



Government of Maharashtra

The Working Plan of Bhandara Forest Division (Nagpur Circle)

Volume - I

2009-10 to 2018-19

By

Dr. F.S. Jafry, IFS
Conservator of Forests
Working Plan Division, Nagpur,
Civil Lines, Nagpur 440 001



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Working Plan, Nagpur.

FOREWORD

The present Working Plan for the Bhandara Forest Division, written by Dr.F.S.Jafry, IFS, Conservator of Forest, replaces the earlier Working Plan prepared for the area of old Bhandara Forest Dn. by Dr.Nandkishore, IFS, and Mr.G.U.Bhaid. This is the first Working Plan prepared for the Division by an officer of the rank of Conservator of Forests. The Draft Working Plan has been prepared by Dr.F.S.Jafry, IFS, and approved by the state level committee in the meeting held on 27th. and 28th. February 2009, with some suggestions and corrections. All suggestions have been incorporated in the final Working Plan. The second P.W.P.R. for the division was also prepared by Dr.F.S.Jafry, IFS and was sanctioned by the State Level Committee in March, 2008. The present work has taken into consideration the directives of the State Level Committee as well as the guidelines issued by Government of India. The Government of India issued detailed guidelines for preparation of Working Plans during 2004 putting emphasis on NTFP, Wildlife Management, JFM and Protection of forests.

The present Plan highlights the deteriorating condition of forest in the area and expresses concern over lack of natural regeneration due to increasing biotic pressure in the areas adjoining to the villages, non implementation of all prescriptions of the plan in totality and other administrative as well as management factors. For well stocked areas, Selection-Cum-Improvement Silvicultural System has been adopted. To deal with the problem of increasing number of hollow teak trees, which neither promised any growth in future nor allows younger regeneration to be established, the removal of all hollow trees above 75 cm girth has been prescribed and preferential treatment to the healthy saplings of seed origin is proposed. As the District of Bhandara is rich in water bodies, a new working circle, Protection and Catchment Area Treatment Working Circle has been introduced to reduce the silt load on these water bodies. After considering the importance of the working circle it was decided that only the areas directly drainage contributing into the water bodies should be included under this working circle.

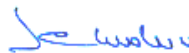
The author has also highlighted the importance of other Natural Resources like valuable Minerals found in the division. Detailed information about the location of deposits of various minerals, with its latitude and longitude, has been given in the Volume II of the Plan.

Other highlights of the Plan are very detailed prescriptions for the management of Wildlife. The fragmentation of wild life habitat and corridor has been discussed in detail and remedial measures have also been recommended. The chapter on wildlife was also discussed with the Principal Chief Conservator of Forests (Wildlife) and he expressed his appreciation regarding the detailed chapter on Wildlife written in the Plan. Besides the chapter on wildlife the chapters on NTFP and introduction of chapters on JFM as well as Forest Protection has also been written in detail, on the basis of whatever information was provided by the Bhandara D.C.F. In order to ensure continuance of the good work in this direction, adequate measures have been suggested and included in the Plan's prescriptions.

The authors Dr.F.S. Jafry,IFS and his staff has taken pains in completing the Plan of the present Bhandara Forest Division in time. I wish to complement the whole team for their hard work and sincere efforts, in spite of many major constraints, like shortage of staff and delay in availability of data from the Bhandara Division.

Real test of the appropriateness of prescriptions would be seen only after all the prescriptions would be implemented properly for a minimum period of five years, after which an effort may be made to revise the prescription, if need is so felt.

I wish the Plan is implemented in the same spirit as it has been formulated by the authors and it results in the vigorous growth of natural regeneration which would bring the glorious past of these valuable forests back for sustainable use by future generations.



Krishnamohan,IFS
Chief Conservator of Forests,
Working Plan. Nagpur. M.S.

Nagpur

Dated : June 17, 2009



Dr.F.S.Jafry,IFS.
Conservator of Forests,
Working Plan, Nagpur.

Introduction

The present Plan is the eighth Working Plan of Bhandara Forest Division. This working plan covers the entire Reserved Forests, Protected Forests, Unclassified Forest and Jhudpi Jungle, admeasuring 927.79 sq.kms. in charge of the Bhandara Forest Division, located in the civil territories of Bhandara District. This replaces the seventh Working Plan of Mr.G.U.Bhaid and Dr.Nandkishore, 1996-97 to 2005-06 (Extended up to 2007-08). The area, as compared to the Bhaid and Nandkishore's plan, is now changed due to the reorganization of the Bhandara and Gondia Forest Divisions, on the line of Revenue District Boundary, vide G.R. No.FDM-2003/Case No. -168 /F-2 Dt. 13-04-2007. In the process, 19690.173 ha. of forest land of Bhandara Dn. have been transferred to Gondia Division and 5656.084 ha. Of forest land from Gondia Dn. have been transferred to Bhandara Division.

The preliminary working plan-I was prepared by Shri S.K.Sood, IFS, the then C.C.F Nagpur Circle and was approved by the State level Committee on 7.8.2006. On the basis of the preliminary working plan-I, the Preliminary Working Plan-II was prepared by the undersigned and accordingly approved by the committee on 27th. March 2008 and was communicated to this office by the Adl.P.C.C.F. (Production & Management), M.S., Nagpur, vide letter No. D-14/WP/CR.369(C)/102/08-09, Dated 28th. April 2008 with the following suggestion.

- Some areas under Protection and Catchment Area Management Working Circle not directly draining into the water body, were to be transferred to Selection cum Improvement Working Circle.
- JFM & Forest Protection Working Circle should be changed to Chapters
- NTFP should be used in place of NWFP.
- Plan should include prescriptions in favour of NTFP to increase the annual sustained production of NTFP to improve the local economy.

After incorporating the suggestions given by the committee, the draft Plan was prepared by the under signed and the same was approved by the state level committee, in the meeting held on 27th. and 28th. February 2009, with the following suggestions:

- Guidelines about seed sowing and stake planting should be incorporated in the plan.
- All the gregarious flowering of the Bamboo crop, irrespective of the extent of area, should be reported to the C.C.F. Nagpur.
- Correction in the Para xiii on page 298, so that the prescription is clear and is in conformity with the present silvicultural practice.
- To verify and correct the authors' name of the sixth Plan on page 101, Para 7.09.

The final Plan has been prepared after incorporating all the above mentioned suggested by various members and accepted by the committee.

Enumeration of forest crop was done by the SOFR unit, Amravati. The analysis of the tree enumeration data was done with the help of computer software developed for the data analysis. Stock mapping was done by the staff of this Division and to complete the work in time, help of staff of the Working Plan Division, Chandrapur - II was also taken. Analyzed enumeration data, Stock Maps and satellite imagery density data helped in forming the different Working Circles.

In this Plan, due care has been taken to incorporate all suggestions given by the State Level Working Plan Committee, in the meeting, during the discussion on the Draft Plan. Though the Protection and Catchment Area Management Working Circle was not proposed in the PWPR-I, considering the number of water bodies and its importance for the very existence of the local people, this working circle, in consultation with the then C.C.F, Nagpur, was inducted in the PWPR-II and continued in the Draft. During the discussion at the time of discussion on PWPR II, the then PCCF, M.S., suggested that the area under Protection and catchment Area Management Working Circle should be reduced by excluding the areas not directly draining into the water bodies, i.e. this working circle is now includes only those areas which are directly draining into the water bodies.

Major changes, as compared to the previous Plan, which has been effected in the present working plan, are as follow:

1. There are many Major, Medium and Minor irrigation projects in Bhandara Division. So major area is under submergence and catchments of these water bodies. To protect these areas, Protection and Catchment Area Management Working Circle has been introduced.
2. Tassar-cultivation (Overlapping) Working Circle has been deleted from this plan as there is no remarkable work done in Tassar cultivation. This activity has been included in the NTFP Working Circle.
3. Ministry of Environment & Forests (GOI) circulated National Working Plan Code in June 2004. In accordance with the National Working Plan Code chapters on Forest Protection & JFM have been incorporated.
4. The Wildlife Management Working Circle has been written with very detail information and guidelines.

5. The major minerals found in the district have been listed and its location has been given in the appendix, so that the field staff should be aware of the Mineral Resources found in the forest areas of the division and proper measures can be taken to protect them.

6. Many Old Teak Plantations have not been worked Silviculturally for the last several years, resulting into loss of quality due to congestion in the crop. For the better management of these plantations, Old Teak Plantation (Overlapping) Working Circle has been introduced in this Plan as was proposed in the PWPR I.

This plan has been completed in time in spite of major constraints like acute shortage of staff, timely availability of relevant essential information from Bhandara Forest Dn. In spite of all efforts, including constant persuasion, many important information, like Coupe Control Forms, Compartment history Forms, Protection Plan, JFM schemes, list of Plantations, list of old and new Survey Numbers of the Protected Forests and Jhudpi Jungle etc. have not been provided to this office. Had the required information been given in time a better plan could have been prepared and that too much earlier.

I express my deep sense of gratitude for the valuable guidance and advice given by Mr. B.Majumdar,IFS, Principal Chief Conservator of Forests (Wildlife), Mr. A.K Joshi,IFS, Addl. Principal Chief Conservator of Forests (P & M) M.S. Nagpur, Mr.Ashok Sharma,IFS, the then Chief Conservator of Forests, Working Plan, Nagpur and Mr. Krishna Mohan,IFS, Present Chief Conservator of Forests, Working Plan, Nagpur, for their kind inspiration and valuable guidance in finalization of this plan. I am highly thankful to Mr.S.W.H.Naqvi,IFS, the then Chief Conservator of Forests (Territorial) Nagpur, Dr.S.K.Khetarpal,IFS, the Chief Conservator of Forests Nagpur Circle, Dr. Nandkishore, IFS Chief Conservator of Forests(Wildlife), Nagpur and Mr.A.K.Saxena,IFS, Chief Conservator of Forests, Wildlife, for their valuable suggestions, guidance, extending help for providing information and co-operating in all respect to complete the Plan in time. I will not be doing justice if I fail to thank Mr.Dilip Singh, IFS, C.F. Working Plan Chandrapur-II, for providing staff to complete the stock mapping of Bhandara Dn. I am grateful to the staff of the SOFR unit of Amravati for their timely work of enumeration. I am also thankful to Mr.B.S.Thakre,IFS, Dy.Conservator of Forests, Bhandara and all his staff for rendering co-operations during the field work. I am also thankful to Mr. B.T.Bhagat, Divisional Manager, FDCM Ltd. Bhandara, for providing data on FDCM, Bhandara Division in writing the chapter on FDCM.

I am thankful to Mr.B.B.Kalbande, Range Forest Officer,Working plan Dn. Nagpur, Mr.B.T.Wadai, Range Forest Officer, Working Plan Dn. Nagpur,(Rtd.), Mr.N.J.Waghade, Range Forest Officer,Working Plan Dn. Nagpur now Asstt. Director SFD, Nagpur, for the services rendered in this regard. I am thankful to Mr. B.S.Belsare, Ranger Surveyor, Mr. J.M.Ghodam, Surveyor, Mr. S. V. Deshmukh, Surveyor, Mr.V.G.Gurao, Surveyor, all belonging to the Working Plan Dn. Nagpur and Mr. G.G.Nanore, Surveyor,

Working plan Dn. Chandrapur II, for their untiring work in compilation & analysis of Data and Digitization of maps with the help of GIS software..

All the photographs used in this Plan have been shot by the undersigned.

The Staff of this Division, deserve commends and thanks, who worked hard and with great enthusiasm, against all odds to complete this plan.

- i. Mr. D.M.Meshram, Chief Accountant
- ii. Ms. P.S. Bhalekar, Accountant
- iii. Mr. N.T.Ikhankar, Clerk
- iv. Mr. M.B.Bhoyar, Clerk
- v. Ms. Reeta Vaidya, Forester (Nagpur Dn.)
- vi. Ms. Poonam Brahmane,Forester (Nagpur Dn.)
- vii. Mr. V.M.Sahare, Forest Guard (C.C.F. W.P., Office)
- viii. Ms. Pushpa Kumbhare Forest Guard
- ix. Mr. S.M.Shah, Forest Guard
- x. Mr. N.M.Puri, Forest Guard
- xi. Mr. B.N. Gomase, Forest Guard
- xii. Mr. Mohammad Irfan, Driver
- xiii. Mr. R.B.Pandey, Peon.

(Dr.F.S. Jafry, IFS.)

Conservator of Forests,

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Nagpur.

Dated: June 10, 2009.

Executive Summary of the Working Plan For Bhandara Forest Division.

1. This is the 8th. Working Plan for the Bhandara Forest Division, under the Conservancy of Nagpur Circle in the Bhandara District of Maharashtra State. Vide Govt.letter No.FDM-2003/C R-168/F-2, dated 13/04/2007; the Bhandara and the Gondia Forest Divisions have been reorganized to coincide with the revenue districts of Bhandara and Gondia respectively. After the reorganization, the Bhandara Division has ten Territorial Forest Ranges, namely Bhandara, Sakoli, Pauni, Lakhni, Lakhandur, Nakadongri, Lendejhari, Tumsar, Jamkandri and Adyal. Out of these ranges, Lendejhari, Nakadongri, Lakhani and Lakhandur are newly created ranges. Tiroda range of old Bhandara Division has been transferred to Gondia Forest Division.

The Division consists of 39 rounds and 163 beats. The Bhandara Forest Division is situated between 20°39' to 21°38' North Latitude and 79°25' to 80°42' East Longitude and the altitude of the district varies from 310 mts. to 340 mts. above the mean sea level. The division is surrounded as follows.

North & North East → M.P.State and Gondia Division, Gondia Distt.

East & South East → Gondia Division, Gondia District.

South & South West → Bramhapuri Division, Chandrapur District.

West → Nagpur Division, Nagpur District.

Bhandara Working Plan is written for 927.79 sq.kms. forest area for the period 2009-2010 to 2018-2019. It comprises of

- i. 547.13 sq.km.of Reserved Forests (160 compptt.)
- ii. 275.68 sq.km.of Protected Forests (275compptt.)
- iii. 100.22 sq.km.of Jhudpi Jungle (324 Village)
- iv. 4.76 sq.km.of Unclassed Forests (1 Village.)
- v. 24.92 sq.km.of area under other Department

In the year 2007 reorganisation of Bhandara division, on the line of revenue district boundary was done and in the process 8159.466 ha. of RF, 7623.167 ha. of PF, Gose PF, 347.900 and 3559.689 ha. of Jhudpi jungle (total area 19690.173 ha.) have been transferred to Gondia Division. In the same way, 2009.078 ha. of RF; 2286.241 ha. of PF and 475.635 ha. of un-classed forest and 885.130 ha. of Jhudpi Jungle (total area 5656.084 ha.) have been transferred to Bhandara Division. These areas already included in current Gondia Division plan but this area has been incorporated in the current



working plan of Bhandara, as the working plan of Gondia Division will be expiring in 2012 - 2013.

For administrative reasons Bhandara District has been bifurcated in to two districts and the present Bhandara district consists of 7 talukas namely Tumsar, Sakoli, Bhandara, Paoni, Lakhandur, Lakhni & Mohadi.

2. The Soils of the district are highly varied. The main types of soils are Black, Cankar, Sihar Marad, Kharoli, and Bardi. The other Soils of the district are Kachhar, Marhami & Petari which are found along the river banks.

3. The geological formation is Archean system; Sakoli and Sausar series.

4. The climate of the division is in general moderate, where the summer is hot while the winter is mild. In April the maximum temperature goes up to 42°C, while in May it goes up to 47°C. The winter is mild during December to mid February and the minimum temperature varies between 6°C to 17°C. The average rainfall in the district during the period 1996 to 2005 was 1128 mm.

5. As per 2001 census, population of Bhandara District is 11.36 lakh comprising 5.73 lakh male & 5.63 lakh female. Out of which 10.73 % is Scheduled Tribe and 18.97 % is Scheduled Caste. There are 660 Villages in the district (division), out of which 388 villages are adjoining the forest areas. At present 210 villages have been covered under the JFM scheme and 22614.271 ha area have been handed over to the Committees. People are economically not very sound but the literacy is about 70%. As per 2005 cattle census cattle population in Bhandara District is 4.78 lakh out of which 47% are cows & bulls, 19% buffaloes, 33% are sheep, goats & horses. The cattle density is 778 per sq.km. Due to concentrated grazing of cattle in the forests adjoining these villages, the health of the forest is poor, specially the regeneration is not very good in the areas facing heavy grazing pressure.

