T. Audio devices with jungle calls etc.

10.4 IDENTIFICATION OF THE ZONE

Eco-tourism committees will be provided with necessary equipments and utensils to cater to the needs of the visitors and to regulate them. Pilgrim accommodation facilities shall be developed and maintained wherever it is existing. Welcome gates with guide map and natures' trail, trekking and S.G.T. along with wayside signage shall be developed along with trekking routes at wildlife sighting points. A Visitors complex is required to be constructed preferably near Laing. However, for preparation of ecotourism master plan a professional landscape architect may be consulted.

10.5 LOCAL AREA DEVELOPMENT

Eco-restoration can be taken up with the help of peoples support. The eco-tourism infrastructure should be self-reliant. The plan should create a database on employment generation activities and programme. Use of the resources should be monitored and pressure on habitat and infrastructure should be evaluated. The result of evaluation should be used for improving strategies. Following measures are recommended.

(1) Incorporate policies that encourage the reinvestment of revenues and profits back into conservation and community development.

(2) Regulate access to sensitive areas in meaningful ways supported by appropriate fee structures to fully realize the potential for generating revenue.

(3) Have policies, plans and regulations for development and management that are enforceable and lead to the establishment of standards and codes of conduct for self-regulation by industry and the consumers.

(4) Actively involve local communities and key stakeholders from planning stage and encourage partnerships across sectors, organizations and individuals.

(5) Rely on low impact design and technologies for reducing resource use, managing waste and promoting energy and water conservation.

(6) Include and support ecologically sustainable green business practices that add value to tourism products and services.

(7) Ensure available marketing leading to realistic expectations.

(8) Incorporate and implement monitoring and audit mechanisms that assess progress and impacts.

(9) Focus on interpretation of natural and cultural resources to enrich visitors' experience.

(10) Be sensitive to local culture and traditions and involve other cultures in non-invasive ways.

(11) Be supported by research in environmental and also social, cultural and economic impacts of tourism.

(12) Lead to the strengthening and development of institutions that facilitate linkages between various stakeholders, particularly among conservation, community and tourism industry.

(13) Give adequate importance to domestic visitors as they are more affected by sustainability issues and are likely to make greater contributions to conservation in the end.

10.6 DEVELOPMENT OF ECO-TOURISM

The following sites are included in this circle and it is proposed to preserve and improve the sites for bringing awareness among masses. The improvement measures shall give boost to eco-tourism and environmental education.

10.7 CAVES

Many areas including the pre-historic caves can be developed into eco-tourism sites where tourists can see and appreciate nature. It is proposed to develop and preserve all such sites for purpose of tourism and education.

10.8 TEMPLES

10.8.1 VEDAVYAS

Situated in the tri-junction point of river Sankh, Koel and Saraswati, a religious conjugal holy place where many temples are located. These are temples of

Shree Chandrashekhar Temple
Shree Raghunath Temple
Shree Durga Temple
Shree Hanuman Temple
Shree Radha-Krushna Temple
Shree Jagannath Temple
Shree Balunkeshwar Temple
Shree Bishwanath Temple
Shree Saraswati Temple

River Brahmani originates from this trijunction point, a holy place situated at a distance of 9 Kms from Rourkela and 102 Kms from Sundargarh. A vedic educational institute is functioning to

educate the financially backward students of the State along with mythological base of "Veda" in Sanskrit medium.

10.8.2 GHOGHAR

A place of pilgrimage on the bank of Mandria Nala 7 Kms away from Rajgangpur and 2 Kms from Kansbahal, where "Lord Shiva" is worshipped, a place of aesthetic importance and picnic spot.

10.8.3 HANUMAN VATIKA

It is situated in the Civil Town ship Rourkela. The Statue of Hanuman is the tallest in Asia, about 75' height. It is a place of pilgrimage to worship Hanuman, surrounded by 13 other statues for worship viz.

1.	Bata Mangala	8.	Maa Laxmi
2.	Shree Vinayak	9.	Maa Bimala
3.	Dwadash Shivling	10.	Maa Kali
4.	Radha-Krishna	11.	Vaishnav Devi
5.	Maa Santoshi	12.	Nava Graha
6.	Bruhat Shivling	13.	Shree Shree Jagannath
7.	Ram Darvar		

10.9 DAMS

10.9.1 MANDIRA DAM

This reservoir is situated at a distance of 13 Kms from Rajgangpur and 33 Kms from Rourkela, surrounded by Mandira RF, Jharbeda RF, Jhurmur RF, Jhandapahad RF, Datni RF and Laing RF, a permanent source of water for RSP embanked on river Sankha. Religious people are worshiping beautiful temple of "Lord Shiva" as they approach to the dam. A good picnic spot and fishing point.

10.9.2 PITAMAHUL DAM

A medium irrigation project situated at a distance of 18 Kms from Rourkela and 110 Kms from Sundargarh surrounded by hills of Haldipani RF (Sagjore Compartment) and Balanda DPF. It is a place of aesthetic view and spot of picnic.

10.10 ECO-DEVELOPMENT MEASURES

The awareness for wildlife preservation may be created through celebration of wildlife week, competitions and debate among the school/college students. The publicity material shall be distributed and the benefits of wildlife conservation explained through electronic media. The legal provisions under the Wildlife (Protection) Act 1972 shall be brought to the notice of people including the scope and extent of compassionate amount for wildlife depredation. To ensure better protection and to enhance their effectiveness, field staff shall be provided with modern equipments including arms and ammunition. For fast and better communication divisional headquarter, range headquarters, section headquarters, beats and

check gates shall be provided with VHF sets. More and more field staff shall be trained in wildlife management and in detection and investigation of wildlife crimes.

Formation of new institutions like V.S.S. /E.D.C. will be taken up with the help of successful J.F.M. villages. Listing of problems and aspirations of these villages may be done and ranking of the priorities should be done for different development activities. To ensure active and willing participation of all stake holders' financial accountability should be given to the local bodies after their due empowerment as applicable by law. Pasture and grazing lands (gochar) must be demarcated along with the practice of controlling the stray cattle and other animals for their stall feeding. Veterinary Department shall be consulted for improvement of the breed of cattle and other animals. Trust building exercises through entry point activities is the stepping-stone. Pisci culture along with Leaf plate processing unit may be taken up to curb devastation of forest by the marginal people around. Self Helf Groups (S.H.G.) may be formed with village based N.G.Os to uphold the traditional profession of different stakeholders and to give a face-lift to the economy of rural women. In addition to above cottage industries, cooperative and trade, energy, transport, water, education, medical care etc. are to be included in the micro plans for holistic village level development.

One of the reasons for failure of programmes in rural sector is the lack of monitoring and evaluation programme. The M & E Programme will not serve its purpose unless each activity of this programme is backed up by follow up action and people themselves take charge of the programme. Feed back questionnaires for the individual and institutions must be reviewed in view of ensuring success of the programmes. Monitoring committees should be headed by A.C.F and consist of R.Os, Dy. FR, Foresters and F.Gs. alongwith 5 members from villages. The eco-development measures will be taken up along with development of villages. The expenses will be met from the budget provisions made in this plan and funds will be procured from district administration and other national and international funding agencies. The peripheral area will be developed with following measures.

1. Employment generation: The rural poor and tribal people will be provided employment opportunities by various means. Every year about ten thousand people in the fringe area will be provided employment measures, which do not disturb the wild life habitat. The provision of apiculture, sericulture, goatry and poultry will help change the mentality of people and they will leave the habit of timber smuggling.

2. Alternate cash crops help in checking man-elephant conflict around sanctuary. The local villagers will be provided opportunity for taking up alternate cash crops. It will change their habit of traditional farming and will stop elephants from invading agriculture fields.

3. The provision of high yielding variety seeds and improved breed of livestock will improve their income and they will switch over from timber smuggling to development works, which are beneficial for the local people.

4. Construction of new roads, culverts and maintenance of forest roads will provide them opportunity to work and gain employment.

5. Creation and maintenance of fire lines will provide employment to local people. Wages for fire watchers/ fire fighting squads will gain employment for the local people.

6. Creation of new and maintenance of existing water points, wallowing grounds including cross dams on the nalas.

7. Provision for artificial supply of drinking water during summer, viz. tube well, PVC pipes for transportation of water, pump sets, digging of percolation trenches.

8. Development and maintenance of meadows with grass seeds.

9. Planting of fodder species to cater to needs of local people.

10. Improvement of riparian zone in Rajgangpur Range.

11. Improvement of the vegetative cover on the fringes of reservoir near all dams.

12. Habitat corridor linking by improvement of vegetation cover.

13. Creation of nursery, mainly using indigenous, fruit and fodder spp., viz Bamboo, zizyphus, Ficus, Bel, Kendu, mango, jackfruit, Jamun and plantations inside forest block.

14. RDF works in khesra forest and revenue lands. Vana Samrakhyana Samitis have been formed to develop areas with the help of local people.

15. Water shed approach, gully plugging on the catchments.

16. Check dams on Nallas coming out from forest areas.

17. Contour trenches, staggered trenches at steep slopes.

18. Peripheral bunding on the slopes.

19. Maintenance of soil conservation structures.

20. Treatment of catchments with forestry, horticulture and agricultural species.

21. Construction and maintenance of inverted bunds.

22. Development of medicinal garden at Mandira dam.

23. Construction of interpretation center containing hides, skins, bones, Audio visual implements along with digital screen literature on different species with theme halls and visitor center at Rourkela and Bisra.

24. Agro forestry, silvipasture, fuel wood planting, horticultural crops and alternate cropping with species of high yielding varieties.

25. Water harvesting structure construction.

26. RDF/Village wood lot in community forest.

27. Stall feeding, introduction of high yielding milch cattle and marketing of the products.

28. Roads, education, drinking water facilities and solar and gas chulhas in peripheral areas.

29. Income generating scheme, handicrafts, mushroom cultivation, basket making, etc.

30. Engagement of guides (local people after training.) Construction and maintenance of field museum.

31. Schooling for the local people.

32. Mobile van for eco development, distribution of commodities and rescue etc.

33. Regeneration of degraded forest along with gap plantation with fruit and fodder tree species @40,560/- per hactare.

34. There is scarcity of drinking water and it will be fulfilled with the help of district administration.

35. Provision of Anti-poaching enforcement camp in the forest areas with provision of fuel, protection watcher, security personnel, sabuja bahini and armed police.

