

## PART – II

### Future Management Discussed and Prescribed Basis of Proposals

#### CHAPTER – I

##### 2.1.1 General objects of Management

Keeping in view the problems of the Division the general objects of management are:

i) to provide adequate cover to the land is guard against soil erosion and siltation of water reservoirs;

ii) to rehabilitate the rooted waste and reforest the denuded and blank areas with suitable species, preferably of commercial values, that can hold against the trying conditions in the area, for meeting the ever increasing demand of industries and thereby augmenting revenue.

iii) to meet the requirements of firewood and small timbers.

iv) to provide forage (fodder grasses) to the villagers to minimize the grazing in the forest area.

v) to check soil erosion, measures in addition to plantations are taken up.

2.1.2 Under normal conditions, financial return is one of the principle objectives in management of forests. However, here in Deoghar Division there are no such forests which can be exploited for the purpose. Whatever little materials can be yielded is from the plantation. These must be supplied on priority basis, to the local villagers which will induce them to protect the plantations.

2.1.3 Conditions of the area that leads to such proposals

##### Land use pattern of Deoghar district

Land use/land cover mapping of Deoghar district was carried out by visual interpretation techniques from the Satellite photographs. These information's have been obtained from the Remote Sensing Application Centre, Bihar, Patna.

False colour composite made from IRS bands 2,3,4 of November 1983 (Kharif) and February, 1989 (Rabi) have been used to prepare a land use map for the year 1988-89 n the scale of 1 : 250000.

Sl. No.	Land use/ category	Land cover	Area in hectares	Percentage to the total geographical area
1.	Built-up land		875.00	00.35
2.	Agricultural land		178397.25	71.99
3.	Forest land		17000.00	06.86
4.	Waste land		49153.25	19.84
5.	Water bodies		2062.00	00.83
6.	Mining area		312.50	00.13
TOTAL			2,47,800.00	100.00

The forest land shown here is not according to the legal boundary of the forest.

Based on the analysis of multi date/season satellite data with limited field checks the following observations were made out. Rice is the major Kharif crop grown in the district followed by maize. Mostly rainfed crops are grown. Due to discrete land classes, two varieties of rice are grown. 'Aghani' rice is cultivated in the valleys which has good depth of fertile soil. The rice grown in the valleys are of good quality and of high yield. On interfluvial upland 'Gora' rice is grown which is normally broadcasted just after rain. On the same land marua, kodo, maize and pulses are grown. Vegetables are taken up generally in 'Bari' land which has fertile soil due to household waste/manure. Rabi cropping is limited in extent only near the source of irrigation. Rabi crop includes wheat and pulses. The limited extent of Rabi crops reflect the present situation of irrigation facilities. The topography of the area is quite undulating and due to this reason, major irrigation projects are not to be likely adopted by the Government. Only medium and minor irrigation projects can be launched. Small tank irrigation system should be adopted on pilot project basis. Existing small tanks needs desalting and depending. At present most of the area remain unirrigated. The undulating nature of the land makes it possible to store rain water by bonding so that water harvesting structures are constructed to check run-off and soil erosion.

If funds are available then the Divisional Forest Officer should go for permanent rubble masonry structures inside forest area to prevent water erosion

and to provide water for irrigation to the nearby cultivated areas. Hence watershed development and management programmes has got much significance in these area. The details of land use and land cover statistics of deoghar district are given in the appendices.

The forests being surrounded by thickly populated agricultural tract the demand for forest produce both for domestic consumption and for agricultural use far outstrips the actual supply. There is no industry worth the name in this area and the people solely depend on agriculture. Poverty and unemployment is the main problems. The local villagers have a miserable living by stealing the forest produce and selling them in the local markets. On account of this and non-directional management of the forests, the crops have come to the stage of rooted wastes. This also let to heavy soil erosion thereby leaving many areas having no soil. Parent rocks are even visible at places. Gully erosions have not been looked after properly. A large number of cattle are there in these areas. In the absence of grass land management heavy grazing occurs in the forest area which suppresses regenerating of natural as well as planted species.

On the basis of these factors management proposals have been chosen.

## PART – II

### CHAPTER – II

Three Working Circles are prescribed :

1. Coppice Selection Working Circles.
2. Rehabilitation & Soil Conservation Working Circle.
3. Plantation and pasture land Working Circle.

Working Plan for the Coppice Working Circle.

#### 2.2.1 General Constitution & Character of Vegetation

This working circle include such areas which contains crop having an average D.B.H. of 6" to 8". These areas show medium to good coppice regeneration. If coppiced and protected properly the crop will have a fair chance of survival and growth. Previously these areas were confined to such localities where pressure of population was comparatively less. Now, though the population pressure has increased, most due to the support of the local people, the forests have remained in this condition. Hence it is strongly proposed that after coupe working due share, must be given to the right holding villagers.

Mostly of the forests belonging to this working circle are present on plains and lower slopes of hills. These are predominantly sal forest. The upper ridges of the hills mostly bears crop of miscellaneous nature.