6. Forest of the Bhandara Division as per Champion & Seth's classification are as below:

<u>Forest Type</u>	<u>Type Description</u>
Group-5	Tropical Dry Deciduous Forest
Sub-group-5A	Southern Tropical Dry Deciduous Forest
i) Climax Type	
5A/C1	Dry Teak Bearing Forest
5A/C3	Southern Dry Mixed Deciduous Forest
ii) Degradation Stage	
5/DS1	Dry Deciduous Scrub
ii) General Serial Type	
5/1S1	Dry Tropical Riverian Forest

The Forest of Bhandara Division is susceptible to injuries from the following:

- i. **Grazing:** Grazing Pressure is acute due to large number of cattle present in this tract. The forests adjoining the villages face severe grazing pressure due to concentrated grazing by cattle including large number of goat and sheep. Over grazing is leading to destruction of ground flora, specially the regeneration of valuable spp. Like Bija, Shisham, Shivan etc. At the same time the soil has also been deteriorated due to compaction and erosion. The loss of various herbs and shrubs are not accounted for.
- ii. **Forest Fire:** Regular Annual Fires are also highly destructive factor for the flora and fauna of the tract.
- iii. **Illicit Felling:** Illicit cutting of trees for local and commercial consumptions and for encroachments upon the forest land is another important factor adversely affecting the forests of the division..
- iv. **Encroachment:** Encroachment upon Forest land is considerably high and as per records, a total of 433.27 ha. of Forest Land is under encroachment.
- v. **Drought** is seldom felt. **Frost** never reported in the area. **Diseases** reported are not so epidemic. Drought, Frost, insects, pests and parasites have little impact on the health of these Forests.

The injuries to the forest can be minimized by strictly implementing all the prescriptions of the plans.

7. 33407.80 ha. of forest land in the tract has been managed by the Forest Development Corporation of Maharashtra and a separate management plan for the said area is prepared by the FDCM.

8. Though the District consists of forest (area of this division) to the tune of 25%, the budgetary allocation of the district planning is too less to experience the impact on the development in the forestry sector.

9. Labour supply for forestry working is mainly through local population, and most of the coupe works are done through F.L.C.S.

Past System of Management:

10. The forest of this area was declared as reserved in 1879. These forests were brought under scientific management only in 1893. At that time these forests were open to all activities for a person who took a license. The systematic working of this forest started in the year 1893 under the range wise Working Plans. In these plans no working was prescribed for the inaccessible areas. Other working Circles formed, were, IWC and Conversion Working Circle. The IWC coupes were worked under Coppice with Standard system on a 30 year rotation and areas of conversion to High Forest Working Circle were worked under Improvement fellings.



11. The area, formerly belonging to Malguzars, vested in the state govt. on 1st.April, 1951, were taken over by the Revenue Department and subsequently transferred to the Forest Department up to 1954. They were then declared as Protected Forests. Notification under Indian Forest Act, 1927 was issued in respect of all these forests. In 1977 some more areas were declared as Reserved Forest.

12. Before a consolidated Working Plan for the tract, written by Dr.Nandkishore and Shri.G.U.Bhaid (1996-97 to 2005-2006 extended up to 2007-2008), the areas were brought under scientific management under the following Plans.

Table No.1 List of Working Plans its' Period and Prescriptions.

Sl.No	Schemes of	Period	Prescription
1	Range wise Plan	1893 to 1910	IWC WC, CHF WC, U WC, WC,
2	Best	1910 to 1930	HF WC, CWS WC, B WC,
3	Chaddha	1930 to 1940	HF WC, SC WC, B WC, M WC
4	Jagdamba Pd.	1940 to 1957	HF WC, IWC WC, CWR WC, M WC, S WC , P WC
5	Trivedi	1957 to 1977	SCI WC, CWR WC, P WC, M WC , B WC , L WC
6	Patil & Sardar	1977 to 1996	C WC, CWR WC, K WC, M WC, B WC , W WC

Where ;

SCIWC = Selection Cum Improvement Working Circle.

IWC = Improvement Working Circle.

CHF WC = Conversion to High Forest Working circle.

UWC = Unworkable Working Circle.

GWC = Grazing Working Circle.

HFWC = High Forest Working Circle.

CWSWC = Coppice-with Standard Working Circle.

BWC = Bamboo (O.L.) Working Circle.

SCWC = Simple Coppice Working Circle.

MWC = Miscellaneous Working Circle.

CWRWC = Coppice with Reserve Working Circle.

SWC = Semal (O.L) Working Circle.

PWC = Plantation/Pasture Working Circle.

LWC = Lac (O.L.) Working Circle.

CWC = Conversion Working Circle.

KWC = Kuran Working Circle.

WWC = Wildlife (O.L.) Working Circle.

13. Dr.NandKishore & Shri G.U.Bhaid's Plan for the Period 1996-97 to 2005-2006, extended up to 2007-2008. This plan dealt most of the areas of the division with the following Working Circles.

Table No. 2. Working Circles, its Area and Prescriptions.

Sl.No.	Working Circle	Area(in ha.)	Prescriptions
1	SCI WC	43744.495 ha.	Thinning Felling in each girth lass.
2	IWC	40005.318 ha.	Improvement Felling.
3	FFP WC	11610.239 ha.	Pasture Area Development No work.
4	Miscellaneous WC	30161.547 ha.	Area under various Department
5	Bamboo (OL) WC	5564.474 ha.	Silvicultural Harvesting of Bamboo. No Commercial Felling.
6	Wild life(OL) WC	125521.599 ha.	Protection &Development of W.L.
7	Tassar Cultivation (OL) WC	175.590 ha.	Raising Plantation of Tassar.

14. Impact of Execution of Dr. Nandkishore's Plan:

The said working plan was sanctioned in the year 1998. The coupe No. I, II and VII could not be worked and were left un-worked for various reasons. It is also observed that the important Subsequent Silvicultural Operations, after the main working, like CBO, cleaning, thinning, singling, protection from fire and grazing etc. have been neglected thus leading to the general deterioration of the forests. Besides this, information in the prescribed Control Forms were not supplied to this division during the implementation of the plan. Considering all these facts it is concluded that the prescriptions of the working plan could not be implemented effectively and hence it is not possible to assess any considerable impact/result due to the implementation of this working plan.

- i. SCI Working Circle:** Total area due for working was 24347.800 ha. out of which only 14214.003 ha. (58.38%) area was worked. On many occasions concentrated felling was done thus creating an opening in the forest. Thinning was not done in the area having congested young crops and old teak plantations, thus adversely affected the crop. Important subsequent operations after main felling like stool dressing, removal of live stumps, CBO, cleaning, thinning were prescribed in the plan but were not implemented seriously. Considerable area of this working circle was also heavily damaged due to regular fire and

uncontrolled grazing (including grazing by goats). Marking rules of this working circle were little complicated for the field staff to understand and practice in the field and important operations of marking have been neglected. Regarding regeneration operations these coupes were not successfully regenerated either naturally or artificially. Only 2044 ha. of plantations were taken during the period. Many of these plantations, in the areas adjoining to the villages are failed.

- ii. **Improvement Working Circle:** Out of 22268.31 ha. due for working, only 10714.198 ha. (48.11%) area was worked. Regarding regeneration only 1089.40 ha. (4.89%) area has artificially been regenerated. The condition of Natural Regeneration is also poor, as most of the areas are around villages and under tremendous biotic pressure.
- iii. **Fuel-wood Fodder and Pasture Working Circle:** As per the prescriptions, the area was supposed to be closed for grazing, high quality grasses were supposed to be planted and protected from fire and unregulated grazing, but none of these operations were carried out properly, as a result the area under this working circles has further deteriorated. Out of 6377.097 ha. area, under this working circles a total of only 228 ha. of grass plantation was taken. Most of these plantations do not exist on the ground.
- iv. **Bamboo (Overlapping) Working Circle:** Natural Bamboos are confined to a small area of this division, which too have deteriorated due to non working and illicit cutting. Large scale plantations have been taken through out the division, which are satisfactory. But due to nonworking, these clumps have become congested and some of them even dead. In some Bamboo plantation areas it has been noticed that in one clump more than one species of Bamboo have been planted. This might be due to mixed seeds of Bamboo was sown in the same poly pot.
- v. **Wildlife (Overlapping) Working Circle:** The location of forests of Bhandara division is very important from the Wild life Management point of view. The population of wildlife in Bhandara division is fairly good. There were several prescriptions in the working plan for wildlife management, but most of these prescriptions could not be implemented.
- vi. **Tussar Cultivation (Overlapping) Working Circle:** The quality of the forest, where this cultivation is practiced has become highly degraded, due to continuous pollarding of the crop, haphazard working and total lack of scientific knowledge of forestry among Tussar (Kosa) cultivators.

15. Present Plan (2009-2010 to 2018-2019) Discussed: National Forest Policy, National Wildlife Action Plan, National Forest Action Plan, Hon. Supreme Court's directives, State Working Plan Code , National Working Plan



Code 2004 and **The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights), Act 2006 and its Rules**, form the basis of preparation of present working plan report. The plan is supposed to deal in the technical aspect of the forestry required for scientific sustainable management of the forests. The silvicultural prescriptions have to be followed, irrespective of the ownership and rights on the forest and all the forest resources.

Following working circles and mandatory chapters are the constituents of the present working plan:

Table No.3 Comparative Area Distribution in the Previous and the Present Plan

Sr.No.	Working Circles	Dr.Nand Kishor Plan (Area in ha.)	Present Plan (Area in ha.)	Remarks
1	SCI	43744.495	25742.851	
2	IWC	40005.318	24083.454	
3	FF&P WC	11610.239	6277.468	
4	Misc.WC	30161.547	-	Deleted
5	Bamboo(OL)WC	5564.474	22626.218	OL WC
6	Wildlife(OL)WC	125521.599 (Entire Area)	92779.057 (Entire Tract)	Entire Area , O.L.W.C.
7	Tussar WC	175.590 Ha.	-	Deleted
8	P & Catch. AM WC	-	10335.424	New Working circle
9	AFF.WC	-	26339.86	New Working circle
10	NTFP (OL) WC	-	Entire Tract	New Working circle
12	Old Teak Pl.WC		5272.7	New Working circle
	Total	125521.599	92779.057	

15.1 Selection-Cum Improvement Working Circle: Selection-cum Improvement Working Circle consists of Forest Areas to the tune of 25742.851 ha. which is 27.74 % of the total plan area. Forest areas with matured crop and capable of producing large sized timber has been included in this Working Circle. The special objects of management are.

1. To gradually convert stunted coppice crop, of valuable species, with reduced coppicing vigor in to high forest.
2. To obtain sustained supply of medium to large sized Timber and poles.
3. To maintain mixed forest composition & high forest of the forest crop and improve the density of the stocking.
4. To increase the proportion of Teak and other valuable miscellaneous trees species in the crop.
5. To improve the productivity of Bamboo.
6. To improve the biological diversity and habitat for the wildlife.

Felling cycle, Felling Series, Harvestable Girth etc. are as follow:

Felling cycle = 20 years.

Number of felling series are 14 and average area of the coupes is 92 ha.

Selection Girth:

For Group -1 Species Teak

Site quality III - 135 cm.

Site quality IV - 120 cm.

For group II Species (Ain, Bija, Haldu, Kalam)

Site quality III - 135 cm.

Site quality IV - 120 cm.

For group III Species (Dhaoda, Tiwas, Surya etc.)

Site quality IV - 90 cm.

For group IV species (Garadi, Lendia)

Site quality IV - 45 cm.

Yield calculation was done, based on the stem analysis work, carried out by the C.F.Working Plan Division Nagpur. **F.D.Liocourt's** method of calculation of yield in all aged forest for selection felling of silviculturally available trees, has been adopted. 50% of the available trees are proposed to be removed and thus marked for felling. The annual yield will be approximately 3366.23 M³. The annual yield per ha. is estimated to be 0.1299 M³, which is as comparable to the volume per ha. in the previous plan i.e. 0.1576 cum. The main reason for the reduction in the yield is due to the transfer of best forest areas of Tiroda range to Gondia Dn.

Coupes will be demarcated & marking of trees will be followed. Coupes will be demarcated and treatment map will be prepared classifying the areas in categories A, B, C & D.

A-Type is protection area and no marking for felling will be done. SMC works, seed sowing and stake planting is recommended. Planting of suitable spp. may be taken if necessary.

B-Type area is under stocked, having crown density below 0.4. No selective marking will be done, only dead and malformed trees will be marked for felling. SMC works will be carried out. Natural Regeneration will be augmented and seedlings of seed origin will be given preference over coppice. Area without NR will be regenerated artificially with choice species. Teak should not be more than 50%.



C-Type area consists of young crop. These areas will be thinned as per rules to provide sufficient growing space to the young crop for proper growth.

D-Type area consists of forests with crown density more than 0.4. Selection felling will be followed for harvesting. No fruit and NTFP bearing trees will be marked for felling. 1st. & 2nd. due coupes for operation will be marked in the first year of operation. Coupe will be marked one year in advance and followed by felling in the next year. SMC works will also be carried out with marking work and will be completed by the onset of monsoon. Regeneration will be achieved by NR. Natural seedling will be treated & tended. Cut back operation in the following year and cleaning in 6th. year of the main working year to be carried out. Regeneration with artificial means will be carried out if it is necessary. Thinning will be carried out in the 11th. year.

15.2 Improvement Working Circle: Improvement Working Circle consists of forest areas to the tune of 24083.454 ha. which is 25.95 % of the total plan area. The special objects of management are:

- i) To improve the existing crops & nursing back these forests to normalcy by carrying out improvement felling in favour of desired species and tending of natural regeneration and supplementary plantations of valuable species.
- ii) To check soil erosion and conserve soil moisture.
- iii) To provide small timber, poles & firewood to meet the bona fide needs of the local people, besides improving the young crop.
- iv) To improve the quality of Wildlife habitat.

Felling cycle will be 20 years; number of felling series will be 11. Average area of the coupes is 109.47 ha. No selection girth prescribed as only improvement felling will be carried out to remove dead and malformed trees. Regeneration will be carried out by Natural Regeneration and if required, supplemented with Artificial Regeneration.

15.3 Afforestation Working Circle: The Afforestation Working Circle consists of forest area to the tune of 26339.860 ha. which is 28.36 % of the total plan area. The special objects of management are:

- i) To restore the vegetative cover of the degraded & open areas and to increase its' productivity.
- ii) To check the loss of top soil and to increase the water absorption capacity of the soil.
- iii) To meet the local demand of fuel wood, small timber & poles.
- iv) To improve the quality of the forest by favouring the valuable species.
- v) To restore the habitat of the local wild animals and birds

Felling cycle will be 20 years. Number of felling series will be 10 with an average coupe area of 79 ha. No felling is prescribed in these areas except

the dead, damaged, malformed and live high stumps. Soil & moisture conservation works; plantations of valuable miscellaneous species. Plantation of Teak will also be carried out, only if suitable areas are available for Teak plantation. While tending the N.R., seedlings of seed origin will be given preference over coppice. Involvement of local communities would be an integral component of all the activities.

15.4 Protection & Catchment Area Management Working Circle: This working circle consists of forest area to the tune of 10335.424 ha. which is 11.13 % of the total plan area. Considering the number of water bodies in the district and importance of water supply to the local people, this new working circle has been formed in the Bhandara division. The majority of the areas of all the major, medium & minor irrigation projects of Bhandara division, having catchment area in the forest, have been included in this working circle. The special objects of management are:

- i) To preserve and increase the vegetal cover & to help check the soil erosion and to arrest the runoff
- ii) To protect the fragile forest sites and to prevent the siltation of the dams and water bodies.
- iii) To conserve the bio-diversity and develop a suitable habitat for the wild animals and birds including the migratory birds.

Total 5 treatment series (Felling Series) with an average area of 103 ha. /coupe has been formed. The working circle consists of areas directly draining into the water body. No harvesting except dead trees removal is prescribed. Thinning is proposed in the congested pole crops if necessary. Silvicultural system is proposed on the pattern of watershed management in the areas. Soil and moisture conservation works along with the afforestation is proposed in the erosion prone areas, to prevent further soil erosion and siltation of reservoirs.

15.5 Fuel-wood, Fodder & Pasture Working Circle: The Fuel wood, Fodder & Pasture working circle consists of an area of 6277.468 ha. which is 6.76 % of the total plan area. Area incapable of producing timber and fire wood are included in this working circle. These areas are located in the immediate vicinity of the villages and have heavy demand of grazing. The objects of management of this working circle are:

- i) To augment fodder requirement of the villages and to improve the productivity of dairy industry.
- ii) To introduce the suitable improved variety of grasses as well as legumes and fodder tree species.
- iii) To meet fuel wood and small timber requirement of the local people.
- iv) To reduce the fodder pressure on good forest areas.

Treatment Cycle is fixed at 4 years. Total area of this working circle has been divided into 6 fodder series & each series further divided into four coupes viz. A, B, C & D. Average area of the coupe will be 261.5 ha. Each year area suitable for fodder development will be selected out of the coupes and developed for fodder either by removal of obnoxious weeds if good quality grass is present in the coupe or through plantation of superior grasses on beds of 8 m X 1 m. X 0.15 m dimension, 38 beds/ha. and fodder tree plantation at an spacing of 15 m X 15 m.

15.6 Wildlife (Overlapping) Working Circle: This is an overlapping working circle consisting of whole area of the Bhandara dn. The forests of Bhandara dn. is extremely important from wildlife management point of view, as it can act as corridor between important Protected Areas like Pench, Kanha, Nagzira, Navegaon and Tadoba. Exclusive areas from the point of W.L. management like corridor and additional space for the wild life from Nagzira Wildlife Sanctuary, Navegaon National Park and Tadoba-Andhari Tiger Reserve (through Pauni and Lakhandur Forests) are identified. The prescriptions given in this chapter relating to wildlife conservation; scientific management of wild life in the managed forest by undertaking measures like habitat management (waterhole development and planting of suitable fodder spp. etc.), protection of ecologically sensitive and special habitat sites, compilation of wild life and rare spp. related database. Besides these, proper actions to be taken to protect the wild animals from various deceases and poaching. Action also will be taken to control the illegal trade in wild animal and animal articles in and around the Bhandara city. Large scale 'Awareness Programmes' will be carried out among the local people to develop a better understanding about wild life and its management and to minimize the man animal conflicts.