36. Immunization of cattle inside and outside proposed sanctuary is necessary to avoid infection and disease to the wild animals of the sanctuary and livestock of local villages. Hence immunization camps may be organized in the villages.

37. Forest Roads are required to be maintained as it is important in view of anti poaching. Improvement of 20 K.Ms of forest road may be taken up with causeway, hume pipe culvert and small bridges.

38. Provision of power supply including electricity and supply of solar power to the local villagers.

39. Fire incidence in the forest during summer is common. Creation of permanent fire lines over stretch of 10 kms is proposed.

40. Stall-feeding for village cattle will help solve the problem of grazing and browsing.

41. Stone idol making among young unemployed will be encouraged and they will be provided training for the same.

42. Firewood and timber depot will be opened to provide forest produce to the local people at reasonable prices. It will bring change in the traditional attitude of tribals and they will reduce their dependence on the forest areas.

10.11 BUDGET

For eco-restoration, eco-development and wildlife improvement various measures are suggested. The budget includes requirement of funds for wild life improvement and Eco-Restoration (Overlapping) Working Circle.

Sl. No.	Description	Amount (in lakhs)
(1)	(2)	(3)
1.	**PROTECTION** Replacement of pillars, maintenance, construction of new cement concrete pillars of size 4'x 4'x 5'. Maintenance of boundary, fencing and demarcation of R.F.	2.0
2.	Secret funds for collection of information regarding poaching and payment of rewards to individual informers, staff, VSS, institution and community.	1.0
1.	**F I R E** Creation and maintenance of fire lines in all forest blocks, especially in Chhatamb R.F.	1.0
2.	Creation and maintenance of fire observation-cum- protection towers at section headquarters.	1.0
3.	Purchase and maintenance of fire fighting equipments, vehicle, fire swatters and fire extinguishers.	1.0
1.	**RESOURCE HABITAT MANAGEMENT AND WATER MANAGEMENT**. Creation of new and maintenance of existing water points, wallowing grounds including cross dams on the nalas to revive the population of bison which have become extinct from the Division.	1.0
2.	Provision for artificial supply of drinking water during pinch period, viz. tube well, PVC pipes for transportation of water, pump sets, digging of percolation trenches etc. in North and South Chirobeda R.F.	1.0
3.	Development and maintenance of meadows at different R.F. and purchase of grass seeds etc.	1.0
4.	Improvement of riparian zone in Rajgangpur Range and Kuarnmunda Ranges. The Mandira dam site and Brahmani River catchment shall be treated.	1.0
5.	Construction and maintenance of hides and machines (limited)	1.0
6.	Weed eradication, implements, labour cost etc. The forest blocks,e.g., North Chirobeda, South Chirobeda R.F., Chhatamb R.F., are highly infested with weeds. It includes the cost of weed cutting, burning, stump removal, ploughing and grass plantation.	2.0

7	Improvement of vegetative cover on fringe areas by taking up plantations by fruit and fodder species. For the elephants R.F. shall be planted with fruit bearing and fodder species.	2.0
8	Habitat corridor linking by improvement of vegetative cover. 2.00 x 6 places. W.H.S. will be constructed in Bhainsamunda R.F., Mudrapahar R.F. , North Chirobeda R.F., and North Sukuda R.F. Meadow creation and plantation of bamboo and fruit bearing trees will be taken up near North Chirobeda R.F., South Chirobeda R.F., North Sukuda R.F., South Sukuda R.F., Brahmanipahar R.F., Mudrapahar R.F., Bhainsamunda R.F., Rutkupedi R.F.,	12.0
9	Creation of nursery, mainly using indigenous , fruit and fodder spp., viz Bamboo zizyphus, Ficus, Bel, Kendu, mango, jackfruit, Jamu at bufferzone/ zone of influence.	2.0
10	Provision of salt licks. Salt licks will be created near North Chirobeda R.F., South Chirobeda R.F., North Sukuda R.F., South Sukuda R.F., Brahmanipahar R.F., Mudrapahar R.F., Bhainsamunda R.F., Rutkupedi R.F.,	1.0

1	**SOIL AND MOISTURE CONSERVATION MEASURES** Water shed approach and gully plugging on the catchment area near North Chirobeda R.F., South Chirobeda R.F.It is required near Mandira dam, Pitamahul dam.	4.0
	Check dams on Nallas in all the ranges.	
	Contour trenches, staggered trenches at steep slopes around reservoir and pheriphery of prooposed sanctuary.	
2.	Peripheral bunding on the slopes near Mandira dam.	1.0
3.	Contour bunding	1.0
4.	Maintenance of soil conservation structure	1.0
5.	Treatment of catchments with forestry, horticulture and agricultural species near all dam sites.	2.0
6.	Construction and maintenance of inverted bunds near dam sites and water harvesting structures	2.0

	Eco Tourism at Mandira	
1	Construction of a day visit camp at the reservoir for accommodation to the tourists.	15.0
2	Creation of a trekking path of about 3Km.	2.0
	Provision of revolving fund for the ETG involved in catering facility for the tourists.	6.0
3	Provision of two motor boats to the community.	12.0
4	Water supply system & solar lighting	5.0

	ECO DEVELOPMENT PLANNING/PERIPHERAL DEVELOPMENT ACITIVTY	
1	Agro forestry ((FERP) silvipasture, fuel wood planting, Horticultural corps and alternate cropping sps.of high yielding varieties. In the alternate crops pulses, vetgetable, papaya. etc. shall be planted.	2.00
2	Stall feeding, introduction of high yielding milch cattle, and marketing of the products.	2.00
3	Community center at Durgapur	1.00
4	Biogas, fuel-efficient chulhas and solar lights for local tribals	1.00
5	Health camps in forest areas	1.00
6	Income generating scheme, handicrafts, mushroom cultivation, basket making, poultry, ducker etc.	1.00
7	Regeneration of degraded forest along with gap plantation with fruit and fodder tree species @10,000/- per hac	2.0
8	Development of meadows	1.0
9	Immunisation of cattle inside and outside the sanctuary is necessary to avoid infection of disease to the wild animal of the sanctuary. Hence 5 Nos. of immunization camp may be organized in the villages.	1.0
10	Provision of power supply including electricity, supply of solar power and purchase of generator for Panposh.	2.00
11	Some people come forward suo moto to inform to the Forest Department regarding the smuggling of timbers, poaching of wildlife etc. To encourage them there should be provision of reward and secret funds.	0.50
12	Fire incidence in the forest during the summer is common. Creation of permanent fire line in and outside the sanctuary area over stretch of 10 kms is proposed. Intensive fire based protection approach requires Rs.1.0 lakh.	1.00
13	Stall feeding for village cattle shall be arranged at block headquaters and other places. The villagers will be persuaded to keep their domestic cattle, goats, sheep, cows and buffallows in their villages.	1.00

An amout of Rs. 97.5 lakhs is required during the plan period and Rs9.00 lakhs is required every year for this circle.

A regular database shall be maintained at Divisional level comprising of details like;

- Schedule species found in the area,
- Pictorial directory of all identified poachers to be prepared and circulated in the locality,
- List of traders in cattle and goatskins as well as tanneries,
- List of eating houses alleged to be serving bird/deer meat and,
- Timely and proper documentation of all the incidences of man-animal conflicts including poaching.

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. Depredation by wild animals is gradually increasing and the main reason for this conflict is shrinkage of their habitat and shortage of food. There are several reports of killings and injury of the human beings and damage to the crops in the division. The DFO should develop short-term and long-term measures to combat this problem. To mitigate miseries of people due to wild animals, the compassionate amount for crop damage, house damage, injuries and death, should be disbursed as quickly as possible. Delay makes people lose faith in the forest department and they tend to take revengeful self-protection measures even by resorting to killing and poisoning of wild animals.

10.12 MISCELLANEOUS REGULATIONS

10.12.1 Control of Grazing: The wildlife rich areas shall be closed for grazing. However, grazing may be controlled as per the provisions of the Orissa Forest (Grazing of Cattle) Rules, 1980. The local people and the VSS may be motivated to immunize their cattle, which graze inside the forests.

10.12.2 Fire protection measures: Fireline should be cleared and maintained regularly. As most of the forest fires are man-made, it can be prevented to a large extent by motivating and educating the local people. Adequate field staff should be stationed with infrastructure in fire prone areas to control and suppress the fire menace during summer season.

10.12.3 Incentives and Rewards: There shall be provision for rewards and incentives to the staff and public including the informers whose efforts lead to detection of wildlife crime and arrest of the offenders. Moreover, they shall be given publicity in the locality as well as recognition on the occasions like Wildlife Weak and World Forestry Day.

10.12.4 Rights and Concessions: Rights and concessions under this Working Circle shall be regulated in accordance with the provisions of the Orissa Forest Act; Wildlife (Protection) Act 1972 and further rules and policies of the Government in force.

10.13 INTERMEDIATE REVISION

No intermediate revision is anticipated. However, if so required, the Conservator of Forests (Territorial) in consultation with the Conservator of Forests (Working Plans) will send a proposal for amendment of prescriptions to the competent authority for necessary approval.

PART-II
CHAPTER-XI
ESTABLISHMENT AND LABOUR

11.1 ESTABLISHMENT AND LABOUR

This Division is having six numbers of Territorial Ranges, 20 numbers. of Sections and 61 numbers of Beats in addition to Divisional Mobile Squad headed by a Forest Ranger with 2 Foresters and Forest Guards to assist him. The present strength of ministerial staff is adequate except shortage of junior clerk cadre. The detailed information of sections, beats and range are given in Chapter 4 of Part I. Vacancy position of employees in the Division is given in Annexure 43(Page-180, Vol-II).