#### 2.2.2 Special objects of management

Special objects of management are:-

- i) To meet the heavy demand of the local people for fire wood and small timber;
- ii) Since coppice regeneration is adequate its success has to be ensured.
- iii) To ensure continued existence of forest for prevention of soil erosion, and conservation of moisture.

iv) To improve the stocking by artificial regeneration where natural regeneration has failed regulating the cutting grazing and fire.

### 2.2.3 Existing problems in the area

Looking at the magnitude of the biotic problems it is very difficult to propose any better management in the future. Due to increasing population pressure and grazing pressure the amount of illegal felling has increased substantially. The extent and rapidity of deterioration during the last two decades can well be understood by the fact that the number of felling series has come down from 174 to 16 only. In the present working plan only in eleven felling series coppice selection working circle has been constituted.

Under the circumstances, mobilization of the goodwill and cooperation of the local people has to be given utmost priority. Keeping this in view, in subsequent working circles, according to the population census and cattle census measures have been prescribed. Though to meet the local demand selection fellings are proposed, it will not be sufficient enough to meet their total demand. However, fellings prescribed in plantation areas will to some extent mitigate their demand on the forests of the region. The typical problem of requirement of firewood by thousands of pilgrims to Baidyanathdham in the rainy season proves detrimental to the forests. Their camping places require heavy amount of fuelwoods thereby causing lot of damage to the forest. No management measures have yet been taken up to face this problem. It is strongly advocated that atleast for the seasonal requirement, the department should arrange temporary fuelwood depots at the fixed camping places in routes to Deoghar.

The approach of management should be to work on short rotation of 20 years, which can provide small timber and firewood to the people. This forest should not be treated for revenue earning. The worked over materials of the coupes should be handed over to the panchyats and the local village bodier in order to create a feeling of close association with the forest department, which may help in future protection.

### 2.2.4 Future Management

It has been seen that opening created by removal of trees, facilitated invasion of area by Lantana which subsequently suppressed other species to come

up. Taking into account all these factors, it appears that annual removal of forest produce should be on conservative scales so that the trees cover is not entirely lost. It is being proposed that forests under these working circles shall be worked under Coppice Selection System. This is proposed because the part experience of coppice with standard system has resulted into large scale felling and subsequent problems put these forests to Rehabilitation or Plantation working Circle. The area has to be protected from fire and grazing.

### Felling Cycle

Felling cycle is proposed to be 20 years. However, felling proposed under this working plan will start from the year 2000 to 2009. The diameter of the crop to be felled should not be less than 6”.

### Demarcation of annual coupe

The management maps of all the felling series have been prepared on 4” = 1 mile topographical maps.

Coupes will be marked on the ground with the help of five feet wide lines in which all shrubs and undergrowth shall be cleared. Trees on these lines would be marked with double coaltar rings, at breast height at suitable intervals according to the crop condition and visibility so that atleast one coaltar tree can be seen on either side from any such trees. The corner tree should be blazed, number of coupe and area should be written on it. This laying out of coupe must be completed by June every year.

### Area Statement

Range-wise area statement is given below:

S.No.	Range	Felling Series	Area in hec.
1.	Deoghar Territorial Range	Baghapathar	508.59
		Simradihi	170.57
2.	Madhupur Range	Saharjori	204.29
		Domubani	142.43
		Mohnadih	920.62
		Chechali	371.20
		Dubrajpur	20.72
		Debipur	38.94
		Dumdumi	25.74
3.	Jamtara Range	Sanahara	471.78
		Makranda	189.33
		Bhatudih	306.45
		Gaisora	81.62
		Ichlijhor	214.75
			3679.03

### Method of executing fellings

Fellings will be executed as follows:

i) All dry, dead or diseased trees with negative increment shall be marked for felling.

ii) No fruit bearing trees should be felled.

iii) No Khair shall be cut. In Domuhani felling series Khair trees are there and they should be protected.

iv) No felling will be done on hills slopes having more than 40% slope.

v) Felling must be done with sharp implements upto a height not less than 6" from the ground. This 6" height should be taken from the lower slope.

vi) Haffazard felling must not be done.

vii) At the time of fellings all the poles and stumps shall be cut.

viii) No debris should be left in the coupe.

ix) It shall be the responsibility of the Territorial Divisions to ensure that marked trees are not cut by right holders.

### Subsidiary Silvicultural Operation

In the year following the main felling silvicultural operations shall be carried out:-

i) Sporadic growths of Lantana should be eradicated.

ii) Areas where Lantana growth is high, should be cleared off Lantana and Plantation of indigenous species has to be taken up.

iii) Similar plantation steps are to be taken up in the region where natural regeneration fails.

iv) Coupes will be rigidly protected from grazing, hacking and fire for atleast five years after coppicing.

Yield

Yield shall be regulated by area.