15.7 Bamboo (Overlapping) Working Circle: Area admeasuring 22626.218 ha. bearing 5161.974 ha. of Bamboo area in 54 compartments has been proposed to be worked under this working circle. 9 felling series with 3 years of cutting cycle have been proposed. The average coupe area is 838 ha. The area is to be worked departmentally to improve the clumps and at the same time meet the requirement of the local people.

15.8 Old Teak Plantation (Overlapping) Working Circle: The total area of 5272.700 ha. of Teak plantations have been discussed under this working circle. Successful plantations will be treated for the thinning in 5 years interval for 1st two mechanical thinning i.e. at the age of 6th year and 11th year. After that the silvicultural thinning at an interval of 10 years till the age of 65 years is prescribed. Since no tending and thinning has been done in most of the plantations in the past, the 1st. thinning (B grade) in plantation raised before 2003 rains and subsequent thinning will be done every 10 years after B grade thinning. Prescribed mechanical thinnings will be carried out in plantations raised after 2003 rains.

15.9 Non Timber Forest Produce (Overlapping) Working Circle: There are many NTFPs like Mahua flower, Mahua seed, Kullu, Dhaoda & Salai gums, Charoli, Myrabolon (Hirda, Beheda, Aonla), honey, lac, Kosa (Tassar) Palas leaves, grasses etc. are the main NTFP of the area. Besides these there are many medicinal plants also found in Bhandara division. A list of the plants has been prepared by the staff of the Working Plan Dn. Nagpur, with the help of the local people of Bhandara division. Developing a data base and techniques of non-destructive harvesting of these NTFP and medicinal plants is the main objective of management. JFM committees are to be encouraged in this regards. The technical knowhow for the harvesting and value addition is to be provided to the people, through proper trainings and workshops of the concerned villages and disposal of these produce will be done as per the recently enacted act i.e. **‘The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights), Act 2006 and its Rules,’ or as decided by the competent authority.**

15.10 Joint Forest Management: It is a mandatory chapter added to encourage the people’s participation in forest management. Poverty and illiteracy are the main obstacles in formation of the JFM committees, eviction of encroachments are also working as obstacle for success of JFM. But few successful JFM results will eliminate these obstacles from the tract. The department will continue to work for promoting JFM. All the micro plans prepared under the JFM scheme, will be in conformation to the silvicultural prescriptions for the area recommended in this plan.

15.11 Forest Protection Scheme: Today protection of forest resources is the greatest challenge before the Forest Department and to meet this challenge we have to devise a mechanism of protection within the existing resources. The D.C.F will have to mobilize his staff to protect the forest from illicit cutting, illegal grazing, fire, encroachment, theft of other forest resources and wild life offences. The existing resources will be utilized as per the requirement during different seasons. Various areas where more attention is required will be identified and plan will be executed accordingly. JFM committees will be motivated and taken into confidence for the protection and conservation of forest resources.

15.12 Miscellaneous Regulations: All important regulations have been discussed in this chapter. Coupe demarcation and marking techniques, harvesting and disposal of forest produce, irregular harvesting, maintenance of boundaries, artificial regeneration, soil and moisture conservation measures etc. have been discussed under this chapter and suitable guidelines have been given.

15.13 Control and Records: Performa for Control Forms, Compartment History, Plantation and Nursery Registers and Divisional Note Book have been given.

15.14 Financial Forecast: On the assumptions that labour wage rate, salary and benefits to staff and static market price for forest produce and



average production of the forest produce and un hindered execution of prescriptions of working plan, financial forecast has been projected as follows:

Table No. 4.Revenue and Expenditure Forecast. *The rates are at 2009-2010 rates.*

Sl. No.	Year	Revenue (Rs in Lakh)	Expenditure (Rs in Lakh)	Wage Component Departmental + licensees
1	2008-09	1,122	531	300
2	2009-10	1,122	544	313
3	2010-11	1,122	566	335
4	2011-12	1,122	607	376
5	2012-13	1,122	656	425
6	2013-14	1,122	702	471
7	2014-15	1,122	717	486
8	2015-16	1,122	722	491
9	2016-17	1,122	727	496
10	2017-18	1,122	714	483

Abbreviations Used in the Plan

Aff.W.C	Afforestation working Circle
A.C.F.	Assistant Conservator of Forests.
b.h.	Breast height.
C.A.I.	Current Annual Increment.
C.A.	Compensatory Afforestation
cm.	Centimeter.
cm³	Cubic centimeter.
Cum/m³	Cubic metre.
Comptt.	Compartment.
C.W.R.	Coppice-with-Reserve
CWLW	Chief Wildlife Warden
d.b.h.o.b.	Diameter at breast height over bark.
d.b.h.u.b.	Diameter at breast height under bark.
Dy.C.F.,D.C.F	Deputy Conservator of Forests.
D.F.O.	Divisional Forest Officer.
Dn.	Division
E.G.S.	Employment Guarantee Scheme
F.D.C.M. Ltd.	Forest Development Corporation of Maharashtra Limited.
F.L.C.S.	Forest Labourers Co-operative Society.
F.R.H.	Forest Rest House.
F.S.	Felling Series.
F.V.	Forest Village.
F.Y.O.	First Year Operations.
F.F&P	Fuel-wood Fodder & Pasture
GIB	Great Indian Bustard
g.b.h.	Girth at breast height.
g.b.h.o.b.	Girth at breast height over bark.
g.b.h.u.b.	Girth at breast height Under bark
ha.	Hectare.
IGF	Inspector General of Forests.
IWC	Improvement Working Circle
JFM	Joint Forest Management
km.	Kilometer.
m.	Metre.
mm.	Millimeter.
M.A.I.	Mean Annual Increment.
M.F.P.	Minor Forest Produce.
MISC.	Miscellaneous
NGO	Non Government Organization
NTFP	Non-Timber Forest Produce
PA.	Protected Area (Wildlife)

P.B.	Periodic Block.
P&CAM	Protection & Catchment Area Management
P.F.	Protected Forests.
P.P.O.	Pre Planting Operations.
R.F.	Reserved Forests.
R.F.O.	Range Forest Officer.
Rs.	Rupees.
SCI	Selection-Cum-Improvement
Sq.	Square.
S.Y.O.	Second Year Operations.
T.Y.O.	Third Year Operations.
W.C.	Working Circle.
WL	Wildlife

Glossary of Local Terms

Adjat species	Miscellaneous species
Bidi	Handmade cigarette wrapped in Tendu leaf.
Bir	An area reserved to grow grass.
Burad	Person who makes mats, baskets etc. of bamboos
Dholi	Containers to store grain.
Doh	A deep pond in a river or stream.
Geru	Red ochre or red earth.
Ghat	A road with a steep gradient.
Ghee	Clarified buffalo-Milkbutter.
Gully	Channel
Jagir	An estate belonging to a Zamindar.
Jagirdar	The holder of Jagir.
Jamindari	An estate belonging to a Zamindar.
Jhiras	Temporary small wells dug in nalas during summer.
Juar	Cultivated millets (<i>Sorghum vulgare</i>).
Kacha (roads)	Temporary (roads).
Kankar	Lime nodules.
Katha	Catechu.
Khariif	Monsoon crop.
Khasara No.	Serial number given to any portion of land entered in land records
Khories	Valleys in between two hills or hillocks.
Malguzari	Land tenure system which existed in Vidarbha.
Malki lands	Lands belonging to private individuals.
Mouza	A village area.
Murum	A reddish hard soil.
Naka	Barrier on road for checking forest produce in transit.
Nala	A water course.
Nistar	Forest produce required for bona-fide agricultural or domestic
Nistar Patrak	Record of rights on Government Land.
Occupational...	The Nistar granted to village Craftman i.e. Mahars, blacksmiths,
Nistar	Chamars etc. at concessional rates for purposes of their craft.
Paidawar	Wild edible flowers, fruits or roots.
Patwari.	Village officer (Subordinate of Revenue Department).
P.C. No.	Patwari Circle Number.
Pucca	Permanent construction.
Pulla	Bundles of cut grass.
Rabi	Winter crop.
Rahadari	Transit.
Raiyatwari	A form of land tenure, applied to land in Raiyatwari tenure and to villagers.
Regur	Black cotton soil.
Rith	A deserted village site
Tatta	A bamboo mat.
UF	Unclassified Forest
Wazib-ul-arz	Village record of customs and rights
Jh.J.	Jhudpi Jungle

Local and Botanical Names of Plants Occurring in Bhandara Forest Division.

Local Name	Botanical Name	Family
A. Trees		
Amaltas/Bahawa	<u>Cassia fistula</u> , (L.)	Caesalpiniaceae
Apta / Kachnar	<u>Bauhinia racemosa</u> , (Lamk.)	Caesalpiniaceae
Aonla	<u>Phyllanthus emblica</u> , (L.)	Euphorbiaceae
Aran	<u>Cassine glauca</u> , (Rottb.)	Celastraceae
Arjun / Kahu	<u>Terminalia arjuna</u> , (Roxb.) W & A	Combretaceae
Ain	<u>Terminalia tomentosa</u>	Combretaceae
Babul / Babhool	<u>Acacia nilotica</u> (L.)	Mimosaseae
Bad/Wad	<u>Ficus benghalensis</u> (L.)	Moraceae
Behada	<u>Terminalia bellerica</u> (Gaertn.) Roxb.	Combretaceae
Bel	<u>Aegle marmelos</u> (L.) Correa.	Rutaceae
Bhirra	<u>Chloroxylon swietenia</u> (Roxb.) DC	Rutaceae
Biba/Bhilawa	<u>Semecarpus anacardium</u> (L.F.)	Anacardiaceae
Bija	<u>Pterocarpus marsupium</u> , (Roxb.)	Fabaceae
Bistendu	<u>Diospyros montana</u> , (Roxb.)	Ebenaceae
Bor/Ber.	<u>Ziziphus mauritiana</u> , (Lamk.)	Rhamnaceae
Char/Chironji	<u>Buchanania lanzan</u> (Spreng.)	Anacardiaceae
Chichwa	<u>Albizzia odoratissima</u> , (Lf.) Bth	Mimosaseae
Chinch/Imli	<u>Tamarindus indica</u> ,(L.)	Caesalpiniaceae
Datrangi/Desipapdi	<u>Ehretia laevis</u> , (Roxb.)	Ehretiaceae
Dhaman	<u>Grewia tiliifolia</u> , (vahl.)	Tiliaceae
Dhaora/Dhawada	<u>Anogeissus latifolia</u> , (R.Br. ex. DC)	Combretaceae
Dhoban	<u>Dalbergia paniculata</u> , (Roxb.)	Fabaceae
Garari.	<u>Cleistanthus collinus</u> , (Roxb.) Bth. ex. Hook. F.	Euphorbiaceae
Ghogar	<u>Gardenia latifolia</u> , (Soland.)	Rubiaceae
Ghoti/Ghot	<u>Ziziphus xylopyra</u> , (Sedgw) Sant	Rhamnaceae
Gogal/Gongal	<u>Cochlospermum religiosum</u> , (L.)	Chochlospermaceae
Gular/Umber	<u>Ficus glomerata</u> ,(Roxb.)	Moraceae

Local Name	Botanical Name	Family
Haldu	<i>Adina cordifolia</i> , (Roxb.) Hook.F	Rubiaceae
Hiwar	<i>Acacia leucophloea</i> Willd	Mimoseae
Hirda/Harra	<i>Terminalia chebula</i> , (Retz.) Wild	Combretaceae
Jambhul/Jamun	<i>Eugenia jambolana</i> , (L.) Skeels	Myrtaceae
Kala karai	<i>Casearia elliptica</i> , (Wild.)	Samydeaceae
Kalaphetra	<i>Randia uliginosa</i> , (DG)	Rubiaceae
Kakad	<i>Garuga pinnata</i> , (Roxb)	Burseraceae
Kakai	<i>Flacourtia indica</i> , (Burm. f.)	Flacourtiaceae
Karai	<i>Milusa velutina</i> , (Dunal)	Anonaceae
Kalam/Mundi	<i>Mitragyna parvifolia</i> , (Roxb)	Rubiaceae
Karanj	<i>Pongamia pinnata</i> , (L.) Pierre	Fabaceae
Kateain/Kasai	<i>Bridelia retusa</i> , (L.) spr.	Euphorbiaceae
Katsawar/Semal	<i>Bombax ceiba</i> , (L.)	Bombaceae
Khair	<i>Acacia catechu</i> , (L.F.) Wild	Mimosaceae
Khirni	<i>Manilkara hexandra</i> , (Roxb.)	Sapotaceae
Kullu/Kulu	<i>Sterculia urens</i> , (Roxb.)	Sterculiaceae
Kumbhi	<i>Careya arborea</i> , (Roxb.)	Lecythidiaceae
Kusum	<i>Schleichera oleosa</i> , (Lour.) Oken.	Sapindaceae
Lendia/Lenda	<i>Lagerstroemia parviflora</i> , (Roxb.)	Lythraceae
Lokhandi	<i>Ixora arborea</i> , (Roxb.) ex.Sm	Rubiaceae
Maharukh	<i>Ailanthus excelsa</i> , (Roxb.)	Simaroubaceae
Medsing	<i>Dolichandrone falcata</i> , (Seem.)	Bignoniaceae
Moha/Mahuwa	<i>Madhuca indica</i> (Gmel)	Sapotaceae
Mokha	<i>Schrebera swietenoides</i> , (Roxb.)	Aristolochiaceae
Moyen/Mowai	<i>Lannea coromandelica</i> (Hout.) Merr.	Anacardiaceae
Neem	<i>Azadirachta indica</i> , (Juss.)	Meliaceae
Padar	<i>Stereospermum suaveolens</i> (DC)	Bignoniaceae
Palas	<i>Butea frondosa</i> (Lam.) Taub	Fabaceae
Pangara	<i>Erythrina variegata</i> (L.)	Fabaceae
Rohan	<i>Soyimida febrifuga</i> (A.Juss.)	Meliaceae
Sag/Sagwan/Teak	<i>Tectona grandis</i> , (L.F.)	Verbenaceae
Saja/Ain	<i>Terminalia tomentosa</i> , W & A	Combretaceae



Local Name	Botanical Name	Family
Salai	<u>Boswellia serrata</u> , (Roxb.ex. Colebr)	Burseraceae
Shisham	<u>Dalbergia latifolia</u> , (Roxb.)	Fabaceae
Shiwan/Siwan	<u>Gmelina arborea</u> , (Roxb.)	Verbenaceae
Sindi/Chhindi	<u>Phoenix sylvestris</u> , (Linn)	Arecaceae (Palmae)
Siras (Black)	<u>Albizzia lebbek</u> , (L.) Bth.	Mimosaseae
Siras (White)	<u>Albizzia procera</u> , (Roxb.) Bth.	Mimosaseae
Sissoo	<u>Dalbergia sissoo</u> (Roxb.)	Fabaceae
Sitaphal	<u>Annona squamosa</u> , (L.)	Annonaceae
Subabul	<u>Leucaena leucocephala</u> (L.)	Mimosaseae
Surya	<u>Xylia xylocarpa</u> , (Roxb)	Mimosaseae
Tendu	<u>Diospyros malanoxylon</u> (Roxb)	Ebenaceae
Tiwas/Tinsa	<u>Ougeinia dalbergioides</u> , (Roxb.)	Fabaceae
Tondri	<u>Casearia tomentosa</u> , (Roxb.)	Samydaceae
Umber	<u>Ficus glomerata</u> , (L.)	Moraceae
Wandra/Bainsa	<u>Salix tetrasperma</u> , (Roxb)	Salicaceae
Warang/Baranga	<u>Kydia calycina</u> , (Roxb.)	Malvaceae
White kuda/Satkuda/ Kuda	<u>Holarrhena anthidysentrica</u> (Wall)	Apocynaceae

B. Shrubs

Aal	<u>Morinda citrifolia</u> , (Linn.)	Rubiaceae
Adulsa	<u>Adhatoda zeylanica</u>	Acanthaceae
Ardanda	<u>Caparis zeylanica</u>	Capparaceae
Bharati	<u>Maytenus emarginata</u> , (Wild)	Celastraceae
Bhawarmal/ Bain Champa	<u>Hamiltonia suaveolens</u> , (Roxb.)	Rubiaceae
Dekamali	<u>Gardenia gummiifera</u> (L.F.)	Rubiaceae
Dudhi/Kalakuda	<u>Wrightia tinctoria</u> , (Roxb)	Apocynaceae
Gautri/Gaturli	<u>Grewia hirsuta</u> (Vahl, symb.)	Tiliaceae
Ghaneri/Ulta	<u>Lantana camara</u> , (Linn.)	Verbenaceae
Gudvel	<u>Tinospora cordifolia</u>	Menispermaceae
Isharmul/saapsan	<u>Aristolochia indica</u>	Aristolochiaceae