The jurisdiction of Rajgangpur Range starts from Rangamatia in the North on the boarder of Jharkhand State extends upto Mahabir RF in the South. In the East it touches Kuarmunda Range at Mandia Kudar village at SH-10 and extends upto Kureibaga in the West. Important Forest Blocks like Chhatam and Haldipani are in this Range. The jurisdiction of Kuarmunda Range begins at Jatiapahd in the North and extends upto Birda on the South touching boarder Bonai Forest Division. On the East, the Range extends from Brahmani bridge to San-nuagaon on the west. Important Forest Block like Rutkupedi and Bhaisamunda of this Range is rich in miscellaneous species. The Bisra range situated on the border of Saranda forest block of Jharkhand State starts from Jareikela in the north, and runs to Badramloi in the south and ends in the west near Bondomunda. This Range has good quality sal forest in Bagdega and S.Chirobeda RF. Panposh Range starts from Brahmani bridge on north and extend up to lathikata near border of Banki Range.River brahmani forms the north and western boundary of Panposh Range.Major RF are N.Chirobeda and S.Chirobeda. The Jharkhand border forms the North and western boundary of Biramitrapur Range .On east Bisra Range and on South Kuarmunda Range completes its boundary.

11.2 LABOUR SUPPLY

Unskilled labor is available in plenty for forestry operations, maintenance of boundary and plantations operations etc except the period of cultivation. Semi-skilled and masons are available locally for non-forestry purposes like construction of culverts, buildings etc. The wages have been revised during last few years. The wage rate changes from time to time and wages shall be paid at the current prevailing rate.

PART-II

CHAPTER-XII

MISCELLANEOUS REGULATIONS

Miscellaneous regulations deal with information about various activities of the Division. These are given below.

12.1 FOREST CHECK GATES

There are four no. of check gates in operation in Rourkela Division. Out of this two are under jurisdiction of this Working plan and one under Banki Range, Bonai WP. The list of functioning check gates are given below. Two these gates were duly notified. The other two gates need to be notified .

LIST OF CHECK GATES

Sl. No.	Name of check gate	Position	Date of notification
1	Birmitrapur(unified) Border of Jharkhand	On Baunarpat-Ranchi NH-23 road at Birmitrapour-32 kms from Vedavayas chowk	21.11.1958
2	Bisra	On Rourkela, Manoharpur road at Bisra	21.11.1958
3	Jodabandh	On NH-23	-
4	Jharbeda	On SH-10 near division boundary with Sundargarh	-

12.2 LIST OF BUILDINGS

Sl. No.	RANGE	NAME OF BUILDING	LOCATION	TYPE	YEAR	Khata No.	Plot No.	Area in Acre
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	**Rajgangpur**	Range Office	Rajgangpur	Pucca		443445	-	1.04
2		RO Qrs	-do-	-do-				
120		FG Qrs	Jharbeda	-do-	60-61	154	-	0.04
121		R.I-cum-FG Shed	Buchkupara	-do-	1955	110	-	0.05
122			Kahuchuan					
						363,364	-	
123		FRH	-do-	Pucca	1956	363,364,365,	-	0.57
						366		
124		R.I-cum-FG Shed	Sagjore	Kacha	1947	579	-	0.7
125		FG Qrs	Laing	-do-	56-57	1771	-	0.4
126		Gongajore						
127		Fr. Qrs	Malidihi	RCC	65-66	105/2, 216/1	-	1.3
128		FG Qrs	Ludhabasa	Kacha	56-57	473	-	0.2
129		Fr. Qrs	Sonakhan	Pucca	54-55	1267, 1268	-	0.38
130			Salngabahal					
131		Marking Shed	Jharbeda	-do-		2346	-	23.5x18.5
132		FG Shed	Sonakhan	Pucca				
133		Marking Shed	Bhalulata	Kacha				
134		Marking Shed	Raiboga	Kacha	70-71			

135		FG Shed	Jajpur	Kacha	42-43			
136		-do-	Raiboga	-do-				
138		FG Shed	Tudalaga	RCC	65-66			
139		Marking Shed	Bankhaman	Kacha	56-57			
140	**Rajgangpur**	FG Qrs	Malidihi	RCC	65-66	105/2, 216/1	-	1.3
141		Marking Shed	Rajgangpur	Kacha	56-57			
142		Depot Fr.Qrs.	-do-	-do-	53-54			
143		Fr. Qrs	-do-	-do-	53-54			
144		Depot FG Qrs	-do-	-do-	53-54			
145		WFP Godawn	-do-	Pucca				
146		WFP Distribution Centre	-do-	-do-				
147		R.O Qtrs	-do-	-do-	53-54			
148	**Kuarmunda**	ACF Quarters	Kuarmunda	N.tile, brick wall	1970	250	602	0.19
149		ACF Orderly Quarters	Kuarmunda	-do-	1970	250	605/1	0.01
150		ACF Clerk	Kuarmunda	N.tile, brick wall	1970	250	643/1	0.18
151	**Kuarmunda**	Ranger's Qtrs(Old).	Kuarmunda	-do-	1946	250	598	0.11
152		Orderly Qtrs.	Kuarmunda			250	605/1	0.01
153		Clerk Qtrs.	Kuarmunda			250	605/3	0.18
154		-do-uble Forester's Qtrs	Kuarmunda			250	650	0.12
155		R.O's Qtrs	Kuarmunda	-do-		250		0.09
156		Forester's Qtrs.	Birda			45	434	0.25
157		Rest Shed	Birda					
158		FG Shed	Garjan			24	536	0.1
159		Forest CG Qtrs						
160		Fr. FG Qtrts	Kulunga			59	202	0.58
161		FG Shed	Sunaparbat			43	278	0.35
162		FG Shed	Durgapur					
163		Fr. Qtrs	Biramitrapur					
164		FG Shed	Jalda					
165		FRH	Panposh & Malkhana					
166		FG Shed	Balanda					
167		Fr. & FG Shed	Kacharu					
168		FG Shed	Barkani					
169		FG Shed	Birkera					
170		FG Shed	Panposh					
171		FG Qtrs	Matkanijharan					
172		Fr.Qtrs	Dalakudar	RCC	1962			
173		M Shed	Dalakudar					
174		FG Qtrs	Kumbhjharia	-	-	-	-	-
175		FG Qtrs	Hatibari	RCC	-	-	-	-
176		FG Qtrs	Kokopauja					
177		Fr. Qtrs	Birda					
178		Depot Fr. Qtrs	Old Station Rd,RKL					
179		Depot Qtrs of Bonai	Rourkela					
180		FG Qtrs	Rutukpedi					
181		M Shed	Kuarmunda					

182		M Shed	Panposh					
183	**Bisra**	Fr. C/G Qtrs		Not available				
184		RO Qtrs-cum-Office	Bisra					
185	**Bisra**	Fr. Qtrs	Bisra					
186		FG Qtrs	Bisra					
187		Marking Shed	Bisra					
188		Mal Khana	Bisra					
189		Old Range Office	Bisra	Damaged			89	0.92
190		FG Qtrs	Birkera					
191		FG Qtrs	Pograbahal	Damaged			43	1.18
192		FG Qtrs	Kukuda	Damaged			44	1.12
193		Fr. Qtrs	Khairtoli				47	1.14
194		FG Qtrs Khuntgaon	Khairtoli					
195		FG Qtrs	Katepur	Damaged			2	0.12
196		FG Qtrs	Jareikela					
197		Fr. Qtrs	San-Ramloi				43	0.28
198		FG Qtrs	San-Ramloi	Damaged				
199		FG Qtrs	Kopsingha (Sukuda)				1	0.5, 0.16
200		Check Gate Shed	Bisra					

The list of forest Rest house and buildings is given in Annexure 44 and 45 (Page-181, Vol-II)

12.3 LIST OF FOREST ROADS OF ROURKELA DIVISION

The list of existing forest roads covered under this working plan are given below:

Sl. No.	DESCRIPTION OF ROAD	LENGTH (in Kms.)
1	Rajgangpur – Kahachuan	30 Kms.
2	Kahachuan - Bankhaman	15 Kms.
3	Bankhaman – Joda	2 Kms.
4	Malidihi – Budham	20 Kms.
5	Budham - Rengalbuda	10 Kms.
6	Rengalbuda – Kaludihi	6 Kms.
7	Kaludihi – Sagjora	2 Kms.
8	Budham – Bankhaman	9 Kms.
9	Matkamhjaran – Barsuan	16 Kms.
10	Bagdoga – Rutkuredi	22Kms.
	TOTAL	**132 km**

12.4 Nursery :

Rourkela Forest Division has 6 no. of permanent nurseries in the five Ranges covered under this Working plan. The detail list of nurseries and their capacity is given in Annexure46(Page-182, Vol-II). Among the two permanent nurseries at Sandalakudar and Laing , the former one is being modified to a hi-tech nursery with OFSDP fund and the later one is being developed as mega-nursery with CAMPA 2013-14 APO fund. Besides this each Range creates temporary nurseries at suitable locations based on the plantation site and availability of water.

12.5 Mining activity in the Division.

The Division has no working mine in the reserve forest areas. However some mining activities are going on in the revenue areas coming under jurisdiction of this Division. The list of working and non working mines in the Division is given in annexure 47(Page-182 & 183, Vol-II) and 48 (Page-184, Vol-II).

12.6 Preservation Plot

Preservation plots are miniature nature reserves for the conservation of natural flora and fauna. In Odisha a total 13 preservation plots exist in different Districts. In Sundargarh District only one preservation plot has been recorded in Koida area of Bonai Forest Division. Available past records show that there is no preservation plot laid in the Rourkela forest division. However, based on the field data collected, this plan proposes for establishment of a new preservation plot in the S. Chirobeda RF of Bisra Range. The selected site is rich in floral diversity with major species being Sal. Total area of the plot is 14ha. The area has a good regeneration of Sal, Bija and Asan. It is easily approachable through the Forest Road. So it can be monitored easily for any change in Bio diversity. The information collected will be send by the DFO to the State Silviculturist for further study and declaring it as a preservation plot.

1	N:- 22 11 27.7	E:- 85 01 31.6
2	N:- 22 11 23.2	E:- 85 01 31.9
3	N:- 22 11 21.3	E:- 85 01 34.6
4	N:- 22 11 18.1	E:- 85 01 35.5
5	N:- 22 11 15.3	E:- 85 01 34.2
6	N:- 22 11 11.1	E:- 85 01 30.8
7	N:- 22 11 16.7	E:- 85 01 25.0
8	N:- 22 11 18.5	E:- 85 01 23.4

9	N:- 22 11 21.6	E:- 85 01 23.8
10	N:- 22 11 27.1	E:- 85 01 22.8
11	N:- 22 11 29.5	E:- 85 01 23.7
12	N:- 22 11 31.0	E:- 85 01 26.5
13	N:- 22 11 30.2	E:- 85 01 31.3
14	N:- 22 11 29.0	E:- 85 01 32.0

PART-II

CHAPTER-XIII

F I N A N C I A L F O R E C A S T

13.1 ESTABLISHMENT

The cost of establishment of division in the year 2013-14 was approximately 216 lakhs per annum. It is estimated that the cost of establishment will increase at the rate of 10 percent per annum.