Details of felling series is given below:-

Name of Felling Series	Name of Village	Thana & Thana No.	Area of C.S.W. in hec.	Total area in hec.	A.C.C. in hec.	Remarks			
Simradih	Madhupur	Deoghar	86	1.52	170.57	17.05			
	Tutanaraini	Deoghar	93	9.40					
	Bisnathi	Deoghar	95	32.14					
	Asnala	Deoghar	106	28.76					
	Bariardih	Deoghar	107	4.12					
	Simaradih	Deoghar	159	94.63					
Baghapathar	Dumarjor	Deoghar	82	78.59	508.59	50.85			
	Gomdedih	Deoghar	83	40.45					
	Khamardih	Deoghar	84	47.09					
	Dhobna	Deoghar	94	17.69					
	Barakharkar	Deoghar	96	43.36					
	Ghogha	Deoghar	97	91.88					
	Baghapathar	Deoghar	98	101.60					
	Jamuatanr	Deoghar	99	1.83					
	Laldikala	Deoghar	100	86.10					
	Saharjori	Kursal	Sarath	512			19.52	204.29	20.42
		Bahudih	Sarath	513			22.90		
Dudhiachura		Sarath	519	14.23					
Barmasia		Sarath	520	21.24					
Damgara		Sarath	521	32.00					
Saharjori		Sarath	522	94.40					
Domuhani	Domuhani	Das.	23	50.63	142.43	14.24			
	Bhimpahari	Das.	24	3.85					
	Chitkuri	Das.	10	0.88					
	Barabad	Das.	22	25.07					
	Pathrabad	Das.	32	33.30					
	Chhotidih	Das.	14	9.51					
	Diniyari	Das.	11	1.40					
	Chotanaidih	Das.	15	7.76					
	Jagatdih	Das.	12	10.03					
Mohnadih	Bhirkidih	Madh.	70	191.20	927.62	92.76			
	Mohnadih	Madh.	72	110.40					
	Kokali	Madh.	76	63.68					
	Dhakodih	Madh.	77	4.48					
	Shampur	Madh.	78	81.75					
	Lerwa	Madh.	78	54.63					
	Jitpur	Madh.	74	223.20					
	Karipahari	Madh.	75	101.80					
Tilokiland	Madh.	71	96.48						
Chechali	Chechali	Jagdishpur	124	304.64	371.20	37.12			
	Pathaljor	Jagdishpur	125	38.22					
	Bhirkibad	Jagdishpur	129	28.34					
Dubrajpur	Manipur	Madh.	111	7.12	20.72	2.07			
	Rajhanstari	Madh.	117	12.48					
	Saliya	Madh.	148	1.12					

Debipur	Madhupur	Madh.	81	23.22	38.94	3.80			
	Punasia	Madh.	115	15.72					
Dumdumi	Sonatanr	Sarath	537	2.82	25.74	2.57			
	Dundiajori	Sarath	555	22.92					
Sonahara	Kharjori	Kund	1	74.83	471.78	47.17			
	Patherhua	Kund	3	38.40					
	Baghaira	Kund	4	94.20					
	Raichapar	Kund	20	32.56					
	Bindabani	Kund	5 (P)	18.88					
	Babupur	Kund	12/23	41.08					
	Haldidih	Kund	22	20.08					
	Indrapahari	Kund	25	14.50					
	Banpahari	Kund	2	1.40					
	Sonahara	Kund	24	135.89					
	Makaranda	Amgachhi	Dhas	35			14.05	189.33	18.93
Junki		Dhas	34	35.72					
Bhaldiha		Dhas	44	11.68					
Banudih		Dhas	47	90.80					
Parabrindabani		Dhas	46	37.08					
Bhatudih	Dhasania	Dhas	21	5.04	306.45				
	Asanbaria	Dhas	28	33.12					
	Andhora	Dhas	30	20.24					
	Bhatudih	Dhas	31	70.12					
	Amsahari	Dhas	17	6.66					
	Kaludih	Dhas	19	72.00					
	Kasaidih	Dhas	20	59.59					
	Sasnibad	Dhas	33	31.66					
	Phulsahari	Dhas	16	1.62					
	Ampachhi	Dhas	35	1.62					
	Kendudih	Dhas	32	4.78					
	Gaisara	Dodanchak	Kund	18			1.52	81.62	
		Gaisara	Kund	19			80.10		
	Ichlijhor	Ichlijhor	Narainpur	5 (1)			93.91	214.75	
Raghunathpur		Narainpur	116	120.84					

Total : 3674.03 hec.

Area to be felled per year

Year	Name of Felling Series	Coupe No.	Area in hec. Per coupe
2000 to	Simradih	1 to 10	17.12
2010	Dubrajpur		2.26
	Debipur		3.33
	Mohanadih		9.76
	Sahjori		19.70
	Domuhani		15.60
	Sonahara		48.36
	Chechali		37.12
	Gaisora		8.16
	Baghpathar		51.52
	Makaranda		16.29

Every year starting from 2000 to 2010 an area of 229.22 hec. Are to be felled each year.

## 2.3.2 Rehabilitation and Soil Conservation Working Circle

### 2.3.2.1 General Constitution

This working circle covers the following areas:

- i) Degraded areas containing root stocks of Sal and other species, which on proper treatment and subsequent protection stand a fair chance of revival.
- ii) Areas under inferior miscellaneous growth of poor density.
- iii) Almost all hill areas having denuded soil.