Local Name	Botanical Name	Family
Jilbili/Dhayti	<u>Woodfordia fruticosa</u> , (Kurz)	Lythraceae
Kaladhotra	<u>Datura metel</u> , (Linn)	Solanaceae
Karwand	<u>Carissa arandus</u>	Apocynaceae
Katekoranti	<u>Barleria prionites</u> , (Linn.)	Acanthaceae
Katumber/Auadumber	<u>Ficus hispida</u> , (Linn)	Moraceae
Kharata	<u>Dodonaea viscosa</u> , (Linn.)	Sapindaceae
Pandhra Kuda	<u>Holorrhena antidysentrica</u>	Apocynaceae
Parijat	<u>Nyctanthes arbor-tristis</u> , Jacq.	Nyctanthaceae
Murudsheng	<u>Helicteres isora</u> , (L.)	Sterculiaceae
Neel	<u>Indigofera tinctoria</u> , (Linn.)	Fabaceae
Nirgudi	<u>Vitex negundo</u> , (L.)	Verbenaceae
Phetra (Safed)	<u>Gardenia turgida</u> , (Roxb)	Rubiaceae
Rui	<u>Calotropis procera</u> , (Aitl) R. Br.	Asclepiadaceae
Sagargota	<u>Caesalpinia bonducella</u>	Caesalpiniaceae
Shatawari	<u>Asparagus racemosus</u>	Liliaceae

C. Herbs

Aghada/Apamarg	<u>Achyranthes aspera</u>	Amaranthaceae
Ambuti/Tipani	<u>Oxalis corniculata</u>	Oxalidaceae
Anantmul	<u>Hemidesmus indicus</u>	Periplocaceae
Bhui Aonla	<u>Phyllanthus niruri</u>	Euphorbiaceae
Dudhivel/Govrrdhan	<u>Euphorbia hirta</u>	Euphorbiaceae
Divali	<u>Tephrosia hamiltonii</u> , (Drumm)	Fabaceae
Gajargawat	<u>Parthenium hysterophorus</u> (Linn)	Asteraceae
Gokru	<u>Tribulus terrestris</u> (Linn)	Zygophyllaceae
Gokukata/Talimkhana	<u>Hygrophilla auriculata</u>	Acanthaceae
Hamata	<u>Stylosanthes hamata</u> (L.)	Caesalpiniaceae
Kamarmodi	<u>Tridax procumbens</u> (Linn)	Asteraceae
Pivla dhotra	<u>Argemone mexicana</u> (L.)	Papaveraceae
Pivili tilwan	<u>Cleome viscosa</u> (Linn)	Cleomaceae
Rantulasi/Bantulasi	<u>Hyptis suaveolens</u> (Linn)	Lamiaceae
Rantur	<u>Atylosia scarabaeoides</u> , (L.)	Fabaceae
Isapghol/Aspghol	<u>Plantago ovata</u>	Plantaginaceae



Local Name	Botanical Name	Family
Kamal	<u>Nelumbo nucifera</u>	Nymphaeaceae
Kamuni	<u>Solanum nigrum</u>	Solanaceae
Kali Musli	<u>Curculigo orchioides</u>	Hypoxidaceae
Kal megh	<u>Andrographis paniculata</u>	Acanthaceae
Lajwanti	<u>Mimosa pudica</u>	Mimosaceae
Ranhalad	<u>Curcuma aromatica</u>	Zyngiberaceae
Rantambaku	<u>Lobelia nicotianaefolia</u>	Lobeliaceae
Sarpgandha	<u>Rauwolfia serpentina</u>	Apocynaceae
Tarota	<u>Cassia tora</u> , (Linn)	Caesalpiniaceae
Waghnakhi	<u>Martynia annua</u> , (Linn)	Martyniaceae

D. Bamboos and Grasses

Bans/Bamboo	<u>Dendrocalamus strictus</u> , (Roxb)	Poaceae/ (Gramineae)
Bhurbhusi	<u>Eragrostic tenella</u> , (L.)	Poaceae/ (Gramineae)
Dab/Dabat/ Phulya	<u>Imperata cylindrica</u> , (Beauv)	Poaceae/ (Gramineae)
Diwartan	<u>Andropogon pumilus</u> , (Roxb)	Poaceae/ (Gramineae)
Hariyalli/Doob	<u>Cynodon dactylon</u> , (Prs)	Poaceae/ (Gramineae)
Gadasheda	<u>Chrysopogon fulvus</u> , (Spr)	Poaceae/ (Gramineae)
Ghonad	<u>Themeda quadrivalvis</u> (L.), O.ktze	Poaceae/ (Gramineae)
Fuler	<u>Arundinella setosa</u> , (Trin)	Poaceae/ (Gramineae)
Katanbahari/Kusara	<u>Aristida funiculata</u> , (Trin. et. Rupr)	Poaceae/ (Gramineae)
Katang bamboo	<u>Bamboosa arundinacea</u> , (Willd)	Poaceae/ (Gramineae)
Khas	<u>Vetiveria zizaniodes</u> , (Linn) Nesh	Poaceae/ (Gramineae)
Kusal	<u>Heteropogon contortus</u> , (Linn)	Poaceae/ (Gramineae)
Marvel (Small)	<u>Dichanthium annulatum</u> , (Forssk)	Poaceae/ (Gramineae)
Marvel (Big)	<u>Dicanthium aristatum</u> (Poir)	Poaceae/ (Gramineae)
Mushan	<u>Iseilema laxum</u> (Hack)	Poaceae/ (Gramineae)
Paunia	<u>Sehima sulcatum</u> (Hack)	Poaceae/ (Gramineae)
Phulkia/Ponai	<u>Apluda mutica</u> , (Linn)	Poaceae/ (Gramineae)
Sabai / Sum	<u>Ischaemum angustifolium</u> (Hack)	Poaceae/ (Gramineae)
Sheda	<u>Sehima nervosum</u> (Rottl.)	Poaceae/ (Gramineae)
Tikhadi	<u>Cymbopogon martinii</u> (Roxb.)	Poaceae/ (Gramineae)



E. Climber

Local Name	Botanical Name	Family
Aradphari/harduli	<u><i>Ola</i></u> <u><i>scandens</i></u> , (Roxb.)	Olacaceae
Chilati	<u><i>Mimosa</i></u> <u><i>hamata</i></u> (Willd)	Mimosaseae
Dhimarwel/Malkagni	<u><i>Celastrus</i></u> <u><i>paniculata</i></u> (Willd)	Celastraceae
Dhudhi/Bokadwel	<u><i>Cryptolepis</i></u> <u><i>buchananii</i></u> , R. & S.	Periplocaceae
Nagwel/Pan	<u><i>Piper</i></u> <u><i>betle</i></u> (L.)	Piperaceae
Eruni	<u><i>Zizyphus</i></u> <u><i>oenoplia</i></u> , (L.) Mill	Rhamnaceae
Gunj/Raktvel	<u><i>Abrus</i></u> <u><i>precatorius</i></u> , (L.)	Fabaceae
Gulvel	<u><i>Tinospora</i></u> <u><i>cordifolia</i></u> , (Willd)	Menispermaceae
Kanjikuri	<u><i>Mucuna</i></u> <u><i>pruriens</i></u> , (L.) D.C.	Fabaceae
Khadyanag/ Langali	<u><i>Gloriosa</i></u> <u><i>superba</i></u> , (L.)	Liliaceae
Khobarvel/Anantmul	<u><i>Hemidesmus</i></u> <u><i>indicus</i></u> , (L.) Ait.	Periplocaceae
Kukudranji	<u><i>Calycotris</i></u> <u><i>floribunda</i></u> , (Land)	Combretaceae
Mahulbel	<u><i>Bauhinia</i></u> <u><i>vahlia</i></u> , (Wand. A)	Caesalpiniaceae
Nasbel	<u><i>Millettia</i></u> <u><i>extensa</i></u> , (Bth.) Baker	Papilionaceae
Papri Lalbel	<u><i>Vantilago</i></u> <u><i>denticulata</i></u> , (Willd)	Rhamnaceae
Palasvel	<u><i>Butea</i></u> <u><i>superba</i></u> (Roxb)	Fabaceae
Piwarvel	<u><i>Combretum</i></u> <u><i>ovalifolium</i></u> (Roxb)	Combretaceae
Ramdaton	<u><i>Smilax</i></u> <u><i>macrophylla</i></u> ,	Smilacaceae
Vasanvel	<u><i>Cocculus</i></u> <u><i>hirsutus</i></u> , (L.) Diels.	Menispermaceae

F. Parasites & Saprophytes

Amarvel	<u><i>Cuscuta</i></u> <u><i>reflexa</i></u> , (Roxb)	Cuscutaceae
Scabra	<u><i>Stylosanthes</i></u> <u><i>scabra</i></u>	Leguminosae
Bandha/ Bandh	<u><i>Vanda</i></u> <u><i>tessellata</i></u> , (Roxb)	Orchidaceae



The Common and Zoological Names of Animals and Birds Commonly Found in the Bhandara Forest Division

Common Name	Zoological Name
A. <u>Animals</u>	
Tiger	<u>Panthera tigris</u>
Panther	<u>Panthera pardus</u>
Striped Hyaena	<u>Hyaena hyaena</u>
Wild dog	<u>Cuon alpinus</u>
Jackal	<u>Canis aureus</u>
Fox	<u>Vulpes bengalensis</u>
Leopard cat	<u>Felis bengalensis</u>
Jungle cat	<u>Felis chaus</u>
Nilgai	<u>Boselaphus tragocamelus</u>
Sambhar	<u>Cervus unicolor</u>
Cheetal	<u>Axis axis</u>
Barking deer	<u>Muntiacus muntjak</u>
Wild boar	<u>Sus scrofa</u>
Sloth bear	<u>Melursus ursinus</u>
Four horned antelope	<u>Tetracerus quadricornis</u>
Langur	<u>Presbytis entellus</u>
Three striped Palm squirrel	<u>Funambulus palmarum</u>
Porcupine	<u>Hystrix indica</u>
Rufous Tailed Hare	<u>Lepus nigricollis ruficaudatus</u>
B. <u>Birds</u>	
Painted sand grouse	<u>Pterocles indicus</u>
Common sand grouse	<u>Pterocles exustus</u>
Peacock	<u>Pavo cristatus</u>
Grey jungle fowl	<u>Gallus sonneratii</u>
Grey partridge(Francolin)	<u>Francolinus pondicerianus</u>
Black breasted quail	<u>Coturnix coromandelica</u>
Indian bustard quail	<u>Turnix suscitator</u>
Blue rock pigeon	<u>Columba livia</u>



Common Name	Zoological Name
Purple wood pigeon	<u>Columba punices</u>
Common Crane	<u>Grus grus</u>
Sarus crane	<u>Grus antigone</u>
Dove (spotted)	<u>Streptopelia chinensis</u>
Ring(Collared) dove	<u>Streptopelia decaocto</u>
Cotton teal	<u>Nettapus coromandelianus</u>
Lesser Whistling teal	<u>Dendrocygna javanica</u>
Vulture	<u>Sarcogyps calvus</u>
Indian White Backed Vulture	<u>Gyps bengalensis</u>
Brown wood Owl	<u>Strix leptogrammica</u>
Brown fish owl	<u>Ketupa zeylonensis</u>
Eurasia Eagle Owl	<u>Bubo bubo</u>
Pied kingfisher	<u>Ceryle rudis</u>
Jungle babbler	<u>Turdoides striatus</u>
Black drongo	<u>Dicrurus macrocercus</u>
Blue jay (Nilkantha), Indian roller	<u>Coracias bengalensis</u>



WORKING PLAN OF BHANDARA FOREST DIVISION

PART-I

SUMMARY OF THE FACTS ON WHICH THE PROPOSALS ARE BASED

CHAPTER – I

THE TRACT DEALT WITH

1.1 Introduction: Bhandara district lies entirely within the Wainganga basin. Three major tributaries of the Wainganga, the Bagh, the Bawanthadi and the Chulband drain the district. The district is traversed West to East in the middle by the Nagpur – Calcutta (South – Eastern) broad gauge railway line and the Nagpur – Raipur National Highway. The district takes its name from Bhanara. A name by which the people still call the town. Bhanara is mentioned in an inscription at Ratnapur about 1100 A.D. The current derivation from **Bhana**, a brass dish is based on the fact that the town had a large brass working industry. The district of Bhandara is often called “Lake District” of Maharashtra, which is well justified by the fact that there are 9 major irrigation projects, 15 medium project and many minor tanks and village tanks. This gives an average of more than 3 tanks for every inhabited village in Bhandara district.

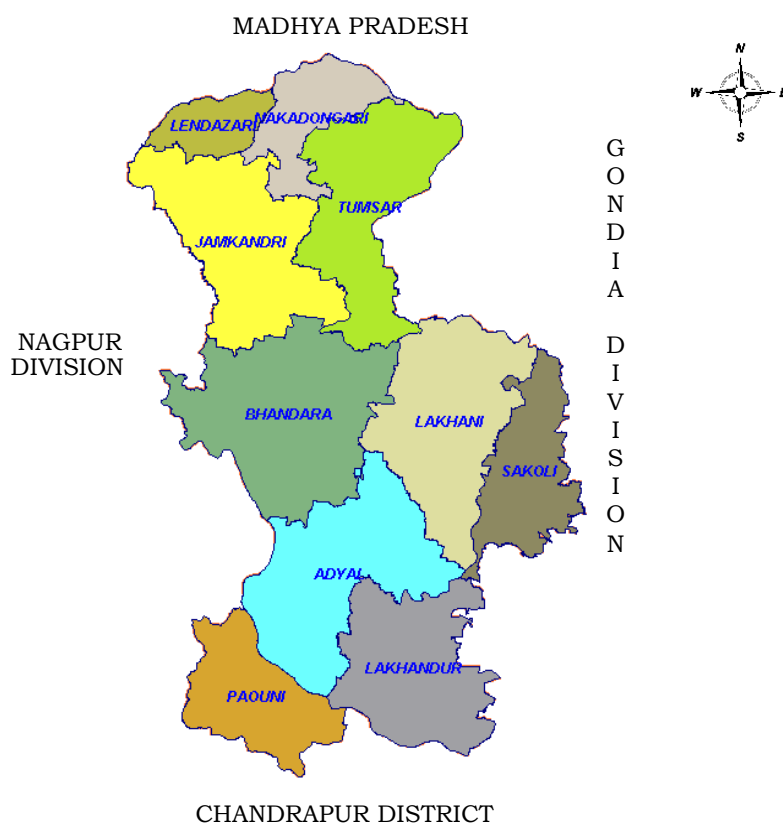
1.2 Name and Situation: The Bhandara Forest division is situated between 20° 39' and 21° 38' north latitude and 79° 25' and 80° 42' east longitude. The forest area of Bhandara division occurs in compact blocks and at some places, in scattered patches and almost touch the district boundary except, on the Road and Railway side. The area is bounded by Wainganga and Bawanthadi rivers in the North forming boundary between Bhandara district of Maharashtra and Balaghat district of Madhya Pradesh, Nagpur district (Nagpur Dn.) in the West, Chandrapur district (Bramhapuri Dn.) in the South and artificial boundary line between Bhandara and Gondia districts (Gondia Dn.) in the East.

Table No. 1.1 Boundary of the Bhandara Division :

Sl. No.	Direction	Name of Forest Division/ District
1	North & North-East	MP State and Gondia district/ Gondia Dn.
2	East & South-East	Gondia Division/Gondia District.
3	South & South-West	Bramhapuri Division, Chandrapur District
4	West	Nagpur Division, Nagpur District



MAP SHOWING RANGES OF BHANDARA FOREST DIVISION



1.3 Configuration of The Ground:

1.3.01 For administrative reasons Bhandara district was bifurcated in to two districts and the present Bhandara district consists of 7 Talukas namely; Tumsar, Sakoli, Bhandara, Pauni, Lakhandur, Lakhni, and Mohadi. The altitude of the district varies from 310 mts to 340 mts above the mean sea level. Distance of Bhandara town from Nagpur is 64 Kms.

1.3.02 The forest in the North and East are largely situated on hilly areas extending at places from the flat top of the hillocks to the lower plains. Some Protected Forests occur as Enclaves in cultivated lands. In Mohadi taluka, the forest occurs mostly along undulating plains. The hill slopes, generally, are gentle to moderately steep; and all aspects are represented. The overall slope of the area is towards North and North-West.

The area, in general, is flat or undulating, broken by the isolated hillocks and ranges of low hill. The slopes are moderate to steep and ground below them is dissected by numerous nalas. There are three main ranges or groups of hills in the tract viz; Ambagarh range in the north-west, Gaikhuri range in the middle and group of hills which crop out near Pauni, in the extreme south-west corner of the tract.