13.2 TREATMENT OF SELECTION WORKING CIRCLE

The total area under selection working circle is 9781.599 ha. The average annual area to be worked out is 978 ha. The cost norms to be followed in this working circle are given below.

(a)	Demarcation of the coupe = 0.1 MD @150.00 MD	= Rs. 15.00 (cost per ha.)
(b)	Marking of coupe = 0.2 MD	= Rs. 30.00
(c)	Felling, debarking, dragging and stacking 15 MD	= Rs. 2250.00
(d)	Firewood and T.L sleeper =0. 3 MD	= Rs. 45.00
(e)	Transportation = 0.3 MD	= Rs. 45.00
(f)	Clearing of the coupe = 10 MD	= Rs. 1500.00
(g)	Fire protection and grazing	= Rs. 150.00
	Total + 26 MD	= Rs. 4035.00
	The cost over the annual coupe area of 978 ha.	= Rs. 3946230.00
(h)	Laying of sample of plots for different RFs	= Rs. 5000.00
(i)	Boundary maintenance over 200 km @ 20 MD	= Rs. 6,00,,000.00

Total Annual Requirement under this working circle = Rs. 4551230.00

Therefore, the cost is about Rs. 45.5 lakhs with an annual escalation of 10 percent every year.

13.3 TREATMENT OF REHABILITATION WORKING CIRCLE

The total area under working circle is 38,856.96hactares and the average annual area to be worked out is 3885 ha. The total cost of treatment will be Rs. 67592/- per hectare spread over four years. The total annual requirement under this working circle will be about Rs. 6.5crores with subsequent rise of 10% every year. The individual cost norms are given below in the table. Cost norm for activities under Rehabilitation Working Circle with labour rate @ Rs.90 /- per day which has been up scaled to labour rate of 150/- per day

Work	Mandays	Amount	Material cost	Total cost
ADVANCE WORK				
1. Survey and demarcation	4	360	-	360
2. Weeding and climber cutting	10	900	-	900
3. Regeneration cleaning, multiple shoot cutting, coppicing and pruning.	15	1350	-	1350
4. Raising of nursery stock at the rate of 400 plants per ha including 10 % for current year casualty.	4	360	500	860
5. Pitting over gaps at the rate of 400 pits per ha of size 45 cm x 45 cm x 45 cm	10	900	-	900
6. Miscellaneous expenses	-	-	200	200
Total	43	3870	700	4570

CREATION

1. Maintenance of nursery from January to June	3	270	-	270
2. Carriage and planting over gaps	4	360	-	360
3. Soil working, weeding and twice manuring.	4	360	-	360
4. Cost of chemical fertilizer, NPK and urea at the rate of 50 gm each including application.	2	180	1000	1180
5. Cost of bio-fertilizer including application.	1	90	800	890
6. Maintenance of regenerated area by weeding and cleaning.	2	180	-	180
7. Fire tracing and inspection path	2	180	-	180
8.Miscellaneous expenses	-	-	2000	2000
Total	18	1620	3800	5420

SECOND YEAR

1.Cutting back of weeds growth and climbers	10	900	-	900
2. Singling of shoots of tree species.	15	1350	-	1350
3. Casualty replacement at the rate of 10% over gap planted area including pitting, carriage and cost of seedlings.	1	90	800	890
4. Tending of seedlings planted over gap through soil working, weeding and manuring.	4	360	-	360
5. Cost of chemical fertilizers at the rate of 50 gm of DAP per plant including application.	2	180	2000	2180
6. Fire tracing	4	360	-	360
7.Miscellaneous expenses	-	-	2000	2000
Total	36	3240	4800	8040

THIRD YEAR

1. Cutting back of weeds, climber and cleaning.	10	900	-	900
2. Tending of seedlings including weeding and pruning.	5	450	-	450
3. Fire tracing	4	360	-	360
4.Miscellaneous expenses	-	-	2000	2000
Total	19	1710	2000	3710

The estimate is for one hectare and the labour cost is Rs.90/- per day.

ABSTRACT	Man days	Amount	Material cost	Total cost
Advance work	43	3870	700	4570
Creation	18	1620	3800	5420
2nd year maintenance	36	3240	4800	8040
3rd year maintenance	19	1710	2000	3710
TOTAL	**116**	**10440**	**11300**	**21740**

Break up of expenditure for soil and moisture conservation measures

Work	Mandays	Amount
1. Digging up of trenches of size 0.5m x 0.5m x 2.0 m.	20	1800
2. Gully plugging with loose boulders/vegetative materials to check run off of water.	10	900
3. Miscellaneous expenses	-	2000
Total	30	4700

SECOND YEAR

1. Renovation of trenches.	10	900
2. Maintenance of structures erected during 1st year	4	360
3.Miscellaneous expenses	-	2000
Total	14	3260

THIRD YEAR

1. Renovation of trenches	10	900
2.Maintenance of structures	4	360
3. Miscellaneous expenses	-	2000
Total	14	3260

A B S T R A C T

1st Year	30	4700
2nd Year	14	3260
3rd Year	14	3260
Total	**58**	**11220**

Break up for Entry Point Activities

WORK	AMOUNT (in Rupees)
FIRST YEAR	
1. Training of staff and VSS members	400
2. Awareness through meeting, dialogue and audio visual programmes.	200
3. Fencing of plantation area with brush wood.	500
4. Promotional activities through supply of fuel efficient chulhas etc.	500
5. Miscellaneous expenses	200
SECOND YEAR	
1. Extension activities to sustain awareness	400
2. Monitoring and evaluation	200
3. Maintenance of fencing	200
4. Miscellaneous expenses including stationery and publicity materials etc.	200
THIRD YEAR	
1.Extension activities	200
2.Training, extension and promotional activities	3000
3.Micro Planning	500

4.Fencing	700
5.Monitoring and evaluation	400
Total	**7600**

A B S T R A C T

Work	Total (in Rupees)@90/per MD	Total in Rupees@ Rs 150/-
Advance Work	4570	7616.6
Creation	5420	9033.3
2nd Year	8040	13400.0
3rd Year	3710	6183.3
Soil and moisture conservation	11220	18700
E.P.A.	7600	12660
TOTAL	**Rs.40,560.00**	**67592.9**

13.4 TREATMENT OF PROTECTION WORKING CIRCLE

1. This Working circle covers the entire working plan area.
2. The treatment includes protection of forest, arms and ammunition, VHF, road maintenance, prosecution of offenders, vehicle and P.O.L., awards to informers and maintenance of protection squad at many places. The average total expenditure on these activities is expected to be Rs. 99 lakhs.
3. Thus, annual expenditure on Protection Working Circle is Rs. 9 lakhs every year with subsequent rise of 10 percent every year.

13.5 TREATMENT OF PLANTATION MANAGEMENT WORKING CIRCLE

The total area under plantation working circle is 6188.6396 ha. Thus, the average area to be worked will be about 619 hectares per annum. The cost norm for the management of old teak plantation will be followed for management of the all old plantation which is Rs.6740/- per ha. tis the total cost per annum for management of old plantation comes to 41.7 or 42 lakh with 10% rise every year.

Sl. No.	Item	Mandays	Total cost
1	Survey and mapping Rs.300.00 per ha.	2	300
2	Silvicultural Operation Rs.3000.00 per ha.	20	3000
3	SMC Rs.3000.00 per ha.	20	3000
4	Fire line maintenance Rs.1650.00 per Km.(10 Ha.)	1.1	165
5	Fire watcher Rs.22500.00 per 1 watcher (100 Ha.)	1.5	225
6	Incentive to VSS Rs.5000.00 per VSS (100 Ha.)	0.33	49.5
	Total	**44.93**	**6739.5**

13.6 TREATMENT OF BAMBOO (OVERLAPING) WORKING CIRCLE

The financial forecast with regard to bamboo working has been assessed in terms of silvicultural operation and gap plantations. The cost norms to be followed in the scheme are as follows:

(i) Silvicultural operation - 5 MD/ha. = 750.00/ha.

The activities like Serial numerical high stump rectification digging of half moon trench, congestion treatment, climber cutting and soil and moisture conservation will be taken up under silvicultural operation.

(ii) The total cost of gap plantation with bamboo is worked out at Rs. 56660.00 per hectare with subsequent annual rise of 5 percent every year.

The spacing for bamboo plantation is 5 mt. x 5 mt and plantation will be done with 400 rhizomes per ha. The year wise financial requirement for gap plantation is provided in the following table:

Sl. No.	Item of work	Year	Norm per ha for 400 rhizomes per ha.	Nor per ha. for 50 rhizomes per ha.
(1)	(2)	(3)	(4)	(5)
1	Nursery cost (Advance work)	0th Year	13330	2666/-
2	Advance work	0th Year	12500	2500/-
3	Plantation	1st Year	13330	2666/-
4	Maintenance- 2nd year	2nd Year	10000	2000/-
5	Maintenance- 3rd year	3rd Year	7500	1500/-
			56660	**11332**

It is proposed that 500 hectares of area will be planted with bamboo rhizomes at an expenditure of 56660 x 500 = Rs.283,30,000/- spread over four years. The requirement for silvicultural operation of bamboo will be assessed by the DFO every year.

13.7 TREATMENT OF N.T.F.P. (OVERLAPPING) WORKING CIRCLE

1. Covers the entire working plan area

2. The treatment includes preference of Non-timber forest produce species in planting operation, research on Non-timber forest produce items, publicity and marketing.

3. Thus annual expenditure on Non-timber forest produce (over lapping) working circle is kept at lump sum amount of Rs. 10 lakh per annum with subsequent annual rise of 10 percent every year.

13.8 TREATMENT OF VILLAGE FOREST WORKING CIRCLE

1. The total area of this circle is 125.46 hectares and about 12 hectares of area needs to be treated every year.

2. The maintenance of established trees, soil working, soil conservation measures and protection are some of the aspects for consideration.

3. The annual expenditure will be about ten man-days, i.e., Rs. 1500.00 per annum per hectare. Thus Rs. 18,000.00 is required per annum for treatment of village forests of Rourkela Division.