### 2.3.2.2 Special objects of Management

A-For rooted wasted and crops having 3" diameter or so.

- i) To rehabilitate these areas so that the crop is able to grow to pole stage.
- ii) To improve the ground cover as safeguard against soil erosion and improve upon the fertility of the soil.

B-i) to take drastic soil conservation measures in highly denuded areas. To prevent further sheet erosion and gully erosion adequate measures have been prescribed.

ii) To provide employment to the local people through forestry operations to reduce pressure on the forests.

### 2.3.2.3 Description of the area

All the degraded Sal areas have been kept under this working circle. Most of the Sal areas have been converted into rooted wastes or coppice saplings through the previous years. It has reached such a situation that even these rooted waste areas are going to be converted to blanks if not treated properly. A lot of areas face severe sheet erosion and gully erosion. Absence of humus in the entire area and emergence of sub-soil to the top is ample proof of the soil denudation. In many areas underlying rock has become visible thereby rendering the area unfit for plantations. The small previous perennial nalas got converted to seasonal nalas. Due

to degradation of the forest and the subsequent loss of ground cover gradually widened and deepened the nalas converting into gullies. Year by year, the gullies are spreading their sphere of action. Condition of crop is better in few patches where the villagers themselves have decided to protect the forest. For example, the forest near Nayadih of Debipur felling series, near Dumdumi village and Sonatanr village of Dumdumi felling series. The extent of deterioration can be assessed from the fact that before 20 years the entire forest of Deoghar was available for coupe working. Before 10 years less than 25 % of the forest areas were available for extraction. During the present working plan period few areas are found suitable for coupe working for the coming 20 years. Exploitation of plantations have been suggested. Sal has so far succeeded in holding the ground only because of its coppicing vigour.

The total area of the forests of above description is 1201.55 hectares. Detailed break-up of Range-wise forest is given below:

S. No.	Name of the Range	Rehabilitation & S.C.W.C. Area in hec.
1.	Deoghar Territorial Range	355.85
2.	Deoghar Soil Conservation Range	134.17
3.	Madhupur Range	230.30
4.	Jamtara	481.23

#### 2.3.2.4 Problems and lines of approach

The main problem is to tackle the most trying biotic factor of indiscriminate hacking by the villagers and intensive grazing and trampling by the village cattle. The first factor is apparently operating more severely than grazing.

Another problem is the extremely unwieldy boundary of the forest. It is very zigzag which is characteristic of deficit forests, riddled with old cultivation and encroachments. In such boundary conditions fencing is very expensive and difficult to be maintained because these forests are generally crisscrossed by paths and tracks. In spite of being provided with fencing at a high cost, the areas remain unfenced in effect.

Due to the continuous degradation of the forest the entire sal areas has almost been converted to either rooted wastes or crops of sapling stage. Even sale of sal patta and datwan sticks is a prime source of income for many rural women folks. This resulted in removal of coppice shoots regularly. Due to the elimination of

overgrowth the undergrowth also vanished which resulted in non-addition of humus to the soil. Soil fertility is lost and soil erosion started. The prescriptions in the previous working plan were not followed and soil erosion went on unchecked.

Under the circumstances mentioned above, it is obvious that neither the rooted wastes can be developed nor can plantations be raised unless the problem of protection against indiscriminate felling and hacking is tackled. The first step in this direction would be to mobilize the goodwill of the people by working the forests on a short rotation to meet the local demand for wood as much as possible and by organizing supply of fuel wood in the locality to reduce pressure of headloaders. These prescriptions are mentioned in the first working circle.

#### 2.3.2.5 Constitution of Rehabilitation and Soil Conservation series

Details of the Rehabilitation and Plantation series are given in Appendix-2.

#### 2.3.2.6 Method of Treatment

The treatment would aim at rehabilitating the forests on the following lines:

- i) The areas are to be selected carefully for the treatment to take care that they fall in compact and less problematic blocks in a concentrated way. This will make the job of organizations and supervision more convenient.
- ii) The treatment would consist of cutting back malformed crop of sal on a rotation of 10 years. The places requiring only tending operations are to be carried out. The small patches of blank areas and eroded areas will get treatment for soil conservation.
- iii) Keeping watch over the treated areas through cattle watchers.
- iv) Well grown saplings will be retained.

#### 2.3.2.7 Methods of execution of cutting

Before taking up an area a 2 meter wide strip shall be cleared along the boundary line inside the coupe. Cutting shall start from one end and progress systematically, section wise, young, healthy and well formed saplings will left as it is.

While felling, old high stumps and pollards also shall be coppiced. The stumps shall not be more than 15 cm. in height. Trees occurring in Jahiras or Sarnas shall not be felled. Sal patch protected by the villagers shall not be felled.

2.3.2.8 Disposal of the forest produces

Whatever produce will be available, it is to be given to the local people.

2.3.2.9 Annual target

Each Range can conveniently look after 100 hac. per year. There being 4 Ranges in the Division, the annual target is 400 hac. The total area is to be worked within three years.