1.3.03 Forest Wealth: The forests in charge of this division, excluding areas transferred to FDCM, Navegaon National Park and Nagzira Sanctuary, is 927.79 sq kms. This comprises of 547.13 sq kms. of Reserved Forest, 275.68 sq kms. of Protected Forest which includes 52.56 sq.km of compensatory lands given against Gosekhurd project and subsequently declared as Protected Forest, 100.22 sq km of Jhudpi Jungle received from the Revenue Department and 4.26 sq.kms of un-classed forest. The forest land of Bhandara constitutes 24.96% of the geographical area, 3716.65 sq km. The last working plan written by Dr. Nandkishore and Shri. G U Bhaid (1996-97 to 2005-06), has expired on March 2006. An extension for coupe No. XI was granted by the Govt. of India up to March 2007 vide GOI Letter No. 12-31/97(FOR)/Vol.III/1923 dated 14th November 2006, again vide GOI letter No. 12-31/97(FOR)/4087, Dated 04.10.2007, permission to work the coupe No.XII was granted with a restriction, not to do commercial fellings.

1.4 Places of Historical Importance: There are many places of historical importance out of which few are mentioned below :

1. **Adyal** - A large village in Bhandara district situated about 22 kms south of Bhandara on the Bhandara-Pauni road. An antique shrine of Mahavir Hanuman with a colossal image beloved to be **Swayambhu** is situated in this village. A big annual fare, lasting for 7 days popularly known as **Ghodyachi Jatra** on **Chaitra Sudha Navmi** is arranged in the month of March – April.
2. **Padmapur** –There remains only massive stone buildings and old images of Hindu Gods like Vishnu and Saraswati and of some Jain Tirthankars, which indicate that the place is probably identical to ancient Padmapura, the birth place of Bhavabhuti one of the greatest Sanskrit play writer who was the author of **Mahavir Charita**, **Multi-Madhav** and **Uttara-Rama-Charita Manas**. Today an Arts and Commerce college at Amgaon perpetuates the memory of Bhavabhuti.
3. **Andhalgaon** – It is in Bhandara tahsil lying about 25.6 km North of Bhandara and connected with Mohadi by good tar road. It is one of the principal centers in the district having a considerable Weaving industry, bordered cloths for women clothing are produced here.
4. **Chandpur** – A small village in Bhandara tahsil situated about 51 kms. north of Bhandara. There are remains of an old fort ascribed to the Gaolis, on the site of which custard apple trees now grow. Inside the fort is a “**Dargah**” of one Chand Shah Vali, at which an annual Urs is held in March-April.
5. **Gaimukh** – A small village in Bhandara tahsil, 32.0 km north of Bhandara. Here spring oozes from the rocks and the name Gaimukh is usually applied to such springs the form of cow’s mouth is being some times carved out of the rock. A fair lasting for a fortnight is held at the place on the day of **Mahashivratri** in the month of March every year.



6. **Gond_Umri** – It is a village in Sakoli tahsil, 32.00 Kms from Sakoli. Soft matting of **Sukhavasa** grass is manufactured here by the Gonds.
7. **Lakhani** – A large prosperous village in Sakoli tahsil situated on the Bombay – Nagpur – Calcutta national highway N. H - 6. 21 Kms from Bhandara. The village is known for lac bangles which used to be manufactured here. This industry as well as glass bangles manufacturing industry which once flourished here is almost extinct.
8. **Mohadi** – A village in the Bhandara tahsil situated at 19 Kms. north of Bhandara on the Tumsar road. A large number of weavers reside here and produce silk bordered cloths, dhoties and saris, being particularly known as coarse cloths, mats and carpets are also woven and dyed. On a small scale bidis are also manufactured.
9. **Pauni** – Small town on the Wainganga River 51 Kms. south of Bhandara by road. An excavation done by Archaeological Department in 1969 reveals that it was a very rich cultural centre during 2nd B.C. to 1st A.D. “Buddha’s Stupa” and “Sanghara” of Ashok regime have been found here. The Stupa has been constructed on the relic of the Buddha’s bones. Pictures of Bodhivruksha (Pipal tree), Kamal (Lotus), Elephant, procession on elephant, climbers, leaves and flowers; are engraved on stones. Recent excavation carried out by the Nagpur University and the Archeological Department of the Central Government have approved that Pauni was well known center of Buddhism in ancient time. It lies on the bank of sacred river Vena (modern Wainganga), which has been highly eulogized in the Maharashtra. Its antiquities go back to pre-Ashokan times. In the excavation, pottery and punch marked coins of the pre-Ashokan period have been found. The hillock near the tank called Balsamudra just outside the city wall represents an ancient **Stupa** which was erected in the pre-Ashokan range and was developed and decorated with a railing and gateway in Shunga period. A set of copper plates discovered recently. Coins of Satavahana and later period have also been found in excavation at Pauni.
10. **Ruyad** – It is a small village situated at 2 km distance on east of Pauni on the bank of Wainganga river. Bhadant Sagharatna has constructed a huge Buddha Vihar with the aid of Japan government. It is called as “Mahasamadhi Bhoomi”. In the front a statue of Meditating Buddan is installed and event from Buddhas life are depicted here. On 8th. February “Dhamma Sabha” is called every year to live a peaceful and virtuous life. Thus, it has become a main Buddhist Cultural Center in the district, to disseminate the essence of Buddhism in the area among people.

1.5 Geology, Rock and Soil: *(Layer of digital soil and geology map have been Included in the GIS project of Bhandara Dn.)*

1.5.01 Geology and Rock: The geological map of Bhandara district has been obtained from the Geological Survey of India, Nagpur. Bhandara district has a



varied lithology and intricate structure. It contains important mineral deposits. The relief is characterized by the presence of lenticular narrow ridges trending in the directions with occasional spurs rising to various heights.

The oldest rocks are the crystalline complexes consisting of granite, granite – gneiss, followed by the mica schist and horn-blended-schist, quartzite, crystalline lime stones, calcigranulites and calciphyres of Sausar series and are exposed in the northern part of the district. They are usually arranged in parallel bands and are very often continuous for many kilometers. It is among the gneisses, schist and quartzites that the manganese ore deposits and the associated manganese silicated rocks are enclosed in the form of elongated lenticular bands conformable in strike and dip to the surrounding rocks.

The southern half of Bhandara is covered with members of the Sakoli formations arranged in a triangular pattern which has also been designated as Bhandara triangle. The various members of formations comprising of phyllites, slates, chlorite schist and sericitic quartzites and sillimanite – kyanite bearing schist are exposed in parallel bands like Sausars in the north. The country separating the Sausar and Sakoli belts is largely covered with alluvium in which small exposure of the Sausar occurs. Both are formations of Dharwar group of rocks. The inferred boundary between the units has been drawn more or less in a north east-south west direction, not far from the town of Tirora and 2 to 3 km north-west of Bhandara town, the Sakoli is lying to the south west and the more metamorphosed Sausars to the north-west. Chemically, Sakolis have scarcity of lime bearing rocks. Lithologically, the Sakoli groups are more predominantly argillaceous and siliceous than the Sausars, which include such rocks as calc-granulite, marbles, manganiferous rocks and manganese ores. Mineralogically, the sausar group of rocks commonly contain feldspar and biotite but not chlorite, whereas those of Sakoli group contain invariably chlorite, rarely biotite and with no feldspars.

A new system of rocks called Dongargarh system of post-Sakoli but pre-Cuddapah age has been suggested by Sarkar (1952). This system occupies a belt of about 88 km wide stretching in a direction for more than 128 kms. between the Sakoli synclinorium on the west and the Chhatisgarh-Cuddapah basin on the east. The main rock types of this system are rhyolite and andesite, Dongargarh granites and sand stone.

The Cuddapahs consisting mainly of sandstones, grits in the upper part with alternate bands of quartzites and conglomerates in the lower part. Beds of Gondwana sediments referred to as Kamthi series comprising conglomerates, arkose and sandstones and lying uncomfortably over the Achaean have been noticed from Wainganga and Chulband river section.

Alluvial soil along the water courses of main tributaries of Wainganga, Chulband is eminently affected the tree growth. The Basaltic rock can be distinguished into two types, namely, those that are extremely compact, hard



and homogenous and the other type is the softer Basalt exfoliating in softer flanks. The former type of rock weathers very slowly and the small quantity of soil i.e. formed in such areas supports low quality tree growth. This covers, mainly, Tiroda, Bhandara, Pimpalgaon, Adyal, Pauni, Sakoli, Jamkandri and Tumsar range. In the areas having softer Basalt, rapid decomposition takes place and a fine yellowish brown loam is obtained. It supports better and valuable tree growth.

As weathering advances the fine grains of the soil and the decomposed organic matters are washed away from the loam and deposited in the lower shelter region forming patches of “Regur” or Black cotton soil. This is a fine grain dark soil which varies greatly in colour, consistency and fertility. It is highly hygroscopic and results in water logging at saturation point. This chemically rich soil is capable of yielding valuable field crops. In the forests, however, the vegetation supported by this soil has mostly to depend upon its natural derivation. Wherever, the drainage is good, as in the belts along streams, it supports valuable forests, elsewhere, it remains particularly water logged and produces an abundant crop of important fodder grasses. Such soils are not favorable for plantations. Regur is some times mixed with canker which generally increases its alkalinity and thus renders it somewhat less suitable for vegetation.

The inter-trappean formation disintegrates into fresh fertile loam capable of supporting good forests, if other factors are favorable. The soil derived from Lameta rocks is only fair and does not seem influencing the vegetation.

1.5.02 Economic Geology: Of the varied mineral deposits of the district that have been taken up for exploitation by private mining concerns, the following economic minerals are important. The location (with Longitude and Latitude) of various minerals in the district is given in the **Appendix - XXVII**

- i. **Manganese** – The manganese ore belt of Bhandara district is principally made up of intensely deformed and metamorphosed rocks of the Precambrian Sausar series. The most important manganese deposits are associated with a series of rocks known as Gondites. Dongri-Buzurg, Sitasongi and Chikla are the three most important manganese belts and have been taken up for mining.
- ii. **Chromites** – It is occurring near Pauni. The chromites occur as several small bands associated with dunite and serpentine surrounded by the country rock granite.
- iii. **Kyanite** – Sillimanite – It occurs in the rocks of Sakoli series. Of these deposits, massive Sillimanite deposits at Pohra and Kainite-Sillimanite deposits at Dahegaon are most important.
- iv. **Corundum** – They have been reported at the foot hill of a small hillock at Pohra.
- v. **Gold** – Occurrence of gold as placer deposits has been reported around Koka village.



- vi. **Radio active minerals** – The occurrence of uranium oxide from granophyres, 5 Kms. NW of Parsori has been reported.
- vii. **Iron ore** – The banded hematite – quartzites and the interbedded purple ferruginous phyllites have given rise to high grade hematite ore in small pockets towards east of Maselli.

Besides the above mentioned minerals, other minerals' deposits of lesser economic significance include the green mica near Mohalgaon, talc and soap stone in Sakoli tahsil and lead and antimony near Pauni.

1.5.03 Soils: The soils of the district are highly varied, arising out of the tropical sub-humid weathering of crystalline metamorphic and igneous rocks. They are essentially residual, though along the southern extremes of the Wainganga valley, down stream of Pauni, alluvial soils predominate. The main types of soils are kali, canker, shire, morand, khardi and bardi. Kali or black regur soils are derived from the weathering of basalts and are generally rare in the district. Kanhar soils are very rich alluvial soils probably of trap origin and occur widely. It crumbles easily and is easy to work. It is clayee-loam in texture, very deep, sticky and retentive of moisture. It bears double crops. The sihar is a reddish-yellow soil derived from, crystalline rocks as a result of oxidation under tropical humid conditions and cracks very little in the hot weather. The khardi soil is dark in colour with a considerable admixture of lime. Bardi is the name given to very poor, gritty sihar or to the detritus of laterite rock.

The other soils of the district are kachhar, marhani and retari which are found along the river banks. They are all alluvial and differ in value according to the deposits brought down. Kachhar is blackish in colour and contains very little sand. Marhani is red and is much more sandy than kachhar. These two soils are good for garden crops. Retari is poor soil and contains almost all sand.

Most of the cultivable soils of the district belong to the morand and sihar types, both of which are light and slightly acidic. The sihar soil is best suited for Rice while morand soil is suited to Jowar, Wheat and Linseed. The bardi and khardi soils are very inferior types of sihar-morand and are used for the cultivation of inferior rice and minor millets.

1.6 Climate: The climate of Bhandara district is hot and dry. There are three seasons namely; cold (winter), hot (summer) and monsoon (rainy). The cold season starts by about the end of November and continues upto middle of February. The cold is mild and the weather is pleasant. The hot season starts by the middle of February till the onset of monsoon in the middle of June. During the months of April and May, the heat of the day is rather unbearable due to hot winds and the dryness of the atmosphere. The monsoon season starts from the middle of June and continues up to first week of October. The monsoon months are sultry. The heat increases as soon as monsoon ends and the months of October and November are mostly uneasy till the winter sets in.



1.6.01 Temperature: The diurnal range of temperature is the largest during March. In August these changes are minimum. In April the maximum temperature goes 42°C, while in May it goes upto 47°C. The shorter divergence is only during the rainy season. The high temperature during the summer months adversely affects the vegetation in flat and bare country. The winter is mild and during December to mid February the minimum temperature varies between 6-17 degree C. In the forest clad hills, more conditions are favourable to plant growth. Temperature data is given in the **Appendix-II.**

1.6.02 Rainfall – The major portion of the total annual rainfall is received during June to September each year, which generally amounts to 85 percent of the annual rainfall. Normally August is the heaviest rainfall month. The average annual rainfall of Bhandara is around 1100 mm. Of late the annual rainfall is showing large variations. The rainfall distribution in a year is also irregular. In the recent past there have been erratic rains during the monsoon almost every alternate year. This affects the natural regeneration as well as afforestation works which are being taken on a large scale. The annual rainfall of Bhandara was 1682.4 mm in 1986 and it was 957.8 mm in 1991. The average rain fall in the district during the period 1996 and 2005, was 1128 mm.

Average number of rainy days in a year varies with place. Except the rainy season, the entire year is dry. The variation of the rainfall from year to year is significantly large. The following table shows the annual rainfall and average number of rainy days (during the year 1997 to 2007) in a year for 6 rain gauge stations of Bhandara district.

Table No.1.2 Average Rain fall and Average Number of Rainy Days During the year 1997-2007.

Sl. No.	Rain-Gauge Stations	Annual Rainfall in mm	Average number of Rainy days in a year
1	Bhandara	1359.3	64
2	Mohadi	1121.16	61
3	Pauni	1289.84	64
4	Tumsar	1132	60
5	Lakhani	1311.67	61
6	Sakoli	1456.72	63
7	Lakhandur	1456.12	59
8	District average	1303.83	82

Table No.1.3 Highest and Lowest Rainfall recorded at Different Stations during 1997 to 2007.

Sl. No.	Rain Gauge Station	Year	Highest Rainfall in mm	Year	Lowest Rainfall in mm
1	Bhandara	2003	2195.5	2004	774
2	Mohadi	1999	1470.9	2004	754.9
3	Tumsar	1999	1602.4	2004	584.1
4	Sakoli	1999	1711.2	2004	1108.7
5	Lakhni	2007	1569.3	2004	671.8
6	Lakhandur	2000	2796.8	2004	1023.8
7	Pauni	2000	1807.6	2004	961.1

1.6.03 Frost: Frost is almost unknown in the forest areas of the district. Slight damage due to frost in the low lying areas of present Tiroda range and Nagzira sanctuary was recorded in 1928-29 and 1936-37.

1.6.04 Storms, Winds and Floods: Winds are generally light to moderate with some increase in wind force during the later part of the summer and monsoon months. During the monsoon the winds blow mostly from directions between south-west and north-west. In the period from October to February, the winds are mainly northerly to north-easterly in the mornings of north-easterly to easterly in the afternoons. By March, winds from directions between south-west and north-west begin to blow and with the advance of the season they become predominant. Occasional storms in pre-monsoon or monsoon periods are also experienced which result into uprooting of isolated trees. The occurrence of floods is not common.

1.6.05 Health: The weather is usually oppressive in summer and very sultry and humid during monsoon. However, during winter it is pleasant. Due to improvement in health services the epidemics are rare. However cases of Gastro-enteritis and Malaria occur in remote villages during the monsoon.

1.7 Water Supply: The major rivers of the district are Wainganga, Bagh, Bawanthadi, Ambagadh, Sur, Bodalkasa, Kanhan, Chulband and Gadvi. Most of these rivers are perennial and are fed by many small tributaries. Due to constructions of irrigation dams, many of these rivers get dry in summer and contain some stagnant pool of water. There are 2 major irrigation projects, 9 medium projects and many minor tanks and village tanks in the district. Average number of tanks per inhabited village comes to more than three. These tanks are used for irrigation, fisheries and drinking water for cattle. The minor tanks and small tanks are shallow and are mostly seasonal in nature. Seepage at the tank bed and evaporation on surface from these tanks are relatively high and they fail in their water supply during the hot weather or years of low rainfall.