13.9 TREATMENT OF WILD LIFE (OVERLAPPING) WORKING CIRCLE

1. The total area under this working circle is entire Rourkela Division.

2. The treatment includes creation of salt licks, game tanks, protection, meadow creation, signages, protection squads, VHF, arms and ammunition, research and publicity etc. The total expenditure on these activities is expected to be Rs. 85 lakhs during the plan period.

3. The annual expenditure on Wild Life (Overlapping) Working Circle comes to Rs. 9 lakhs with subsequent rise of 10 percent every year.

13.10 TREATMENT OF ECO-RESTORATION (OVERLAPPING) WORKING CIRCLE

1. The total area under this working circle covers entire Rourkela Division.

2. The treatment includes plantations, meadow creation, employment generation, improvement of small industries, soil conservation, creation of game tanks, protection, research and publicity etc. The average total expenditure on these activities is expected to be Rs. 97.5 lakhs during the plan period.

3. The annual expenditure on Eco-Restoration (Overlapping) Working Circle comes to Rs. 9 lakhs with subsequent rise of 10 percent every year.

13.11 COLLECTION OF TIMBER, FIREWOOD AND IRREGUALR EXPLOITATION.

The expenditure on these collections is kept on lump at Rs. 5 lakhs with subsequent rise of 10 percent every year.

13.12 MAINTENANCE OF BOUNDARY

The total length of the boundary is 1225.958 km. The average length of the boundary to be maintained annually is 245.18km once in every 5 years. The average number of pillars will be 2451 at the rate of 10 pillars per km.

(i) Cost of clearance of boundary line = 245x 9 x 150 = Rs. 330750

(ii) Maintenance and posting of (90%) stone cairn pillars per annum
= 2451 x 5 x 150 = Rs. 1838250.00

(iii) Construction of 10 % massonary pillar at the rate of Rs. 1100 per pillar

= 245 x 1100 = Rs. 269500.00

Hence, the total cost per annum on boundary line maintenance and pillar posting is Rs. 2438500.00 with a subsequent rise of 10 percent every year.

13.13 MAINTENANCE OF FOREST ROADS

The division has a network of 132 km. of forest roads. The forest roads require frequent maintenance and about Rs. 10,000 per km are required per annum. Thus, the total expenditure on repair and maintenance of road is Rs. 1320,000 or say Rs. 13.2 lakhs per annum with a subsequent rise of 10 percent annually.

13.14 FOREST CONSOLIDATION

There are 6 Proposed Reserved Forest blocks having an area of 425.59 hectares. There are many objections raised by FSO, most of them relate to demarcation. For proper demarcation of these blocks an annual expenditure of Rs. One lakhs is required with a subsequent rise of 10 percent of every year.

13.15 REPAIRS AND MAINTENANCE

For the replacement of old vehicles, maintenance of VHF sets, purchase of new sets, expenditure on arms and ammunitions and other miscellaneous works and approximate amount of Rs. 5 lakhs is required annually with an escalation of 10 percent annually.

13.16 BUILDINGS

The condition of buildings is deplorable and many quarters require immediate renovation. The ACF quarter and forest rest house needs to be constructed at Sundergarh. There should be separate courtroom and a conference hall to carry out FDA and VSS meetings. Confinement rooms (hazat) are required in each range headquarter. For carrying out these works an annual expenditure of Rs. 16, 00,000 is required with an escalation of 10 percent every year.

13.17 LIBRARY, EQUIPMENTS, MAPS AND TOOLS

An amount of Rs. 5 laks is estimated on lump sum basis with an annual rise of 10 percent every year.

13.18 MISCELLANEOUS REGUALTIONS

An amount of Rs 3 lakh per annum is estimated with subsequent rise of 10 percent every year.

13.19 PROJECTED COST OF THE PLAN

ESTIMATED COST OF THE WORKING PLAN (Rs. IN LAKHS)

Budget Head	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	Total
Establishment	216	237	260	286	314	345	379	416	457	502	3412
Selection W.C	45	49	53	58	63	69	75	82	90	99	683
Rehabilitation W.C	650	715	786	864	950	1045	1149	1263	1389	1527	10338
Plantation W.C.	41	45	49	53	58	63	69	75	82	90	625
Bamboo W.C	70	70	70	70	80	80	80	80	88	88	776
N.T.F.P W.C	10	11	12	13	14	15	16	17	18	19	145
Wild life WC	9	10	10	10	11	11	11	12	12	13	109
Eco restoration W.C	9	10	10	10	11	11	11	12	12	13	109
Village Forest W.C	0.18	0.18	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	2.86
Timber Collection	5	5	6	6	6	6	7	7	7	8	63
Boundary Maintenance	24	26	28	30	33	36	39	43	47	51	357
Forest road	14	15	17	18	20	22	24	26	29	30	215
Forest consolidation	1	1	1	1	1	1	1	1	1	2	11
Infrastructure Dev.	5	5	6	6	6	6	7	7	7	8	63
Building	16	17	17	18	19	21	23	25	27	29	212
J.F.M.	1	1	1	1	1	1	1	1	1	2	11
Library and equipments	5	5	6	6	6	6	7	7	7	8	63
Miscellaneous	2	2	2	2	2	3	3	3	3	3	25
Total:-	**1123.18**	**1224.18**	**1334.2**	**1452.2**	**1595.3**	**1741.3**	**1902.3**	**2077.4**	**2277.4**	**2492.4**	**17219.86**

13.20 COST BENEFIT ANALYSIS

The tangible benefits from forests include timber, firewood, poles, bamboo, NTFP items and medicinal plants etc. The number of trees available for marking in selection coupe is limited to 2 trees of sal per ha and 2 trees of non-sal per ha. Thus the total timber obtained from selection working circle coupe annually is calculated as follows.

Total number of trees available for felling = 4 trees per ha.
The unit volume of each tree = 4 units
The number of units available = 16 units
Annual selection area available = 978.1 Ha
Total units available per year = 15649.6
Cost per unit = Rs. 1387
Value of timber available = Rs. 21705995.2 or 217 lakh

The total production of kendu leaves is 12712 quintals in the division. The average rate per quintal is Rs. 2500/-. The total value of kendu leaves in this division is 31780000 or 317 lakhs. The value of firewood is calculated as follows. It is generally known that for one cubic meter of timber there will be outturn of one tonne of fire wood. The annual production of timber is 742 cumt. So the out turn of fire wood will be 742 M.T. The value of one M.T. is about Rs. 1000/- and total value of firewood is 742000 or 7.4 lakhs. This includes timber, firewood and miscellaneous revenue. The revenue received on rents, miscellaneous and other receipts is 28 lakhs. Estimated total benefit per annum from the forest is depicted in the following table.

Estimation of total revenue

Sl. No.	Item	Value (in lakhs)
1	Timber	742
2	Kendu leaves	317
3	Firewood	7.4
4	Revenue	28
	Total	**1094.4**

The projected benefit by assuming 5 percent annual rise for next 10 years is calculated below:

ESTIMATED BENEFIT (IN LAKHS)

Year	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	Total
Amount	1094	1148	1205	1265	1328	1394	1463	1536	1612	1692	13737

The cost benefit ratio of plan is as follows:
Total cost of the plan : 17219lakhs
Total projected benefit : 13737 lakhs
Cost benefit ratio : 1.25

13.21 FOREST REVENUE

During last plan period the forests of this division have been seriously exposed to biotic interference causing depletion, degradation of the forest crop and causing serious threat to the present eco-system. Hence, in this revised plan no significant yield of timber is aimed at. All forestry operations including felling of timber, firewood and bamboo has been prescribed in this plan. Hence, some amount of revenue is expected from removal of wind fallen, uprooted, dead and silviculturally matured trees.

In case of bamboo forest, yield is expected to improve, with the provision of intensive bamboo silvicultural operation prescribed in the bamboo overlapping working circle. Revenue from N T F P items is expected to increase because of its use in commercial as well as domestic purposes during the present plan period. On the whole division is expected to generate a good amount of revenue of about 5.8 cores at the rate of 2001 from sale of different forest produce like timbers, firewood, bamboos and M.F.P items. Forest revenue collected in the Division for last 23 years is given in the table below:

Year	**Volume**	**Timber and FW amount**	**Bamboo**	**Amount**	**NTFP Items**
1979-80	Not available	-	Not worked	-	2,42,248.87
1980-81	-do-	39,13,965	-do-	-	1,57,373.25
1981-82	-do-	11,27,221	8,087,50	-	2,62,213.76
1982-83	-do-	30,63,240	12,752,50	-	53,562,27
1983-84	-do-	24,62,120	4,026,92	-	12,90,198.80
1984-85	-do-	20,87,269	3,976.83	-	5,08,649.85
1985-86	-do-	20,11,958	5,120,51	-	25,51,865.00
1986-87	-do-	24,54,100	8,857,84	-	6,97,654,99
1987-88	-do-	24,39,500	1,627,68	-	6,70,285.75
1988-89	-do-	19,99,700	1,627,69	5,21,236	45,855.00
1989-90	-do-	18,43,000	2,135,54	7,26,084	65,400.00
1990-91	406 cum	18,06,300	5,554,98	19,72,016	4,87,319.00
1991-92		-	-	-	-
1992-93					59,067.00
1993-94					93,283.00
1994-95					54,327.00
1995-96					59,997.00
1996-97					1,13,708.00
1997-98					3,65,407.00
1998-99					2,68,486.00
1999-00					2,98,,038.00
2000-01					4,84,498.00
2001-02					1,38,707.00
2002-03					
2003-04		8,57,731			

2004-05		27,76,228			
2005-06		19,10,019			
2006-07		18,61,120			
2007-08		19,70,893			
2008-09		17,7,179			
2009-10		5,80,461			
2010-11		6,84,961			
2011-12		6,62,344			
2012-13		19,33,578			
2013-14		12,53,270			

The average revenue from the above table is given below:

Timber & Fire wood Rs.22,91,670/- annually
Bamboos Rs.10,73,112/- annually
N T F P Rs. 4,16,005/- annually