2.3.2.10 About the small blanks and the degraded areas soil conservation measures are to be taken up.

Prescriptions for prevention of

Soil erosion

or

Watershed Management

2.3.2.11 Causes of soil erosion

Erosion is mostly due to rain water. The gradual depletion of the forest cover depleted the organic matter content in the soil. The organic matter (hums) improves the aeration of the soil and increases its capacity to conserve moisture and deliver it readily to the plant roots. It improves these soil conditions favouring root penetration and the growth of beneficial micro-organism and larger organisms. It aids in processing the inorganic constituents of the soil, changing unavailable material into forms, available as plant nutrients. It aids in conserving the easily soluble constituents of the soil as plant nutrients. Under a good cover of forest there is almost insignificant rates of soil loss and the runoff rate is very low.

Erosion speeds up as the more absorptive humus charged top soil is washed off to expose sub-layers, which generally are of lower absorptive capacity. To continuous biotic pressure has resulted in the loss of topsoil as well as subsoil exposing the parent rocks at places. In these areas the rains are quick and heavy in the monsoon period. Due to the stripping off the absorptive top soil the loss absorptive day is exposed and 90% of the rainfall is lost as runoff thereby aggravating the problem of gully erosion.

#### 2.3.2.12 Methods of Soil Conservation

There are two types of erosion met with in the Division: Sheet erosion and Gully erosion.

##### 2.3.2.12 (a) Prevention of Sheet erosion

Sheet erosion is to be prevented by contour trenching. Contour is an imaginary line on the surface of the earth connecting points on the same elevation. In the sloppy hills several contour trenches are to be dug up to prevent soil loss as well as helping in retention of water. The size of each contour trenches should be 15'x1'x1'. The longitudinal interval between two contour trenches is 10'. The vertical distance between the adjacent contours should be not more than 20'. The plan example of contour trenching is shown diagrammatically below:

The dug out soil is kept on the lowerside of the trench. On these dugout soil babul and ber seeds are to be sown just before monsoon. The countour trenches prove very effective for checking removal of subsoil. More so the trenches also retain water and help in percolation in the hard and compact soil. The furrows catch and hold run off water and store it in the soil, thus reducing run-off and erosion and bringing about a more uniform distribution of rainfall moisture. This will also help grow in the cut back stumps or saplings.

##### 2.3.2.12 (b) Prevention of gully erosion

Innumerable number of gullies are present in all sloppy hills and adjoining plains almost throughout all the felling series. Simultaneous to the prevention of sheet erosion gully erosion must be tackled properly in order to check further erosion. Gullies may be controlled by terracing on the gully heads. However

according to the terrain it is not a practical solution. It becomes very cumbersome and needs very well planning which may be difficult to implement in the field.

Hence it is prescribed that gullies are to be stabilized with structures. Again structures may be permanent or temporary. Structures are used in gully control work either to facilitate the establishment of vegetation or to provide protection for those critical sections which cannot be adequately protected by other measures. When our motto is only soil conservation and improvement of vegetation, temporary structures are preferred. When aim is to provide for small irrigation or making it a waterhole for the animals then permanent (brick cement mortar) structures are required. The temporary checkdams cost less and is cost effective for 5 to 6 years. It may last more even.

Temporary checkdams are made of brush, wire poles or loose rock. Temporary check dams constructed across the bed of a gully have two uses:-

- i) To collect enough soil and water to ensure eventual growth of protective vegetation &
- ii) To check channel erosion until sufficient stabilizing vegetation can be established at the critical point.

According to the distance and depth of the gully more than one temporary structures prove to be very efficient. Generally the first and second ones become filled up with silt within a year, however, the subsequent ones retain water only. Low checkdams are more preferred to high check dams. Low dams are much less subject to failure than high ones; and after they silt up and rot away, they can be better protected from overfalls with vegetative cover. These temporary dams should be extended far enough into the bottom and sides of the gully to prevent washouts underneath or around the ends and should have sufficient spillway capacity to convey the maximum expected runoff. Generally, an apron of rock will be needed (immediately below the dam) to protect the structure from the under-mining action of water discharged from the spillway. The requisite capacity of the spillway notch can be determined in the field by estimating the probable rate of runoff on the basis of the size and nature of the watershed. The height of the temporary check dams need not exceed 2ft.

Construction materials required :-

Woven wire or wire net, brushwood and loose rocks or stones.

Example, Design of construction: Diagrams given below:-

If fund position is good, then after 3/4 temporary checkdams in a particular gully, one permanent checkdam can be constructed which can help in small scale irrigation in addition to the more effective gully control.

Example, Design of permanent checkdam is given below:

PART - II  
CHAPTER – III

2.3.3 Plantation and Pasture Land Working Circle

2.3.3.1 General Constitution

This working circle covers the following areas:

- a) Degraded and barren areas are taken up in this working circle.
- b) Degraded areas of very poor miscellaneous growth which are not likely to revive after treatment.
- c) Blank areas near the villagers to be taken as overlapping pasture land circle.
- d) Old plantation areas which have failed.