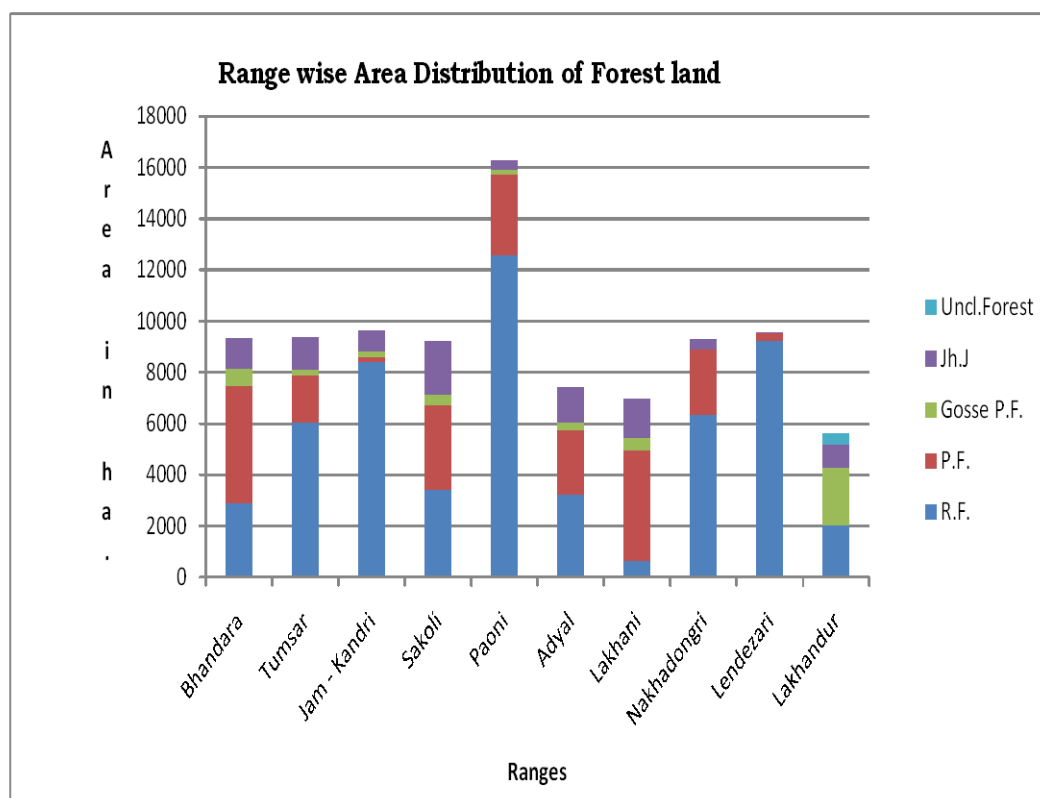
1.7.01 Wells: There are 18616 irrigation wells and 18907 other wells. There are large number of tube wells and hand pumps. The main source of water supply for drinking is through wells, hand pumps and water supply schemes. In summer, shortage of drinking water is felt in many villages, especially in years of low rainfall. During this period drinking water is supplied by tankers and bullock carts to the scarcity villages. Forest department has also constructed wells in the staff colonies, rest houses and nurseries. List of Forest Department wells is in the **Appendix-III.**

1.8 Distribution of Area: The total Forest area of the division excluding FDCM, Navegaon and Nagzira extends over to 927.79 Sq.Kms.

1.8.01 Reserved Forests: The old Reserved Forests of the Bhandara district were divided into 49 blocks having numbers 12 to 17, 17A, 17B, 18, 18A, 19 to 31, 31A, 31B, 32 to 37, 37A, 38 to 42, 44 to 55. In 1930, 46 blocks and in 1940, 3 blocks were divided into 329 compartments having nos. 28 to 356. Koda Mendki (39) and Devangatta (55) blocks comprising compmts. 284 and 356 were disforested during 1943 and 1970 respectively. In 1960 Bhandara division was bifurcated into two Forest division, namely, Bhandara and Gondia. Out of the 47 blocks, 37 complete blocks and part block having numbers 12 to 17, 17A, 17B, 18, 18A, 19 to 31, 31A, 31B, 32 to 37, 37A and 38 (Pt) consists 226 compmt. Having nos. 28 to 213 and 285 to 324 remained in Bhandara division and 9 complete blocks and one part block having nos. 38 (Pt), 40 to 42, 44 to 47, 53 and 54 consists of 101 compmts. From 214 to 283 and 325 to 355 transferred to Gondia Division. In 1984 Nagzira Game Sanctuary, Navegaon National Park were separated from Bhandara and Gondia division and were handed over to the wild life wing. Nagzira sanctuary consists of 37 compartments from 86 to 101 and 109 to 129 spread over block No. 27 and 17A (Pt). Navegaon National Park consists 2 compatts. 202 and 203 from Bhandara division besides other compmts. of Gondia division. These 2 compmts belong to block no. 34. In the year 2007, reorganisation of Bhandara division, on the line of revenue district boundary, was done and in the process 30 compartments (8159.439 ha.) of Reserved forest, 62 compmts.(8016.098 ha.) of Protected forests and 105 villages (3559.689 ha.) of Jhudpi jungle were transferred to the Gondia division. In the same way 5 compartments (2009.078 ha.) of Reserved Forest, 21 compmts. (2286.241 ha.) of Protected forests, 1 village (475.635 ha) of un-classed forest and 885.13 ha. Of Jhudpi Jungle in 12 villages was transferred to Bhandara division. Thus the area of the Reserved Forest in Bhandara division, included in the present plan is 54713.231 ha. consisting of 28 full blocks and 4 part blocks. The total number of compartments in the Reserved Forests is 160.

Table No.1.4 Range wise Area Statement of Bhandara Division. (in Ha.)

Abstract of Bhandara Forest Division								
Sr. No.	Name of Range	(RF,PF, Gose PF, Jh.J. & Unclass Forest)						Total Area in h.
		RF	PF	Gose PF	Total PF	Jh.J.	Unclassed Forest	
		Area in ha.	Area in ha.	Area in ha.	Area in ha.	Area in ha.		
1	2	3	4	5	6	7	8	9
1	Bhandara	2880.341	4590.147	676.23	5266.377	1201.9	0	9348.618
2	Tumsar	6036.61	1837.14	225.77	2062.91	1264.36	0	9363.88
3	Jam - Kandri	8380.683	210.509	225	435.509	825.74	0	9641.932
4	Sakoli	3412.522	3309.131	415.184	3724.315	2113.71	0	9250.547
5	Paoni	12569.498	3162.579	191	3353.579	353.43	0	16276.507
6	Adyal	3239.392	2503.251	275	2778.251	1425.83	0	7443.473
7	Lakhani	623.267	4315.095	507	4822.095	1512.03	0	6957.392
8	Nakhadongri	6349.344	2554.785	0	2554.785	376.79	0	9280.919
9	Lendezari	9212.494	306.793	0	306.793	59.89	0	9579.177
10	Lakhandur	2009.08		2263.517	2263.517	888.38	475.635	5636.612
Grand Total		54713.231	22789.43	4778.701	27568.131	10022.06	475.635	92779.057



1.8.02. Protected Forests: The Protected Forests measuring an area of 27568.131 ha. which includes 191 compartments with area of 22789.430 ha of old PF and 84 newly formed compartments with an area of 4778.701 ha. in 84 villages, given as compensatory land against Gosekhurd project, declared as Protected Forests. Thus the total Protected Forest of 27568.131 ha. remain with the Bhandara Division for Silvicultural Management.

1.8.03 Un-classed Forests and Jhudpi Jungle: Jhudpi Jungle extends over an area of 10022 ha. and 475.635 ha of un-classed forest land is also with the Bhandara Forest Division.

1.8.04 In Dr. Nandkishore's working plan, village maps of 16" = 1 mile scale have been transferred on topo sheets of scale 4" = 1 mile with the help of pantograph showing Protected Forest boundaries. Isolated patches of Protected Forests have been shown on separate sheet. The present plan has endeavoured to prepare digital map of entire forests area in the GIS (Geographical Information System) environment, which integrates maps in different scale to bring uniformity. This digitisation includes Reserved Forest boundaries, Cadastral village maps (village maps) of Protected Forests area (of the 275 revenue villages) and digitisation of Jhudpi Jungles (324 villages).

1.9 Administrative Units: For administrative convenience the ranges, rounds and beats were reorganised in Bhandara Dn. and the entire division has been divided into 10 ranges, 39 rounds and 163 beats. Range wise distribution of forests is given in **Appendix-XIII**.

1.10. Forest Areas Diverted for Non-Forestry Works :

1.10.01 Disforestation Prior to 1980: The disforestation made in Bhandara division of 22443.678 ha. is disforested and transferred to Revenue department prior to 1980 (**Appendix—XIV**). Thus total area disforested in Reserved Forest is 2857.963 ha and total area disforested in Protected Forest is 19585.715 ha. (**Appendix -XIV**).

1.10.02. Area Diverted for Non-forestry, Purposes under Forest Conservation act 1980: Forest areas as given in Table 1.5 are under non-forestry use and the provisions of Forest Conservation Act, 1980 are applicable in such cases. The total area of such forest land is 2492.255 ha. under 44 projects. In lieu of this 3871.125 ha Jhudpi Jungle has been made available to the division from project authorities and revenue department. Out of 3871.125 ha land, surplus land shall be made available for Compensatory Afforestation against the projects other than Bhandara district (**Appendix – XV**).



Table No. 1.5 Projects of Bhandara District.

Projects of Bhandara District					
No.of Projects	Forest land Under Various projects (ha)	Compensatory lands for various projects (ha)			Remark
		Jhudpi Jungle	NFL	Total	
44	2492.255	7173.983	2448.1	9622.083	10 Proposals in principle approved by the GOI.

1.11. State of Boundary:

1.11.01 The total length of external boundary of the Reserved Forest is 1192.53 km, of which about 121.82 km. is formed by permanent natural features and 1070.71 km. is demarcated artificially and a total no of 4412 pillars are used for the purpose. Artificial boundaries are 12 mt. wide cleaned lines with numbered pillars at suitable intervals. Each pillar is surrounded by cairn of stones or earth and is placed in the middle of the 12 mt. wide boundary line. The pillars are serially numbered in anti-clock-wise direction. Separate series of numbers are given for boundary lines passing through different villages. Half width of the boundary line lies in the Reserved Forest adjoining the Protected Forest. While the whole width line lies within the Reserved Forest, where the reserved forest adjoin the other areas.

1.11.02 The approximate length of the boundary line of Protected Forest is 1333.278 Kms. of which about 142.200 Kms is formed by natural features and 1191.078 Km is demarcated artificially. The Protected Forest at some places is in small patches and it traverses along with reserved forest. At the time of transfer of ex-proprietary forest to the Forest department, no demarcation was done on the ground. The survey and demarcation of these forests was started in 1960-61, under the scheme "survey and demarcation of ex-proprietary forests". The demarcation was done by pillars. But these pillars were not maintained further due to which these pillars are not traceable on site. In the year 1987-88, TCM were taken in the protected forests, under EGS, to provide work to the labourers due to scarcity. But they were taken as per the demand of labourers and many work remained incomplete due to encroachment problems and non availability of labour. The instructions issued by Principal Chief Conservator of Forests, MS, Nagpur in the year 1987-88, for demarcation in the Protected Forest and Jhudpi jungle land handed over to the Forest department; from the revenue department and accordingly works were carried out to some extent the proposal for reservation of this land under Section 4 of Indian Forest Act, 1927 has already been submitted to the Commissioner, Nagpur. **Therefore, a time bound scheme for demarcation needs to be prepared and implemented on top priority to protect it from further encroachment.**



1.12 Legal Position:

1.12.01 Reserved Forest : The forest that were, originally, declared Reserved forests under the provisions of Indian Forest Act, VII of 1878, as per the notification No.917(a) dated 26.02.1879 subsequent changes, as effected under the authority of State Government and gazette notifications issued from time to time are incorporated. The rest of the Reserved Forests were declared as RF under section 20 of the Indian Forest Act 1927 by the Govt. of Maharashtra vide it's notifications FLD-3574-53802-F2 dated 7.9.1977, FLD-3575/93648/F2 Dated 7.9.1977 and FLD-3570-68426-F2 dated 14.4.1978

1.12.02 Protected Forest: As per Madhya Pradesh Abolition of Proprietary Rights (Estates, Mahals and Alienated lands) Act of 1950 (I of 1951), the areas formerly belonging to *Malguzars* were vested in the State Govt. On April 1, 1951, they were taken over by the Revenue Department as per the instructions contained in M. P. Revenue Department's Letter No 2249-286-XII dated April 6, 1951 and No 7177-CR-617-XII, dated December 4, 1951. The transfer of these forests to the Department was completed by the year 1954.

These forests were then declared as Protected Forests under section 29 of the Indian Forest Act, of 1927 vide Govt. of Madhya Pradesh Notification No. 3058-2979-XI dated June 4, 1955.

1.12.03 In exercise of powers conferred by section 30 and 32 of Indian Forest Act, 1927, notifications reserving trees, etc., were issued and rules were framed by the Govt. of Bombay under FLD-4657/103064-E dated December 19, 1958.

1.12.04 Notification under section 4 of the Indian Forest Act, 1927 were issued in respect of all these forests vide Govt of Maharashtra No FLD-1258/II, 3314-E dated May 30, 1959.

1.12.05 In 1977 and 1978, Govt. of Maharashtra declared 16685.0 ha. area of this Protected Forest as Reserved Forest under Section 20 of the Indian Forest Act, 1927, vide notification No FLD-3574-53802-F2 dated 07.09.1977, FLD-3575/93648-F2 dated 07.09.1977 and FLD-3570-68426-F2, dated 14.04.1978.

1.12.06 A number of alteration and adjustments affecting the area of the Reserved and Protected Forest have subsequently taken place. The details of these are recorded in Form No 1.

1.12.07. 10022.06 ha. of Jhudpi jungle owned by Revenue department was handed over to the Forest department, the proposal for notification sent to Commissioner, Nagpur, to convert theses lands into Protected Forest. The notification is awaited. Talukawise and Rangewise Jhudpi jungle is shown in Table No 1.6.



Table No. 1.6 Jhudpi Jungle Distributions - Taluka and Range-wise:

Jhudpi Jungle (Taluka Wise)		
Taluka	No. of village	Total area (ha)
Bhandara	58	1201.9
Pauni	53	1779.26
Sakoli	31	2113.71
Lakhani	43	1512.03
Mohadi	31	885.63
Tumsar	85	1641.15
Lakhandur	23	888.38
Total	324	10022.06

Jhudpi Jungle (Range Wise)		
Range	No. of village	Total area (ha)
Bhandara	58	1201.9
Adyal	37	1425.83
Pauni	16	353.43
Sakoli	31	2113.71
Tumsar	64	1264.36
Jamkandri	29	825.74
Lakhni	43	1512.03
Nakadongri	21	376.79
Lendejhari	2	59.89
Lakhandur	23	888.38
Total	324	10022.1

1.13. Rights and Concessions:

A. Reserved Forests: There were no rights in the Reserved Forests except right to way and access to water. There is no commutation of Nistar or Paidawar in the Bhandara Forest Division. Various concessions were granted from time to time to the agriculturist and others by the erstwhile Govt. of Madhya Pradesh and Govt. of Maharashtra. The following concessions were permitted in the past.

- Grazing of cattle belonging to the agriculturists of certain villages, in the vicinity of the Reserved Forests, in accordance with, the grazing rules in force.
- Agriculturists of villages in the vicinity of the Reserved Forest are given certain quantity of bamboo and firewood for their bona fide domestic use at concessional rates. None of these concessions was a legal right.

But after the enactment of “**The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights), Act 2006**” all the rights, recognized under this Act, has to be respected and granted to the eligible persons and communities after following all the legal formalities.

B. Protected Forest: Before the abolition of the proprietary rights all lands belonged to the proprietors. A village administration paper called ‘Wajib-ul-Arz’ was prepared for every settlement; and plots of land were separately recorded, showing the Khasra numbers and area which was set apart for a particular purpose. In order to distinguish between the rights existing on the government waste lands and on the other land, a provision was made in Madhya Pradesh Land Revenue Code, 1957 prescribing the preparation of the Nistar Patrak and Wajib-ul-Arz for every village. The Nistar Patrak deals exclusively with community and customs over private land.

1.13.01 The Nistar enquiry had been conducted in Bhandara district during the period 1954-56 and all the villages have been covered under it. The Nistar officers have formed grazing and Nistar zones by clubbing together surplus



villages with deficit villages, while self-sufficient villages have been treated as individual zones. Villages assigned to a particular zone can exercise their Nistar rights within that zone.

1.13.02 The classification of the villages into surplus, deficit or self sufficient for exercise of Nistar rights was made on the following basis:

- i. A village having tree clad area equal to half the occupied area was considered to be self-sufficient.
- ii. A village having tree clad area more than half the occupied area was considered to be surplus village.
- iii. A village having tree clad area less than half the occupied area was considered to be a deficit village.