Year	Establishment	Non-Plan	State plan	Central plan (Sponsored)	Central plan	Capital outlay on forestry	Others
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1979-80							
1980-81	14,15,014.80	17,41,435.04	-	-	-	-	-
1981-82	17,53,770.20	21,88,823.67	-	-	-	-	-
1982-83	24,75,328.77	28,22,465.27	-	-	-	-	-
1983-84	25,28,619.70	38,32,797.36	-	-	-	-	-
1984-85	24,63,991.91	28,68,509.70	-	-	-	-	-
1985-86	28,43,358.27	33,56,358.27	-	-	-	-	-
1986-87	30,16,811.70	38,05,051.68	-	-	-	3,02,264.60	-
1987-88	36,16,288,93	43,43,383,89	-	-	-	-	-
1988-89	37,73,081.68	03,02,264,60	2,76,896.61	31,263.00	25,429.85	3,2,264.60	-
1989-90	44,92,848.50	51,93,013.02	2,49,847.51	36,605.00	53,829.60	4,77,877.74	-
1990-91	46,43,461.26	54,32,571.04	2,41,869.07	31,134.00	35,000.00	4,62,496.00	-
1991-92	55,40,765.63	64,64,368.14	94,838.12	54,838.12	-	4,58,799.45	22,45,641.25
1992-93	73,49,302.00	90,11,050.32	98,311.16	71,319.28	-	3,19,599.78	5,53,920.22
1993-94	79,03,638.90	86,86,937.40	1,52,539.91	82,477.00	-	3,82,740.00	28,11,964.32
1994-95	80,75,145.44	02,,23,888.50	2,23,888.50	1,28,374.50	-	1,97,558.00	1,16,83,842.41
1995-96	86,41,329.09	04,34,331.60	4,34,331.60	3,34,267.91	-	13,04,968.00	88,44,633.04
1996-97	98,05,317,80	1.16,20,315.32	2,84,080.00	2,85,558.99	-	7,24,260,00	1,01,13,947.25
1997-98	1,03,96,058.00	1,20,96,979.42	2,60,777.12	66,202,00	-	34,486.00	19,57,989.10
1998-99	1,19,86,392.10	2,62,203.50	2,62,203.50	10,000.00	-	88,765.00	32,72,794.00
1999-00	1,55,78,558.70	03,05,550.60	3,05,550.60	44,000.00	-	33,750.00	22,57,944.00
2000-01	1,53,29,754.74	1,63,84,505.46	1,02,410.00	-	3,84,500.00	45,000.00	-
2001-02							
2002-03							
2003-04	45,96,755	31,94,014		8,000	1,09,565	10,80,441	7,71,576

Year	Establishment	Non-Plan	State plan	Central plan (Sponsored)	Central plan	Capital outlay on forestry	Others
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2004-05	1,05,39,000	32,10,378	9,08,000	7,57,005	-	-	3,93,000
2005-06	1,07,41,000	11,49,946	-	5,00,000	-	44,18,800	41,16,702
2006-07	1,06,43,000	10,50,000	27,56,415	-	-	44,23,550	45,70,138
2007-08	94,81,000	34,10,000	19,93,000	9,10,000	-	22,01,773	44,89,450
2008-09	2,28,19,562	36,74,969	14,88,070	3,86,000	-	18,18,301	44,51,989
2009-10	2,58,85,450	35,54,654	16,36,000	-	-	9,28,000	28,13,587
2010-11	2,98,52,941	26,93,000	45,56,000	2,32,000	-	13,84,000	38,65,592
2011-12	2,86,95,655	23,03,000	1,00,77,212	-	-	98,47,513	31,65,770
2012-13	2,97,43,785	49,63,360	2,26,42,765	2,70,625	-	1,39,56,285	37,31,679
2013-14	3,20,95,037	279,43,260	4,80,35,703	-	-	-	57,66,447

Keeping in view the past expenditure for 20 years and over all price increase on rate of 2001 expenditure on various proposed Forestry operation during the present plan period is expected to increase by 5 percent every year.

13.22 COST OF THE PLAN

This revision of plan was started from February 1999 upto July 2003. Cost of the plan is Rs.1,01.36,985/-. The total forest area covered by the plan is 54952.67 hactares of RF, PRF, and DPF. The expenditure under different heads is given in the table below:

Year	Establishment	W. P.	Total
(1)	(2)	(3)	(4)
1999-2000	19,91,394	2,19,791	22,11,185
2000-01	20,84,017	49,101	21,33,118
2001-02	18,46,703	48,968	18,95,671
2002-23	25,77,359	6,10,000	31,87,359
2003-04 (Up to 7/03)	6,69,421	40,231	7,09,652
TOTAL	**91,68,894**	**9,68,091**	**1,01,36,985**

The cost of plan has escalated due to lack of allotment during 2000-01, 2001-02 and lack of adequate staff. Allotment was received during 02-03 and topo sheets were purchased during 02-03.

PART-II
CHAPTER-XIV
SUMMARY OF THE PRESCRIPTIONS

PART – II CHAPTER	HEADING	PRESCRIPTIONS	PARA	PAGE
1. Basis of proposal	1.1 General Considerations	Forest plays a multidimensional role in sustaining all kinds of life forms and all life forms are dependent upon forest for their requirements.	**1.1**	**92**
	1.2 General Objectives of Management	1. To prevent degradation of environment by restricting felling of trees and giving emphasis on preservation of flora and fauna of forests. 2. To improve condition, composition and productivity of the existing forests by enriching the standing crop through scientific management. 3. To meet requirements of forest produce of local people living in and around forest area. 4. To rehabilitate the barren, degraded and depleted forest areas and mining degraded areas through artificial regeneration by adopting various soil conservation measures. 5. To generate employment to local people living in and around forest areas by involving them in various forestry operations including collection of various non-timber forest produce (NTFP).	**1.2**	**92**
	1.3 Method of treatment to be adopted **Total area**	1. Selection working Circle 2. Rehabilitation Working Circle. 3. Protection Working Circle. 4. Plantation Working Circle. 5. Bamboo (Overlapping) Working Circle. 6. NWFP (Overlapping) Working Circle. 7. Village Forest Working Circle. 8. Bio-aesthetic Working Circle. **54952.62 Hectares.**	**1.3**	**92-96**
	1.4 Allotment of area to different Working Circles	The Working Plan covers 109forest blocks consisting of 70 RFs, 6 PRFs and 33 DPFs.	**1.4**	**96**
	1.5 Blocks and compartments	Area is divided in to compartments	**1.5**	**96-97**
	1.6 Period of Working Plan and necessity for intermediate revision.	The Working Plan has been prepared for a period of 10 years	**1.6**	**97**
2.Selection Working Circle	2.1 General Constitution	Well-stocked forest blocks having density more than 0.5.	**2.1**	**98**

	2.2 Character of vegetation	1. To improve the density and composition of forest crop and to encourage natural regeneration and establishment of principal species. 2. To emphasize soil and water conservation. 3. To maintain and improve the bio-diversity of forest blocks. 4. Obtain sustained yield. 5. To carry out cleaning operations with climber cutting.	**2.2**	**98**
	2.3 Special objectives of management	1. To build up the growing stock and improve the stand structure and to encourage natural regeneration by taking suitable silvicultural operations with emphasis on soil and water conservation measures. 2. To remove the mature and silviculturally available trees. 3. To maintain and improve biodiversity of forest blocks.	**2.3**	**99**
	2.4 Area statement	Moist peninsular high level and low level Sal in top and lower hills of 2 RF are covered under this plan. Area- 9781.599 Ha.	**2.4**	**99**
	2.5 Analysis and valuation of crop	One percent strip enumeration completed.	**2.5**	**99**
	2.6 Silvicultural System	Selection-cum-Improvement felling and thinning.	**2.6**	**100**
	2.7 Choice of Species.	No preferred species, Fruit bearing species not to be felled.	**2.7**	**100-102**
	2.8 Exploitable Girth Class.	1. Bandhan > 120 Cm. 2. All other species > 150 Cm.	**2.8**	**103**
	2.9 Felling cycle	Smythies safeguard formula.	**2.9**	**103**
	2.10 Rotation	Sequence of felling 1. Demarcation of annual coupes. 2. Marking rules. 3. Execution of marking and felling.	**2.10**	**103**
	2.11 Calculation of yield.	The yield has been regulated by area with a percentage check as removal of selection trees arrived at be Smythie's safeguard formula.	**2.11**	**103-105**
	2.12 Felling Series	There are Two felling series covering the entire area of Working Circle.	**2.12**	**105-107**
	2.13 Sequence of felling	It is given in annexure	**2.13**	**108**

	2.14 Method of Execution of felling and demarcation	Demarcation of coupe will be done before felling. 2.14.1 Demarcation of annual coupes 2.14.2 Marking rules 2.14.3 Execution of felling	**2.14** **2.14.1** **2.14.2** **2.14.3**	**108-110**
	2.15 Subsidiary Silvicultural Operations	1. Post felling operations 2. Treatment plan and map 3. Annual action plan	**2.15**	**110-111**
	2.16 Control	Compartment histories, control forms and other records shall be maintained for each selection coupe, compartment and felling series in accordance with the provision of the working plan code.	**2.16**	**111**
	2.17 Miscellaneous Regulations	Looping is strictly prohibited. Efforts shall be taken to maintain coupe lines as fire lines every year.	**2.17**	**111**
	2.17.1 Grazing	Grazing shall be regulated.	**2.17.1**	**111**
	2.17.2 Fire protection	For taking suitable fire protection.	**2.17.2**	**111**
	2.17.3 Rights and Concessions	As per Forest Act 1972, Rights and concession shall be regulated.	**2.17.3**	**111**
	2.17.4 Sample plots		**2.17.4**	**111**
	2.18 Working Norm	9781.599 ha. areas are covered under Selection Working Circle.	**2.18**	**112**
	2.19 Intermediate revision	Intermediate revision is not expected during the plan period.	**2.19**	**112**
3 The Rehabilitation Working	3.1 General Constitution	Forest blocks having valuable crops in depleted condition in bushy form and at various stage of degradation.	**3.1**	**113**
	3.2 Character of Vegetation	1. To improve the density and composition of forest crop and to encourage natural regeneration and establishment of principal species. 2. To emphasize on soil and water conservation. 3. To maintain and improve the bio-diversity of forest blocks. 4. Obtain sustained yield. 5. To carry out cleaning operations with climber cutting.	**3.2**	**113-114**