2.3.3.2 Special objects of management

- a) To raise plantations of short rotation crops which can meet the local demand.
- b) To meet the commercial demand of forest produce such as fibres.
- c) To plant fodder species in addition to fuelwood species to meet the fodder demand.
- d) To raise grasses in the forest land along with plantations to meet the fodder requirements so that grazing in other forest areas would be minimized.
- e) To provide employment to the local people as much possible through these forestry operations.
- f) Soil erosion is also prevented by this practice.

2.3.3.3 Description of the area

Blanks are mostly taken up for this working circle. Too much degraded miscellaneous areas are also taken up in this working circle. Due to continuous indiscriminate felling and grazing such areas has been converted to blanks or semiblanks. Soil is invariably poor and less than 20 cms. in depth. It is generally poor sandy loam with admixture of gravels at places:

Old plantation areas are also involved in this working circle. Afforestation work was started in the year 1953 by the Deoghar Afforestation Range of the then Afforestation Division, Bihar. A separate Afforestation Division was created at Deoghar in 1956 for doing afforestation work in the Santhal Parganas and Monghyr districts. The work consisted of raising plantations in blank areas and treating sal rooted wastes by cut back and fencing. This Division was wound up in 1969. The old plantations have already been felled illegally. The plantations of seventies have failed mostly due to biotic pressure. The picture at present is of patchy success of plantations. The plantations done after 1985 shows a greater amount of success.

Rangewise area distribution is given below:

Sl. No.	Range	Area Statement in hec.		
		Fit for exploitation	Fit for plantation	Fit for pasture land dev.
1.	Deoghar Territorial Range	1381.07	6887.32	295.82
2.	Deoghar Soil Conservation Range	2032.85	3522.43	276.68
3.	Madhupur Range	4662.71	4839.01	649.61
4.	Jamtara Range	2909.83	4838.01	258.27
TOTAL		10,986.46	20,977.77	1,480.38

#### 2.3.3.4 Problems and Line of Approach

In the Deoghar Forest Division, a total number of 934 villages are there with a total population of 238700 according to the 1981 census figures. The total number of families are 39900. The details of population figures are given in Appendix-V. The per capita consumption of fuelwood is 1 MT per year. So the total consumption of fuelwood per year is 214830 tons. This figure is the assumption on the lowside since the requirement of Deoghar & Jaspur town is not counted into. According to this requirement the plantations of short rotation species are to be carried out.

The cattle population of Deoghar Forest Division according to the cattle census of 1977 is 2,10,600 including sheep, goats and pigs. The population of sheep, goat and pigs is 93,000. So only the cattle population is 1,17,000. According to the fodder plantations as well as grasslands are to be done.

In plantation areas watchers are to be employed even after complete fencing of the planted area by barbed wires. The following species are to be planted only:

1. Cassia siamia
2. Acacia auriculiformis
3. Eucalyptus species
4. Sisam (Dalbergia sisoo)
5. Subabul (Leucaena leucocephals)
6. Terminalia arjuna
7. Fruit trees
8. Babul (Acacia Arabica)
9. Vilaitibabool (Acacia tortilis)

Chakundi, Acacia and Eucalyptus can serve the propose of fuelwood. Subabul, Acacia Arabica & Acacia tortilis are to be planted as fodder species. Sisam are to be planted along river banks. Arjun trees plantation can be taken up at certain places in consultation with the villagers to introduce sericulture. Fruit bearing trees are also to be planted throughout the plantation areas so that people will be attracted to save the plantations. Good breeds of hardy fruit trees are to be planted to give early return.

Plantation of sisal has to be also taken up in compact blocks. The technique of sisal plantation is discussed later.

According to the fodder requirements the grass lands are to be created.

List of Fodder requirement per day

Class of stock	Green fodder in Kg.	Dry fodder in Kg.
Milking Cows	30-35	3-4
Milking buffaloes	40-45	3-4
Dry Cows & Buffaloes	15-20	4-8
Pregnant Cows & Buffaloes	40-50	1-2
Growing calves	15-50	1-3
Buffaloes Idle	15-20	4-8
Working	30-40	3-4

However on an average it can be taken that green fodder requirement of a cattle per day is 30 kg. so for a total cattle population of 1,17,000 the total amount of green fodder required is  $1,17,000 \times 30 \text{ kg} = 3510 \text{ tons}$ .

#### 2.3.3.5 Grassland management technique

In the sandyloam soil Anjan (*Cenchrus ciliaris* or *setigerus*) and Dinanath are the best to be developed. The package practices for these grass are mentioned below:

1. Anjan (*Cenchrus ciliaris*):- This grass grows better in light to medium well drained soil. Sowing time is June-July. 5-6 kgs. of seed is needed per hectare. When the grasses attain a height of 6-10 cms. it is cut and used as fodder. In the first year one cut is permissible and in the 2<sup>nd</sup> year 2-3 cuts can be done. This grass yields 300 to 350 quintal per hectare. This is a perennial grass. The seeds are sown after minor soil working. In the blank areas soil working can be done either by tractors or by ploughs.