1.13.03 Grazing: As per the 2005 cattle census, the total cattle population of Bhandara district 4.78 lakhs. Out of this, 47 percent are Cows and Bulls; 19 percent are Buffaloes, 33 percent are Sheeps, Goats and Horses. No other cattle are recorded. The cattle density is 778 per Sq. km. in 2005. There has been 18 % increase in the cattle population from 2004 to 2005. Taluka-wise livestock population in Bhandara district is given in table below:

Table No.1.7 Taluka Wise Live-Stock Population in Bhandara district (as per 2005 census)

Taluka	Cows & Bulls	Buffaloes	Sheeps	Goats	Horses	Others	Total
Tumsar	46623	19483	0	32065	2	0	98173
Mohadi	303346	16662	31	22374	0	0	342413
Bhandara	30797	15192	2	27369	7	0	73367
Sakoli	38381	12784	0	17619	0	0	68784
Lakhani	25190	10517	0	18022	1	0	53730
Lakhandur	26699	6545	1333	19474	5	0	54056
Pauni	29724	8839	602	21509	0	0	60674
Total	227760	90022	1968	158432	15	0	478197

1.13.04 The basis for forming grazing zones was that each head of cattle in the cotton-jowar tract should have 0.4 hectare as grazing land. Villages in which the grazing lands were less than the above requirement were clubbed with the neighbouring village in which such area exceeded the above standard. In villages where grazing land was just sufficient for the needs of the cattle of that village, no rights for persons residing in other villages to graze their cattle have been recognized unless already recorded in the "*Wajib-ul-Arz.*"

1.13.05 Villages clubbed as above constituted a grazing zone. The clubbing of the villages was done in such a way that the villagers were not required to take their cattle to a longer distance than what their cattle can easily cover in a day. Within a specific zone all persons were at liberty to graze their cattle



free, until otherwise ordered by the appropriate authority. The information of village wise grazing units and grazing capacity is mentioned in the **Appendix-LXVII.**

1.13.06 The directives contained in the Madhya Pradesh Land Reforms Department's memorandum no. 1290-1227-XXVIII, dated 4th September 1953 prohibited grazing by sheep and goats in forests meant for production of big timber and even in the forest areas where villagers generally exercise their Nistar rights. This ban was imposed after considering the severe damage caused by the sheep grazing in the forests. However, subsequent directive from the Government of Maharashtra, vide G.R No.MFP-2103/CNo. 135/F-1 Dated 29.10.2007, has allowed grazing by sheep in the forest areas, as per the recommendations of the Grazing Settlement Reports, but continued complete prohibition on grazing by goats in the forests. Following norms of concessional grazing have been prescribed under the Protected Forests (Vidarbha Area) Rules, 1959:

- a) Cultivators - 2 plough cattle per plough plus 4 others including one she-buffalo.
- b) Agricultural artisans and labourers – 4 cattle including one she-buffalo; Provided further that all animals in excess of those specified in 1.13.5; Provided that a calf under one year shall not be counted;

Provided further that all the animals, in excess of those specified in clauses (a) and (b), shall be charged at such rates, as the State Government may, from time to time, sanction in this behalf.

1.13.07 Occupational Nistar : In the Nistar Patrak, occupational rights of the Kumbhars, Chambhars, Gonds, Mahars, Pradhan and Lohar communities have been recorded and recognised in several villages, having entries in the *Wajib-ul-Arz* of each village.

As regard other occupational Nistar, **Ghost** fruits and **Dhaoda** leaves are allowed to be removed by the charmakers free of charges. They are also allowed to remove **Bakul** (*Mimusops elengi*), and **Kahu/Kullu** (*Sterculia urens*) bark on nominal payment from trees marked for felling.

1.13.08 General Nistar: The Nistar is required by the villagers for *bona fide* domestic and agricultural purposes. Nistar from the forests generally includes timber of certain species and sizes for agricultural implements, houses and cattle sheds, fire woods, bamboo, thatching and fodder grasses, fencing material, bark, fibre, minor minerals and paidawar i.e. edible fruits, flowers and roots, honey wax etc. The rights and concessions are governed by the provisions made in the Nistar Patrak for each village accordingly to which, agriculturists and agricultural labourers are entitled to following kinds of forest produce for their Nistar either free of charge or at concessional rates fixed, from their Nistar zones.



1.13.09 Distribution of Forest Produce Under the Nistar System:

(i) Bamboo: Prior to the reorganization of the division there were 824 families of Burad community, but now there are only 669 families remain in this division as rest of them have been allotted to Gondia Division. These Burads are dependent upon the forest department for supply of bamboos. The Forest department has issued cards to each family of Burad community and accordingly 1500 Bamboos are supplied to them on concessional rates from the department's Depots.

Dry and Green bamboos are removed as per silvicultural rules and distributed to the local farmers under Nistar and the surplus Bamboos are sold in open public auction.

(ii) Small Timber and Poles: According to the zone arrangement framed by the Nistar Officers, the villagers are entitled to obtain their Nistar requirements of small timber and poles from the available material from the forests included in a particular zone either free or on payment up to a certain quantum fixed by the Collector. In order to meet the demand of the cultivators of the villages which were not included in the zone, the Nistar officers have prescribed that in the event of supply being in excess in a particular zone after meeting the demand of zonal villagers, the excess could be given to persons outside the zone on payment at the rates.

(iii) Firewood: Free removal of firewood from Khasra number set aside for Nistar is permitted as per rights recorded in Nistar Patraks for bona fide use to the villagers. In khasra numbers which are in excess, no such right is allowed. Fire wood is also supplied on Nistar/ concessional rates from the forest depots.

(iv) Other Forest Produce: Where thorns are not available, removal of brushwood such as lops and tops of the felled trees are permitted. Removal of thorns and brushwood is allowed free of cost or at nominal rates.

Bark, Fibres and Roots are allowed to be removed where it is customary to allow their removal for cordage. **Moha, Char, Tendu or other edible fruits, flowers** and roots are allowed to be removed free of cost from all over the forests for domestic consumption.

(v) Nistar Rules: In the Nistar Patrak of each village the khasra numbers set-aside for Nistar and grazing are recorded. The details regarding quantum of Nistar, period during which it is to be allowed, payment if any to be made etc. are given in the Nistar Patrak in general. However, due to heavy encroachments, over harvesting, illicit felling over grazing and fire, these areas have become highly degraded and are no longer able to meet the Nistar requirements of the people. They need immediate rehabilitation through afforestation, soil and moisture conservation and proper management on sustainable basis.



CHAPTER – II

THE FLORA & FAUNA

IIA FLORA

2.1. Trees:

2.1.01 The forest of Bhandara Division comprises of miscellaneous forests with few Teak patches. It is Southern Tropical Dry Deciduous Forests in type, subgroup 5A, and composition which supports high proportion of mixed trees. The crop mainly ranges from young to middle aged with some matured trees and is of uneven ages in character and composition. They are rich in floral diversity. The dominant site quality is IVA, but areas of site quality III and IVB are also found in the crop. Within the main crop type, local variations can be seen. The main reasons for these variations are the biotic and edaphic factors.

2.1.02 Teak is present in varying degrees, but nowhere it forms a pure crop. Teak is found in alluvial soils along nalas and rivers in small patches of Reserved Forests of Jamkandri, Adyal, Pauni ranges and in few Protected Forests. Saja is the predominant species in the mixed forest. Its important associates are Bija, Dhaoda, Surya and Garadi. Density of the mixed forest varies from blank patches to 0.8. Bamboos are absent all through except along some nalas.

2.1.03 Natural regeneration of almost all species is found but is far from adequate and varies from place to place depending upon the intensity of fire and grazing damage. Areas of Protected Forests adjoining to villages have scrub and scanty forests and mostly thorny species like Babul, Chilati, Khair are found. The grass lands are not properly managed during previous plan because of which weeds, shrubs and thorny bushes invaded “The grass lands areas”. Most of the forest lands near villages are highly degraded due to regular hacking of the trees and over grazing. Some of these forests are rich in root stock and can be reclaimed only by protecting and tending the root stocks. MFP species like Tendu, Kullu, Salai, Dhaoda, Char, Aonla and medicinal plants, form a major component of the vegetation.



Table No. 2.1 Girthwise Distribution of Species and Basal area/hectare in Bhandara Division. Based on Enumeration 2004-2006.

Species	16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-up	Total	BA
Ain	29.19	14.68	7.17	4.26	3.33	1.76	0.96	0.48	0.43	62.26	1.16
Aonla	1.69	0.93	0.68	0.39	0.21	0.1	0.02	0	0	4.02	0.07
Behada	0.52	0.28	0.18	0.17	0.14	0.09	0.05	0.03	0.11	1.57	0.06
Bel	0.83	0.52	0.44	0.31	0.25	0.12	0.05	0.02	0.02	2.55	0.06
Bhirra	10.95	4.61	2.28	1.26	0.8	0.37	0.18	0.05	0.05	20.55	0.3
Biba	0.78	0.42	0.21	0.07	0.03	0.03	0.01	0	0	1.56	0.02
Bija	2.38	1.11	0.86	0.84	0.75	0.55	0.37	0.18	0.16	7.21	0.24
Bor/Ber	0.05	0.04	0.03	0.01	0	0	0	0	0	0.13	0
Char	10.42	4.16	1.95	0.84	0.49	0.21	0.08	0.03	0.01	18.19	0.22
Chichwa	0.45	0.34	0.3	0.24	0.16	0.13	0.06	0.03	0.02	1.73	0.05
Dhaman	0.45	0.45	0.27	0.09	0.06	0.02	0.01	0	0	1.35	0.02
Dhawada	19.12	8.28	4.15	2.29	1.5	0.75	0.41	0.17	0.12	36.79	0.58
Garadi	33.77	14.89	5.42	1.81	0.67	0.18	0.09	0.01	0.01	56.84	0.56
Haldu	0.22	0.15	0.12	0.05	0.06	0.05	0.03	0.03	0.04	0.76	0.03
Hirda	0.22	0.11	0.05	0.02	0.02	0.01	0	0	0	0.44	0.01
Kalam	0.35	0.2	0.19	0.19	0.15	0.14	0.07	0.04	0.03	1.36	0.05
Kasai	0.74	0.58	0.41	0.28	0.16	0.09	0.05	0.02	0.01	2.35	0.06
Khair	3.55	2.01	1.13	0.46	0.18	0.04	0.01	0	0	7.37	0.09
Kulu	0.04	0.05	0.02	0.02	0.02	0.01	0	0	0	0.17	0
Lendia	21.44	6.66	2.34	1.04	0.53	0.23	0.07	0.04	0.02	32.38	0.32
Moha	5.19	2.19	1.35	0.89	0.83	0.64	0.51	0.39	0.93	12.92	0.46
Mokha	0.05	0.06	0.04	0.04	0.03	0.01	0	0	0	0.24	0.01
Mowai	2.47	2.01	1.78	1.51	1.19	0.89	0.53	0.19	0.21	10.78	0.37
Other	29.04	11.5	4.64	1.78	1.03	0.59	0.38	0.2	0.33	49.49	0.64
Palas	7.74	4.52	2.35	1.03	0.47	0.22	0.1	0.04	0.04	16.5	0.24
Rohan	7.94	3.04	1.88	1.23	0.93	0.58	0.3	0.1	0.06	16.07	0.3
Salai	0.35	0.21	0.17	0.15	0.18	0.18	0.11	0.08	0.09	1.52	0.07
Semal	0.11	0.09	0.1	0.1	0.09	0.08	0.05	0.02	0.05	0.7	0.03
Shisham	0.06	0.05	0.05	0.01	0.01	0	0	0	0	0.19	0
Shiwan	0.13	0.04	0.04	0.02	0.01	0	0	0	0	0.25	0
Surya	1.17	0.62	0.47	0.27	0.13	0.07	0.02	0	0	2.75	0.05
Teak	16.36	7.64	3.67	1.58	0.83	0.4	0.22	0.09	0.06	30.85	0.42
Tendu	10.31	2.58	1.13	0.68	0.41	0.21	0.08	0.05	0.05	15.51	0.18
Tiwas	0.15	0.16	0.13	0.08	0.07	0.03	0.03	0.01	0	0.66	0.02
Total	218	95.2	46	24	15.7	8.8	4.84	2.35	2.86	418	6.72

*Enumeration Work carried out during Dec. 2004 and Mar. 2006 by the SOFR unit, Amravati.

2.2 Composition and Condition of the Crop: The forests of Bhandara Division belong to the sub group 5A “Southern Tropical Dry Deciduous Forests”, as per the revised classification of forest types of India by Champion and Seth. Depending mainly upon the topography, edaphic factors and past treatments given to the area, composition of the crop varies considerably. Local variations in the altitude do not influence the distribution of various species.

The excessive grazing, irregular fellings, frequent fires, negligence in silvicultural operations are the main biotic factors responsible for the degradation of the forests. The fellings are often concentrated on the species most valued for various purposes. Young regeneration is found exterminated due to excessive grazing and fire. The soil of the forest land near the villages have become very compact and unsuitable for germination of seeds, the reason is heavy grazing, including herds of goat and sheep.

The forest of Bhandara Division has been classified, as follows: (as per Champion and Seth's classification)

Table No.2.2 Forest types found in the Bhandara Division:

Type	Notation	Type Description
Sub-group I. Climax types	5 A 5A/C1 5A/C ₃	Southern Tropical Dry Deciduous Forests. Dry Teak bearing forests Southern dry mixed deciduous forests
II. Degradation Stages	5/D S1	Dry Deciduous Scrub.
III. General Serial type	5/1 S1	Dry Tropical Riverain Forest

*(Champion and Seth's classification)

2.2.01 Dry Teak Bearing Forests: The Teak is found in patches but it does not form a pure crop. The presence of Teak can be ascribed to the alluvial soils along nalas and rivers in Reserved Forest of Jamkandri, Adyal, Pauni ranges and few Protected Forest areas. The Teak plantation would also fall in this category.

2.2.02 Southern Dry Mixed Deciduous Forest: Most of the forests belong to this category are more or less leafless in hot season. Bamboo is absent all through except some nalas and some patches. Bamboo plantations have come up satisfactorily at many places but lack of proper management of these plantations have made these clumps very congested leading to deterioration of the crop. Grass is conspicuous in open and degraded areas. Saja occurs as main species along with associates like Bija, Dhaoda, Surya and Garadi. Quality of crop is mostly IVA & IVB. Site quality IVB is found in eroded and calcareous areas. Density of the crop varies from blank patches to 0.8. The floristic is as follows:





- I.** *Terminalia alata* , *Pterocarpus marsupium* , *Anogeissus latifolia*,
Lagerstroemia parviflora , *Diospyros melanoxylon* , *Xylia xylocarpa* ,
Boswellia serrata , *Chloroxylon swietenia* , *Madhuca longifolia* , *Lannea*
coromandelica, *Terminalia bellerica*, *Schleichera oleosa*, *Adina cordifolia*,
Albizzia odoratissima , *Mitragyna parvifolia* , *Bombax ceiba* , *Sterculia*
urens, *Manilkara hexandra* , (in comptt. 307 and 308 of Pauni range),
Soymida febrifuga .
- II.** *Cleistanthes collinus* , *Buchanania lanzan* , *Butea monosperma* , *Grewia*
tiliifolia , *Acacia catechu* , *Cochlospermum religiosum* , *Cassia fistula*,
Bauhinia racemosa , *Casearia tomentosa* , *Gardenia latifolia* , *Ixora*
arborea , *Kydia calycina* .
- IIa.** *Dendrocalamus strictus* .
- III.** *Holarrhena pubescens* , *Nyctanthes arbortristis* , *Maytenus emarginata*,
Gardenia resinifera , *Woodfordia fruticosa* , *Wrightia tinctoria*, *Helicteres*
isora, *Indigofera tinctoria* , *Gardenia turgida* , *Dodonea viscosa* , *Vitex*
negundo .
- IVa.** *Cassia tora* , *Tephrosia hamiltonii* , *Parthenium hysterophorus* .
- IVb.** *Heteropogon contortus* , *Themeda quadrivalvis* , *Iseilema laxum*,
Eragrostic tenella , *Imperata cylindrica* , *Vetiveria zizanioides* , *Sehima*
nervosum , *Apluda mutica* .
- V.** *Olex scandens* , *Mimosa hamata* , *Zizyphus oenoplia* , *Calycopteris*
floribunda , *Bauhinia vahlii* , *Butea superba* , *Cryptolepis buchanani* ,
Abrus precatorius,
- Parasite:** *Loranthus longiflorus* .



2.2.03 Dry Deciduous Scrub Forest: These forests are found in low broken soil cover and contain shrubs of 3 to 6 mt. height including few tree species reduced to similar condition. They are mostly found in isolated patches of Protected Forest surrounded by cultivation and the patches of Reserved Forest closed to human habitation where biotic interference is heavy. Such areas are found in all most all ranges. The floristic is as below:

I/II. Terminalia alata, Acacia catechu, Lannea coromandelica, Buchanania lanzan, Soyimida febrifuga, Zizyphus spp, Gardenia spp., Butea monosperm, Chloroxylon swietenia .

III. Holarrhena pubescens , Nyctanthes arbortristis , Dodonea viscosa .

IVa. Cassia tora , Tephrosia hamiltonii .

IVb. Heteropogon contortus , Eragrostic tenella , Apluda mutica .

V. Mimosa hamata , Zizyphus oenoplia .

2.2.04 Dry Tropical Riverain Forest : In this type, irregular over wood of greater height trees, larger in size occur in patches and stripes along the major water courses which have moisture during the major portion of the year in all ranges. The floristic of this type is as below:

I Terminalia arjuna, Terminalia alata, Mitragyna parvifolia, Syzigium cumini, Ficus racemosa .

II. Pongamia pinnata , Diospyros tomentosa , Butea monosperma .

III. Helecteres isora, Ficus hispida , Vitex negundo.

IVa. Parthenium hysterophorus.