	3.3 Special objectives of management	1. To enrich the micro-edaphic conditions. 2. Improve the existing growing stock 3. To regenerate the barren and blank patches 4. Soil and moisture conservation. 5. Encourage natural regeneration. 6. To boost up growth of Sal and other valuable species of coppice origin. 7. To provide adequate protection to the areas having root stock. 8. To meet the bonafide needs of local inhabitants.	**3.3**	**114**
	3.4 Area statement and rehabilitations series.	Area = 38,856.96 hectares	**3.4**	**114-117**
	3.5 Analysis and valuation of crop	Degraded forest will be improved through Rehabilitation.	**3.5**	**117-118**
	3.6 Silvicultural system	No silvicultural system.	**3.6**	**118**
	3.7 Choice of species	Suitable species shall be planted.	**3.7**	**118-121**
		12.7.1 Soil conservation measures	**3.7.2**	
		12.7.2 Choice of Species	**3.7.3**	
	3.8 Rehabilitation cycle	Ten year cycle.	**3.8**	**121**
	3.9 Calculation of yield	No yield is prescribed	**3.9**	**121**
	3.10 Sequence of rehabilitation operations	Rehabilitation series divided intyo ten years have been constituted	**3.10**	**121**
	3.11 Method of execution of rehabilitation operations	3.11.1 Demarcation of Annual Rehabilitation Area	**3.11**	**121-122**
	3.12 Preparation of Treatment map	Annual rehabilitation area shall be shown on treatment map.	**3.12**	**122-123**
	3.13 Treatment Plan	Each rehabilitation coupe shall be treated for four years.	**3.13**	**123**
	3.14 Execution of Rehabilitation Method	Rehabilitation measures will be done in annual coupes.	**3.14**	**123-125**
	3.15 Rehabilitation Operations	Fencing shall be taken up.	**3.15**	**125-126**
	3.16 Rehabilitation in different series	Plantation will be taken up according to Rehabilitation series.	**3.16**	**126**
	3.17 Control	Journals and records will be maintained	**3.17**	**126**
	3.18 Miscellaneous Regulations	Grazing and fire will be controlled.	**3.18**	**127**
	3.19 Rights and concessions	As per Govt. Rules.	**3.19**	**127**
	3.20 Working norm	Rehabilitation measures will be taken up @ Rs.40,560/- per hectare.	**3.20**	**127-130**
	3.21 Intermediate Revision	It may be reviewed after 5 years.	**3.21**	**130**

4 The Plantation management Working Circle	4.1 General Constitution	This Working Circle includes areas having blank/stretches of forest blocks allotted under Rehabilitation Working Circle in the outgoing plan.	**4.1**	**131**
	4.2 General Observation and vegetation	Distributed through out the Division. Plantations already exist in field, but the condition of the plant and their growth is not remarkable	**4.2**	**131**
	4.3 Special objectives of management	1. To reforest all barren areas and restock the degraded areas. 2. To maintain and tend the existing plantations. 3. To enhance the land productivity through soil and moisture conservation measures. 4. To increase the biodiversity. 5. To prevent soil erosion and conserve soil-moisture.	**4.3**	**131-132**
	4.4 Analysis and valuation of crop	The planted stock is not up to mark. No exploitation has been done.	**4.4**	**132**
	4.5 Area allotment and planting series.	Range wise distribution of different RF and PRF blocks allotted to this working circle.	**4.5**	**132-133**
	4.6 Silvicultural System	Gap planting, tending operation	**4.6**	**133**
	4.7 Calculation of Yield	The yield shall be regulated according to area and exploitable class of trees.	**4.7**	**133**
	4.8 Table of Operation	The site-specific table of operation in tabular form will be prepared by DFO.	**4.8**	**133-136**
	4.9 Subsidiary Silvicultural operation	The young plantations need regular attention otherwise; they are left uncared till first thinning.	**4.9**	**137**
	4.10 Treatment of Existing Plantation	Cleaning, Pruning etc.	**4.10**	**137-138**
	4.11 Miscellaneous Regulation	4.11.1 Grazing Annual rehabilitation areas and new plantation shall be closed to grazing for a minimum period of 5 years.	**4.11.1**	**138**
		4.11.2 Fire Protection The entire rehabilitation area should be rigidly protected from fire hazard.	**4.11.2**	**138**
	4.12 Rights and Concession	Rights and concessions shall be regulated as per the existing provisions of the relevant Gazette notifications.	**4.12**	**138**
	4.13 Intermediate Revision	May be revised after inspection by the reviewing authority.	**4.13**	
5 The Protection (overlapping)Working Circle.	5.1The Protection (overlapping)Working Circle.	Covers the entire working plan area	**5.1**	**139**

	5.2 General Observation	Ecologically fragile areas of high hills around reservoirs susceptible to environmental degradation. The forest blocks under pernicious practice of shifting cultivation in the past with little or no vegetation.	**5.2**	**139-140**
	5.3 Special Objectives of management	1. To keep delicate and eco-sensitive areas ecologically intact by maintaining adequate vegetative cover especially in the catchment areas. 2. To rehabilitate the forest area.	**5.3**	**140**
	5.4 Area Statement and treatment series	Entire working plan area	**5.4**	**140**
	5.5 Analysis and valuation of crop	The blocks included in this circle have either degraded forest or high forest which needs intensive protection measures	**5.5**	**140**
	5.6 Silvicultural Systems	Cleaning, thinning and pruning is prescribed. No felling will be done.	**5.6**	**140-141**
	5.7 Protection cycle and unit	Two protection units.The cycle is fixed at 5 years, so that the earmarked areas will be treated twice during the plan period	**5.7**	**141-143**
	5.8 Calculation of yield	No yield is prescribed.	**5.8**	**143**
	5.9 Methodology	DFO to prepare annual plan of operation	**5.9**	**143**
	5.10 Protection Operation	1. Regular monitoring will be done by staff. 2. Grazing and browsing shall be stopped.	**5.10**	**143-144**
	5.11 Control	The journals and other records will be maintained for each protection coupe in accordance with Orissa Forest Plantation Manual 1972.	**5.11**	**144**
	5.12 Miscellaneous regulation	Full protection will be provided from fire and grazing	**5.12**	**144**
	5.12.1 Grazing	Annual rehabilitation areas and new plantation shall be closed to grazing for a minimum period of 5 years.	**5.12.1**	**144**
	5.12.2 Fire Protection	The entire rehabilitation area should be rigidly protected from fire hazard.	**5.12.2**	**144**
	5.13 Right and Concession	Rights and concessions shall be regulated as per the existing provisions of the relevant Gazette notifications.	**5.13**	**145**
	5.14 Financial Forecast	The working circle covers entire working plan area. The total annual requirement under this Circle will be Rs.99 lakhs per year with subsequent rise of 10 percent every year.	**5.14**	**145**
	5.15 Recent activities	Recently forest protection squads deployed. Barrak, malkhana etc constructed	**5.15**	**145**
	5.16 Intermediate revision	No major changes in the prescription of the Working Circle.	**5.16**	**145**
6. The Bamboo (Overlapping) Working Circle.	6.1 General Constitution	Forest blocks having good bamboo potential.	**6.1**	**146**
	6.2 Character of Vegetation	Two species of bamboo are found in the forest of this division.	**6.2**	**146**

	6.3 Objectives of Management.	1. Systematic management for sustained yield. 2. Meet the demand of local people and artisans. 3. Meet the demand of paper mills. 4. Generation of employment. 5. To revise and rehabilitate the exhausted bamboo bearing areas.	**6.3**	**146-147**
	6.4 Working of Bamboo	Healthy and well-stocked bamboo clumps shall be worked	**6.4**	**147-150**
	6.5 Morphological charcters of culms	Correct determination of age of each culm is essential for framing cutting rules.	**6.5**	**150-151**
	6.6 Subsidiary Silvicultural Operations	6.15.1 Simultaneous silvicultural operations 6.15.2 Improvement of bamboo forest 6.15.3 Treatment of gregariously flowered areas	**6.6**	**151-153**
	6.7 Control	Necessary entries with regard to works taken up in bamboo coupes.	**6.7**	**153**
	6.8 Miscellaneous regulations	Stone packing shall be done in down hillside of clump to conserve water.	**6.8**	**153**
	6.9 Intermediate revision.	May be taken up after inspection.	**6.9**	**153**
7. Non-Timber Forest Produce (Overlapping) Working Circle.	7.1 General constitution.	All forest blocks except the blocks allotted to the Protection Working Circle	**7.1**	**154**
	7.2 General observation and vegetation	1. Collection as per Government policy 2. Productivity of various N.T.F.P 3. Protect and promote regeneration. 4. Development of N.T.F.P. based industries. 5. Involving people for employment and income.	**7.2**	**154-155**
	7.3 Special objectives of Management.	Sustainable collection, extraction and utilization of N.T.F.P. in consistence with Govt. Policy. Different parts are utilized from plants	**7.3**	**155**
	7.4 Utility of N.T.F.P. items	1. Consumable medicinal and commercial. 2. Consumable by rural inhabitants.	**7.4**	**155**
	7.5 Area Allotment	The overlapping working circle is 134239.87 ha.	**7.5**	**155**
	7.6 Collection	Most of the NTFP items available in this division have one-year collection cycle.	**7.6**	**156**
	7.7 Working of Important NTFPs and some prescription for important	7.7.1 Kendu leaf 7.7.2 Mohua flowers and seed 7.7.3 Sal seed 7.7.4 The TDCC Ltd. has been given long-term lease for NTFP items. 7.7.5 Medicinal plants	**7.7.1** **7.7.2** **7.7.3** **7.7.4** **7.7.5**	**156-157**