2. *Cenchrus setigerus* : This is a good grass for sandyloam soil. Sowing time is June-July. The amount of seed required is 8-10 kg. per hectare. The grass is cut once in the first year and two to three times in the second year. Cutting height is 6-10 cms. This is also a perennial grass. The fodder yield of this grass is 250 to 300 quintal per hec.

3. Dinanath (*Pennisetum pedicellatum*) : This grass grows well in clayey loam to sandy loam soil. Sowing time is June-July. Amount of seed required per hectare is 8-9 kg. The first cut is done after 90 days and the second cut is made after 60 days. Grass is cut when it attains a height of 6-10 cms. Fodder yield is 700-800 quintal per hec. This grass is annual.

4. Stylo (*Stylosanthes humilis*): This grows well in sandy surface soil. Sowing time is June-July. Seed rate is 6-8 kg. per hectare. The first cut is done after 70-80 days when the grass attains a height of 6-8 cms. The second cut is made after 60 days. Fodder yield is 200-250 quintal per hec. This grass is also annual.

5. Bankulthi (*Atylocisa scarabaeoides*): This grows well in sandyloam, well drained and gravelly soil. Sowing time is June-July, 10-12 kg. of seeds per hec.

is required for sowing. It is a perennial grass. A single cut is given in the second year, cutting height is 8-10 cms. Fodder yield is 70-125 quintal per hectare.

The minimum fodder requirement of this Division is 35,100 quintals. If an average of 100 quintals per hectare is taken as the standard then by utilizing 351 hectare of land as grass land would suffice the purpose. In case of use of manures in the grass land the production will be much more. In an average rotation of 2-3 years alternate areas can be taken up. In grass lands plantations of fodder species or fuelwood species can be done. After the 3<sup>rd</sup> year when the trees species attains good height & growth, other areas for grasses would be taken up. Local people would be allowed to cut & take away the grasses at a nominal rate say 10 paise per bundle.

2.3.3.6 Sequence of operations for plantations of fuelwood and fodder species:

- i) Fencing of the area to be completed by the end of June.
- ii) Nursery work to be started by December.
- iii) Planting operations to be completed by the end of July.
- iv) Hoeing and weeding in planted up species and to naturally regenerated seedlings, if any, of valuable species by the end of September.
- v) Any other operations and subsequent year operations as recommended by Afforestation Committee are to be followed.

2.3.3.7 Subsidiary regulations :- Plantations are generally attended up to the 3<sup>rd</sup> year only. However, in Deoghar Forest Division plantations show medium result. Hence following prescriptions are given for the 4<sup>th</sup> year.

- i) Hoeing should be done all over, with application of Fertilizers to plants, that are lagging behind in growth, say 50%.
- ii) Cleaning in cut back areas should be done leaving two or three shoots per stump.
- iii) Seedlings of Salai & Khair should be helped.
- iv) Interference in growth by inferior species should be removed.

2.3.3.8 Regulation of grazing:

Treated and planted areas shall be protected from grazing atleast for five years.

#### 2.3.3.9 Regulation of fire:

Occurrence of fire is totally prohibited in the planted as well as cut back areas.

#### 2.3.3.10 Exploitation of old plantations:

Mostly Eucalyptus, Acacia and Chakundi plantations are met with in this Division. As discussed earlier, results of plantations are not satisfactory. Exploitation of old plantations are to be done according to the Chief Conservator of Forests, Bihar's memo. No. 9578 dated 20.08.74. It specially states that the Chief consideration for deciding about the exploitation of Acacia & Eucalyptus plantations should be their diameter growth rather than any exact age. Because at a certain age all plants, do not attain same level of growth. The exploitable diameter for Acacia and Eucalyptus will be 10 cm (4") at breast height.

#### 2.3.3.11 Method of disposal

After exploitation of the crop according to the local need 75% of the yield is to be distributed amongst the villagers and the rest is to be handed over to the State Trading Division. This will ensure faith among the local people which will encourage them in protecting the future plantations.

#### 2.3.3.12 Sisal Plantation Techniques

a) Sisal fibre is obtained from Agave sisalana (Ver. Name Mooraba, Rambans). It is a native of Mexico. The fibre is used where tensile strength is needed. It is used in marine cordages and in manufacture of articles of daily uses such as brushes, carpets, bags etc. India imports about Rs. 50 lakhs to 100 lakhs worth of sisal fibre annually.

b) Object- The plantation of Sisal is also a soil conservation measure. This requires very less moisture. Hence sisal plantation is a good utilization of soil which is neither fit for agriculture nor tree plantation.

c) Soil and climatic requirement : Sisal has been found to grow on a soil depth of less than one foot. It can develop on any type of soil. It is a drought-resistant plant by nature and rainfall of 30"-40" is just sufficient for it.

d) Planting materials : Sisal can be raised either by bulbils or by suckers. Bulbils are borne on poles, which appear only once in the life cycle of a sisal plant. These bulbils are small in size and are nurtured in nursery beds of standards size at a spacing of 20cm x 20 cm. for twelve to fifteen months. They are transplanted in fields when they attain the size of 25-30 cm. Suckers are thrown out every year around a sisal plant from the roots of the plant. Suckers usually become available from the third year at the rate of on an average, 2-5 per plant. These suckers are transplanted when they attain the size of 25-30 cm. They do not need any rearing up in nursery beds and can be transplanted directly. Normally a sucker is a better planting material.

In this plantation only protection against trampling by cattle for two years is needed.

e) Soil Working : Pits of 30 cm x 30 cm x 30 cm are dug up in the plantation area during October to March. The soil is heaped by the side of pit for weathering. Alternatively the soil is hoed in strips 150 cm (5') wide and the cods of earth are up turned for weathering. Soil working may be completely abandoned and the plants can be transplanted directly in the field with the break of monsoon in good sites where the top soil is light loam or loam. The spacing adapted is of 1m x 1m is separated by a 2.5m wide strip to facilitate intercultural operations, harvesting and carriage of leaves. The number of plants per acre is 2300.

f) Transplantation : Before actual transplanting uprooted suckers or nursery raised bulbils are carried to the transplanting sites. Adventitious roots are trimmed by a sharp axe. Then the outermost layers of leaves are removed exposing the cream colour. This process is called root trimming. Trimmed plants should be transplanted immediately. The entire operation from uprooting to transplanting may be completed within 48 hours.

Suckers are transplanted preferably with the onset of monsoon. By end of July all transplanting operations must be over. The cream coloured portion of the bulb is planted in the soil. Soil around is tightly pressed.

g) Weeding and hoeing: In a strip of 150 cm. width where the double row of plants have been planted, all weeds consecutively. Soil is loosened up to a depth of 15 cm. – 20 cm. in the 150 cm. wide strip without disturbing the soil in the radius of 15-20 cm. around the plant. This is essential for the healthy growth of plant and to promote production of suckers.

h) Manuring: Sisal plants are calciphilous. Hence calcium fertilizers must be applied to it, besides nitrogen, phosphoreous and potassium.

Doses per plant needed.

Urea – 28 gms.

Muriate of Potash – 8 gms.

Dicalcium phosphate – 36 gms.

Mixture of fertilizer is applied in a radius of 15-29 cm. from the centre of the plant after 15-20 days from transplanting. Single super phosphate and dolomite may be substituted for calcium phosphate.

#### Extraction of fibres:

Sisal plants become mature to yield leaves from the fourth year. In the first harvested only the peripheral leaves are cut leaving 20 leaves in the centre. The unfurled column of leaves in the centre is not taken into count. In the subsequent harvested only 15 leaves are left excluding central column of unfurled leaves.

Leaves are cut by a curved say the with a long handle as close to its base as possible, but without injuring the trunk of the plant. This instrument is called sisal leaf cutter. Sisal leaves contain only 3% fibre. Harvested leaves are decorticated on sisal decorticator machine. The fibre is washed and dried in the sun. Dried fibre is baled in balling machine into 50 kg. or 100 kg. bundles. This now becomes ready for sale.

Harvesting of leaves is continued from 4<sup>th</sup> year to 10<sup>th</sup> year-after which plants are uprooted and new plantations are raised. This usually coincides with the poling, after which plants die out.

#### Area demarcation:

The areas to be planted with sisal should be decided by the Divisional Forest Officer himself after knowing fully well the details of sisal plantation.

#### 2.3.3.12 Exploitation of Fuelwood and Fodder species

The plantation felling series has been constituted for the areas which have been planted in eighties. On an average felling has been proposed after 10 years. However to equidistribute the work minor variations are done. Clear felling of the areas is to be done and then taken up for replanting. The existing blank areas are to be taken up for plantations in successive years. Subsequent felling operations will be taken up after 10<sup>th</sup> year of plantation. The areas which are more vulnerable for illegal cutting the felling cycle may be reduced upto 9 years. Same procedure will be adopted for roadside plantations.

#### 2.3.3.14 Creation of Mandays

The total number of fully unemployed people (males and females) in the Division is 1,36,500. To provide 183 days work to everybody a total number of  $1,36,500 \times 183 = 2,49,79,500$  mandays are needed. However this is a very astounding work only for the Forest Department. According to the information available from the Deputy Commissioner regarding creation of mandays by other governmental agencies, the Divisional Forest Officer should work out the amount of work to be taken up per year so as to provide required employment to the local people. Various forestry operations has been suggested in this working plan such as free felling, coupe working, plantation of tree species, plantation of sisal, grassland development, construction of checkdams, construction and repair of roads, construction and repair of buildings, fire protection works, cattle watching etc. Taking all the operations into account the Divisional Forest Officer should prepare yearly plan of action. The detailed census figures with compiled figures are given in the appendices. The Divisional Forest Officer should strive for doing village development works on the basis of the given census figures if needed. According to the pressure of cattle population in different areas, different amount of grassland development work is to be done in order to contain the grazing. Preparation of grasslands must be done around the sal forest areas to prevent grazing in the forest.