8. The Village Forest Working Circle	8.1 General Constitution	All the plantation areas raised by Social Forestry Project, Sundergarh Division have been declared as village forest by the State Govt.	**8.1**	**188**
	8.2 Area	18 nos. of village forest covering an area 120.95 ha.	**8.2**	**188**
	8.3 Special objectives of Management	1. Improve and regenerate the village forest areas. 2. Provide benefit from such forest to village community. 3. Management of forest in accordance with J.F.M. plan	**8.3**	**188**
	8.4 Method of Management	Govt. has formulated the frame work of operation	**8.4**	**188**
	8.5 Treatment Series	Most of the plantations have been scattered patches with coppice shoots coming up from stumps	**8.5**	**189**
	8.6 Analysis and valuation of Crop	As fixed Village Committee	**8.6**	**189**
	8.7 Silvicultural system	No silvicultural system. Only protection is required.	**8.7**	**189**
	8.8 Choice of Species	No plantation	**8.8**	**189-192**
	8.9 Cycle	10 years cycle	**8.9**	**192**
	8.10 Calculation of yield	Yield will be controlled and regulated by village committee.	**8.10**	**192**
	8.11 Table of operation	Climber cutting, singling of shoots and other site-specific improvement measures may be taken up.	**8.11**	**192**
	8.12 Method of execution of operations	No operation is required.	**8.12**	**192**
	8.13 Management prescription	No operation is required.	**8.13**	**192**
	8.14 Control	Through village committee	**8.14**	**193**
	8.15 Miscellaneous Regulations	8.15.1 Grazing 8.15.2 Fire Protection	**8.15.1** **8.15.2**	**193**
	8.16 Rights and concessions	As decided by Village Committee	**8.16**	**193**
	8.17 Working norm		**8.17**	**193**
	8.18 Intermediate revision	No major changes are anticipated. It may be taken up after getting recommendation of CF.	**8.18**	**193**
9. Wild Life (Overlapping) Working Circle	9.1 General Constitution	The Forest blocks having importance of wildlife and recreation are included in this circle.	**9.1**	**194**
	9.2 Objectives of management	1. Improvement of the habitat of Wildlife. 2. To create more water sources and salt licks. 3. Conservation and preservation of the diversity of flora and fauna. 4. To educate and create awareness. 5. To conserve and develop the existing pre-	**9.2**	**194**

		historic sites.		
	9.3 Strategies	To help visitors develop awareness, understanding and appreciation of the area being visited. To make their experience enjoyable. To evoke positive response in them towards conservation of natural, historical and cultural sites. To achieve management goals. To build public support for the area	**9.3**	**194-195**
	9.4 General character of vegetation	All the forest blocks contain good forest and wild animals are available in every block.	**9.4**	**195**
	9.5 Special objectives of management	i. To conserve, protect and improve forest and wild life habitat. ii. To promote wildlife in general and endangered species in particular. iii. To create awareness among the local people regarding the necessity to conserve and protect the wildlife and their habitat. iv. To conserve and develop important wildlife habitat for the purpose of eco-tourism. v. Increase in biodiversity and wildlife population. vi. Prevention of wildlife related crimes.	**9.5**	**195**
	9.6 Analysis and evaluation	Regular census will be taken up and efforts will be made to solve man-elephant conflict.	**9.6**	**195-196**
	9.7 Area and allotment	All the forest blocks have been included in this overlapping working circle. Area of the circle is 62,515.1554 hectares.	**9.7**	**196**
	9.8 Species structure	Forest blocks support many types of flora and fauna including carnivores and herbivores.	**9.8**	**196-197**
	9.9 Poaching and wild life crime	Poaching and wild life crime shall be stopped.	**9.9**	**197**
	9.10 Maintaining special habitats	Habitat suitable for wild animals and birds will be protected.	**9.10**	**198-199**
	9.11 Development of habitat	Food, cover, water and salt licks will be provided to wild animals.	**9.11**	**199-200**
	9.12 Classification of habitat	Habitat with degree of deterioration is discussed.	**9.12**	**200-203**
	9.13 Animal depredation	Animal depredation shall be checked.	**9.13**	**203**
	9.14 Research	Scientific research on migration, disease, habitat and population dynamics.	**9.14**	**203**
	9.15 Common wild life	Common wild animals are discussed.	**9.15**	**204**
	9.16 Sanctuary and National Park	No sanctuary and National Park is available.	**9.16**	**204**
	9.17 Wild life Rules	Different wild life rules in force are discussed.	**9.17**	**204**
	9.18 Works of improvement	Improvement works will be taken up for wild animals.	**9.18**	**204-207**
	9.19 Migration of	Four migration routes of elephants have been	**9.19**	**207-210**

	elephants and revival of habitat corridors	discussed.		
	9.20 Wild life protection measures	Protection measures will be taken up.	**9.20**	**210**
	9.21 Miscellaneous regulations	Grazing and fire etc shall be stopped.	**9.21**	**211**
	9.22 Financial forecast	Financial requirement for Rs.85 lakhs have been made for ten years.	**9.22**	**211-213**
	9.23 Wild life depredation & measures taken to tackle it	Anti depredation squad and vehicle has been provided to drive away the elephant	**9.23**	**213**
	9.24 Intermediate revision	Intermediate revision may be taken up after five years.	**9.24**	**213**
10. Eco-Restoration (Overlapping) Working Circle				
	10.1 Objectives	The eco-restoration will bring the forest of Division to normalcy. Efforts will be made to increase vegetation cover along with improvement of wild life which is an integral part of the forest and performs important functions in the ecosystem.	**10.1**	**214**
	10.2 Strategies	To conserve, protect and improve forest and wild life habitat. To promote wildlife in general and endangered species in particular. To create awareness among the local people regarding the necessity to conserve and protect the wildlife and their habitat.	**10.2**	**214-215**
		To conserve and develop important wildlife habitat for the purpose of eco-tourism. Increase in biodiversity and wildlife population. Prevention of wildlife related crimes.		
	10.3 Self-guided trails	It is a device of natural history interpretation.	**10.3**	**215**
	10.4 Identification of the zones	Different zones will be developed.	**10.4**	**215**
	10.5 Local area development	Employment generation will be done through various schemes and projects for upliftment of local people.	**10.5**	**215-216**
	10.6 Development of eco-tourism	Eco-development of area will be taken up for conservation and preservation of the diversity of flora and fauna. Local inhabitants will be educated to create awareness.	**10.6**	**216**
	10.7 Caves	Pre-historic caves will be maintained	**10.7**	**216**
	10.8 Temples	Important temples will be developed for bio-aesthetic purposes.	**10.8**	**216-217**
	10.9 Dams	Dams will be developed for the purpose of eco-tourism.	**10.9**	**217**

	10.10 Eco-development measures	Employment generation, construction works, agro-forestry, silvipasture, water harvesting structures, plantations, NTFP collection and marketing and development of healthy live stock will help in eco-development in the area.	**10.10**	**217-220**
	10.11 Budget	Provision has been made for Rs. 85.00 lakhs during the plan period for eco-restoration.	**10.11**	**221-224**
	10.12 Miscellaneous regulations	Control of grazing. Fire protection measures Incentives and rewards Rights and concessions	**10.12**	**224**
	10.13 Intermediate revision	Intermediate revision may be taken up after five years on the recommendation of CF.	**10.13**	**224**
11. Establishment and Labour	11.1 Establishment and labour	Field staffs and ministerial staffs including distribution of sections, beats and ranges	**11.1**	**225**
	11.2 Labour Supply	Wages of Skilled and Un-skilled labour	**11.2**	**225**
12.Miscellaneous regulations	12.1 Forest Check Gates	List of Check Gates	**12.1**	**226**
	12.2 List of Buildings	List of buildings (Range wise)	**12.2**	**226-228**
	12.3 List of Forest Road	Name and Length of the Forest Road	**12.3**	**228**
	12.4 Nursery	Six permanent nurseries in Five Ranges coming under this WP	**12.4**	**229**
	12.5 Mining	No mining inside RF area	**12.5**	**229**
	12.6 Preservation Plot	Previously No preservation plot present. A new proposal to be send by DFO to state silviculturalist	**12.6**	**229**
13.1 Financial Forecast	13.1 Establishment	Estimate of the cost of establishment	**13.1**	**230**
	13.2 Treatment of Selection Working Circle	Total area under Selection working circle is 9781.5990 hectares.	**13.2**	**230**
	13.3 Treatment of Rehabilitation Working Circle	Total area under Rehabilitation working circle is 38,758.4908 hectares.	**13.3**	**230-233**
	13.4 Treatment of Protection Working Circle	Total area under Protection working circle is 19,208.3336 hectares.	**13.4**	**233**
	13.5 Treatment of Plantation Working Circle	Total area under Plantation working circle is 6188.6396 hectares.	**13.5**	**233**
	13.6 Treatment of Bamboo (Overlapping) Working Circle	No area has been prescribed under this circle. Plantations of bamboo in gap areas will be taken up.	**13.6**	**234**
	13.7 Treatment of NTFP Working Circle	Total area under NTFP working circle is 62,515.1554 hectares.	**13.7**	**234**
	13.8 Treatment of Village Forest Working Circle	Total area under Village Forest working circle is 120.95 hectares.	**13.8**	**234-235**

	13.9 Treatment of Wild life (overlapping) Working Circle	Total area under Bio-aesthetic working circle is 62,515.1554 hectares.	**13.9**	**235**
	13.10 Treatment of Eco-Restoration (Overlapping) Working Circle	Total area under Village Forests Working Circle is 62,515.1554 hectares.	**13.10**	**235**
	13.11 Collection of timber, firewood and irregular exploitation.	Rs.5 lakhs with subsequent rise of 10 percent every year	**13.11**	**235**
	13.12 Maintenance of boundary	Total length of the boundary is 1379.16 Km.	**13.12**	**235-236**
	13.13 Maintenance of Forest Roads	Forest Roads for maintenance about Rs.10000 per Km. is required per annum.	**13.13**	**236**
	13.14 Forest Consolidation	6 PRFs forest blocks having an area of 425.59 ha. need immediate consolidation measure.	**13.14**	**236**
	13.15 Repairs and maintenance	Replacement of old vehicle, maintenance of VHF sets, purchase of new sets.	**13.15**	**236**
	13.16 Buildings	The condition of buildings is deplorable and many Qtrs. Require immediate renovation.	**13.16**	**236**
	13.17 Library, Equipments, Maps and Tools	To be maintained in Division Office	**13.17**	**236**
	13.18 Miscellaneous Regulations	Proper care will be taken for improvement of forest and wildlives.	**13.18**	**236**
	13.19 Projected Cost of the Plan	Estimated cost of the Working Plan	**13.19**	**237**
	13.20 Cost Benefit Analysis	Benefits from forests	**13.20**	**238**
	13.21 Forest Revenue	Past forest revenue collected	**13.21**	**239-241**
	13.22 Cost of the Plan	The cost of plan has escalated due to lack of allotment	**13.22**	**241**