IVb. Very little grass.

V. Very few climbers.

2.3 Status of Natural Regeneration: Data on regeneration status collected along with enumeration of the crop in 0.04 ha sub-plots in the enumeration plots. The seedlings are enumerated in the following three categories, as given in the Table 2.3. The data are analyzed and used to devise prescriptions for regeneration in the forest areas by both the natural and artificial means. The focus is on tending of existing natural regeneration and rootstocks. Plantation is proposed only as a supplementary activity limited to the extent to fill the deficiency in natural regeneration, on the degraded and blank areas, other than natural blanks.



Table No. 2.3 Distribution of Seedlings and Saplings per ha in Overall Area:

Range	R1 (<30cm)	R2 (30cm-3m)	R3 (> 3m)	Total
Adyal	1501.17	503	168.75	2172.92
Bhandara	1355.28	554.69	190.22	2100.19
Jamkandri	1969.12	785.65	217.76	2972.53
Lakhni	1339.9	431.35	69.39	1840.64
Pauni	1355.54	504.8	137.08	1997.42
Sakoli	1233.86	870.52	209.79	2314.17
Lendejhari	2059.46	444.13	206.58	2710.17
Tumsar	1534.13	673.45	187.9	2395.48
Nakadongri	1229.96	586.15	254.69	2070.81
Lakhandur	0	0	0	0
Total	13578.42	5353.74	1642.16	20574.33
Average	1357.842	535.374	164.216	2057.433

2.4 Injuries to Which the Crop is Liable: Appendix-LVI

2.4.01 These forests are liable to, the following, injuries.

(I) Injuries Caused by Man: The damage by man can be classified into, the following categories.

(a) Illicit Cutting: There are 3 hyper sensitive beats, 26 sensitive beats and 134 normal beats in the division. Illicit cutting of timber, poles and firewood is common throughout the division, though it varies in degree. It is heavy in areas adjoining to thickly populated towns and villages. Bhandara, Sakoli, Pauni, Tumsar, Gangejhari, Lakhandur and Sangadi are the main places where timber is in great demand for large scale construction activities. Due to sharp increase in the cost of timber, illicit cutters use various modes for transport from head load to truck and take away the timber, to far away places even up to Nagpur. Besides this, the construction activity has increased in villages which also put extra pressure on these forests. The increase in population has resulted in the increased demand for



A tree illegally felled



Head loads being loaded on a truck.



Head loads of fire wood - one of the biggest problems in forest protection.

Table No.2.4 Hypersensitive, Sensitive and Normal Beats for Illicit Felling.

Sr. No.	Range	Hypersensitive Beats	Sensitive Beats	Normal Beats	Total
1	Adyal	0	0	13	13
2	Bhandara	0	6	11	17
3	Jam Kandri	0	4	14	18
4	Pauni	0	3	19	22
5	Sakoli	0	1	15	16
6	Lendejhari	1	6	13	20
7	Tumsar	0	3	16	19
8	Nakadongri	0	0	16	16
9	Lakahndur	0	0	9	9
10	Lakhni	2	3	8	13
Total		3	26	134	163

fuel wood which also provides an easy employment to local villagers. Illicit cutting and lopping of Tendu trees for leaf collection has also increased. Due to increase in the network of roads in the forest as well as outside the forest areas, the protection of forest has become more difficult. The long term damage done by headloaders are more severe than the illicit cutting of big trees by the timber smuggler, as the headloaders carry away several future trees in one headload thus inflicting a very serious blow to the future crop.

Bhandara District has a large population of Burads, who earn their livelihood by making bamboo mats and other articles. Bamboo is used by local people for their various household works, The increase in population has resulted in the increase of illicit cutting of Bamboo also. Which cause damages to the naturally regenerated clumps in the area. All these factors have put tremendous pressure on forests and has resulted in depletion of the growing stock.

Table No.2.5 Illicit Felling during the Last 10 years:

Year	No. of Cases	Teak	Non-Teak	Loss in Rs.
1996-97	5002	3516	17025	3810473
1997-98	3588	1800	10717	3003585
1998-99	2806	1229	7970	2054459
1999-00	2597	1402	7684	2488063
2000-01	3061	1776	9377	2588560
2001-02	3164	1595	9043	2499253
2002-03	2779	1671	7692	1920800
2003-04	2766	1949	7391	1180616
2004-05	2593	1106	5314	736463
2005-06	1037	1042	5520	255326
2006-07	1996	1096	5025	6581193
Total	31389	18182	92758	27118791

(b) Encroachments: There have been large scale clearances of the forests in the past for encroachment with a purpose to get agricultural crops. The State Government has issued orders vide GR Nos. LEN/1078/3483/G-1, dated 27.12.1978 and FLD/1079/1366/F-3, dated 12.09.1979 to regularize all the encroachments on forest lands done during the period from 01.04.1972 to 31.03.1978(**Appendix- LXIII**). This has increased the tendency of people to encroach upon the forest land with a hope that in future also such encroached lands will be regularized by the Government. The problem of encroachment is more on Protected Forests, as they are adjoining the cultivation and villages and there is no proper demarcation at most of the places.(**Appendix-LXVIII.**)

The encroachment on forest land prior to April 1978 is given below:

Table No. 2.6 Number of Encroachments and Area Encroached:

Year	Opening Balance		Encroachments during the year		Total Encroachment		Evicted		Balance	
	No.	Area in ha.	No.	Area in ha.	No.	ha.	No.	ha.	No.	ha.
96-97	380	312.524	5	804	385	313.328	0	0	385	313.328
97-98	385	312.328	16	13.344	401	326.672	3	4.15	398	322.522
98-99	398	322.522	19	13.76	417	336.282	7	2.09	410	334.192
99-00	410	334.192	1	0.34.	411	334.532	12	0.84	399	333.692
2000-01	399	333.692	288	114.296	687	447.988	19	11.28	668	436.707
2001-02	668	436.707	134	23.853	802	460.56	50	10.47	752	450.086
2002-03	752	450.086	100	47.551	852	497.637	28	22.8	824	474.839
2003-04	824	474.839	33	0.837	857	475.676	94	49.15	763	426.525
2004-05	763	426.525	12	2.62	775	429.145	23	2.025	752	427.12
2005-06	752	427.12	14	5.502	766	432.62	0	0	766	432.622
2006-07	766	432.622	3	0.808	769	433.43	2	0.16	767	433.27



Table No. 2.7 The Encroachment on Forest Land between 1978 & 1996: as per Old Bhandara Division.

Sr. No.	Range	No.of Encroachers	Encroachment Area(Ha)	Encroachments Evicted (Ha)
1	Adyal	11	11.558	2.05
2	Jam Kandri	66	48.3	0
3	Paoni	72	44.2	0
4	Tiroda	36	10.617	0
5	Tumsar	175	173.07	0
6	Bhandhara	32	32.31	0
7	Pimpalgaon	0	0	0
8	Sakoli	4	2.61	2.1
	Total	396	322.665	4.15

(c) Forest Fire: Summers are hot and dry from February to mid June during which forests are vulnerable to fires. Fires taking place at the end of winter and beginning of summer are not severe. Whereas, a fire in the hot summer is very harmful as it kills the young seedlings and coppice shoots of all major species and plantations. Fire hardy species, such as Teak, Bhirra, Salai, Mowai and Palas escape, slightly, as compared to other species. Severe fire causes considerable damage to the trees also by scorching their bases which ultimately leads to unsoundness and hollowness and renders them liable to attack by fungi and insects.



Bamboo clumps and ground flora devastated due to forest fire



Bamboo clumps and ground flora devastated due to forest fire.

Fire also indirectly cause soil erosion by destroying the soil cover as well as the organic matter. Fire incidences during 1996-97 to 2006-07 is given in the table below:

Table No.2.8 Information Regarding Forest Fires:

Year	No of Cases	Extent of area burnt (ha)		Year	No of Cases	Extent of area burnt (ha)
1996-97	82	1820.64		2002-2003	29	96.4
1997-98	11	178.45		2003-2004	18	131
1998-99	13	147.5		2004-2005	9	66.5
1999-2000	45	519.05		2005-2006	8	59
2000-2001	61	778.5		2006-2007	7	51.5
2001-2002	91	1549				

In Bhandara Dsivision, fires occur annually over most of the area of the division due to increased biotic interference. Fires are mostly set by Tendu collectors to obtain profuse flush of leaves on Tendu shoots. Fires are



also set by local villagers to facilitate movements in the forest for the collection of Mahua flowers, gum and other forest produce and to get new flush of grasses. Sometimes fires spread from the adjoining cultivation area or through half burnt cigarette or Bidi stubs thrown by the people passing through the forest. Natural fire is extremely rare. Fire is the major factor responsible for the degradation of forest. It also leads to degradation of forest soil. Many valuable species of NWFP in the form of herbs, shrubs and climbers are also vanishing due to regular fire in the forest.

Besides the damages to the flora of the forest, fire causes immense damage to the Fauna found in these forests. The worst sufferers are the lower animals like insects etc., amphibians, reptiles, mammals and birds nesting on the ground. Besides these the micro organisms found in the surface soil are also destroyed.

(d.) Improper Implementation of Working Plan Prescriptions: It has been observed that besides the above mentioned factors one very important factor, damaging the forest, is the non implementation or partial implementation of the prescriptions of the working plans. It has been observed that the very important Subsequent Operation Prescriptions are not given the required attention and most of the time they are not carried out. For example post felling operations are totally neglected. CBO, singling, tending, thinning, closure for grazing, and fire protection are neglected.



Unworked planted Bamboo clump died due to congestion

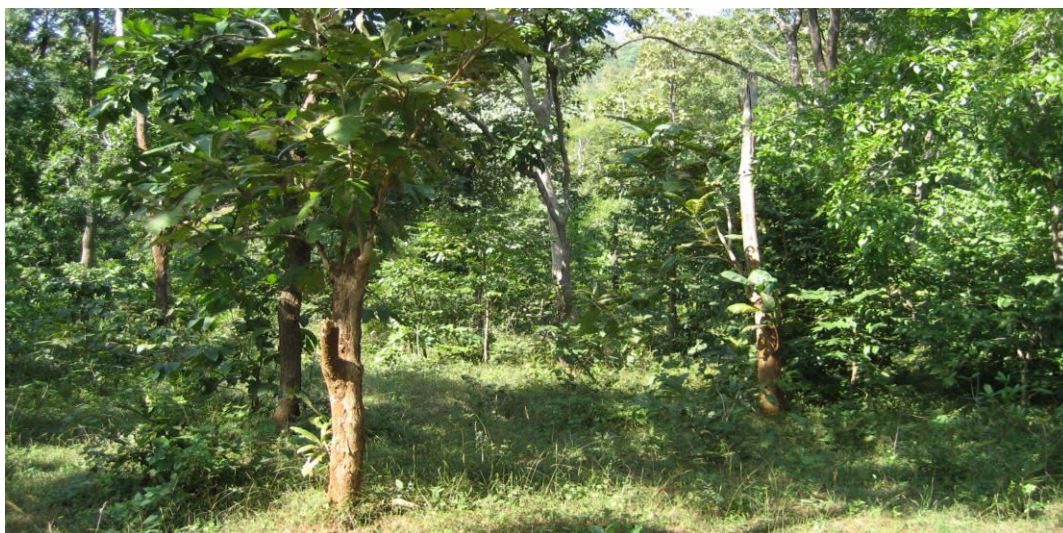




Suppressed Teak Plantation – due to underplanting of Teak.



Congested good Teak plantations could have improved with thinning



Current year coupe - No work other than timber removal was carried out. Damaged trees are still in the coupe.



(e) Unscientific Harvesting of NTFP: The valuable resource trees like Kulu, Dhaoda, Saja etc. are getting damaged due to unscientific methods of harvesting of gums and Kosa silk. Trees are burnt to harvest honey. Same is the case with various herbs and shrubs, their number is reducing very fast due to unsustainable harvesting. Tendu trees are felled to or heavily lopped to collect Tendu leaves.



Damaged Tendu tree.



Damaged Kulu tree

(II) Injuries Caused By Cattle: Damage caused by uncontrolled grazing is heavy due to large cattle population. The grazing incidence, as prescribed in the Grazing Policy of 1968 of Govt. of Maharashtra is not followed. Moreover, the Protected Forests have Nistar rights for grazing and they have so far not been worked under any scientific forest management. Due to this the Protected Forests are more vulnerable to heavy grazing. Even large no. of goats are also seen grazing in the forest. Continuous and heavy incidence of grazing not only prevents regeneration of tree species but also the plantations and young regeneration obtained during the period of closure is lost soon after the areas are open to grazing. In areas with clayey soil, the trampling by cattle results in compaction of soil and reduction in the soil aeration. In sandy soils heavy grazing results in accelerated erosion and denudation. Due to over grazing the wild animals also suffer due to scarcity of fodder in the forest.



Grazing by Goats in Reserved Forest



Bamboo Plantation destroyed due to grazing





Grazing of Goats in Forests is very common.



Goats grazing in the coupe felled last year.

Grazing by sheep and goat is highly damaging to the flora as well as the soil. These animals not only browse the foliage of plants and grasses but also uproot and eat away the roots and rhizomes of the grasses as well as the bark of the young plants, leading to exposure of the soil and drying of saplings. Due to the structure of the hoof of sheep and goats, the pressure exerted on the soil due to their body weight is very high and this leads to the compaction of the surface soil. Once the soil becomes compact, it becomes very difficult for the wild seeds to germinate during the rainy season.

Recently the Govt. of Maharashtra vide its G.R No.MFP-2103/Case No.135/F-1. Dated 29.10.2007 has granted permission for grazing of sheep in the forest area including Bhandara Division. The illegal grazing by goats and sheep is already in practice and if it goes uncontrolled it will lead to irreversible degradation of forest leading to severe scarcity of fodder in the forests. The degradation of forest will not be limited only to the flora and fauna but it will degrade the land it self, as the single biotic factor contributing to the desertification is the uncontrolled grazing in general and grazing by herds of sheep and goats in particular.

(III) By Wild Animals: The damage by wild animals in Bhandara Division is, generally, very little. Chital and Nilgai, which are found allover and Bison, found near Nagzira sanctuary, browse young seedlings and coppice growth. Some damage is caused by wild boars, by digging the roots of young plants and bamboo rhizomes. Monkeys cause some damage to fruit trees, Sissoo seedlings and succulent bamboo culms.

(IV) By Insects and Fungi: Teak trees are attacked by defoliator (*Hyblea parea*) and skeletonizer (*Hapalia machaeralis*) during the monsoon. The attack is more during the year when the rain fall is irregular or scanty. But the damage is not appreciable. Termite attack is common throughout the division. In the bigger trees it is confined to dead bark and causes no damage. In the young seedlings, natural as well as artificially planted, the termite attack results in the mortality of weaker plants. Damage due to fungi is unassessed.



(V) By other Parasites: Banda (*Loranthus longiflorus*) is generally found on the branches of Char, Hiwar, Salai and sometimes on Tendu, Saja, Dhaoda and Lendia.

(VI) By Climbers and Obnoxious Weeds: The common climbers in the division are Eruni (*Zizyphus oenoplia*), Chilhati (*Mimosa hamata*), Palasbel (*Butea superba*), and Kukutranji (*Calycopteris floribunda*). In the moist areas Mahul is also found. These climbers, coppice vigorously and are hardly affected by fire. The damage is caused by strangling of trees when they entwine a sapling or a tree. Usually the apical bud is destroyed. The deep grooves formed by entwining in the large trees reduce the yield of timber. Tarota (*Cassia tora*) is the common weed. In some areas Lantana has also come up. The thick cover of Lantana prevents the regeneration of other trees. Congress grass (*Parthenium hysterophorus*), has also started invading the forest areas.

(VII) By Frost: Frost is very rare in Bhandara division. Slight damage to young regeneration due to frost in the low lying areas of present Tirora range and Nagzira sanctuary was recorded during 1928-29 and 1936-37.

(VIII) By Drought: Damage due to drought is not common. However, some damage to the young natural regeneration and plantations is caused in the year in which the rainfall is irregular or scanty. The scanty rainfall results in occasional dying of bigger trees which are severely damaged by fire.

(IX) By Winds and Hail Storms: Strong winds during pre-monsoon or monsoon period cause uprooting of trees all over the forest area. Occasionally hail storms damage the fruit crops of Moha and Char. Hailstorm in the month of April and May sometimes damages Tendu leaves making them unfit for Bidi manufacture.

(X) Soil Erosion: Soil erosion is noticed all over the forest areas of division. The top layer of soil which stores organic matter, and nutrients, on which plants feed, is lost in this process. It decreases the soil fertility, lower the sub-soil water level and water holding capacity of the soil.

Sheet erosion in plains and gully erosion on slopes is moderate in most of the areas of the forest. But it is increasing at an alarming rate in forest all over the division. The erosion has increased due to excess harvesting of coupes without soil conservation works in the subsequent year of felling, excessive grazing and repeated fires. The heavy soil erosion is mostly in the Reserved Forest of Pauni range and in scattered patches of Protected Forest all over the division. Illicit cutting is further accentuating the process of erosion.



CHAPTER IIB

FAUNA

2.5 Description of the Fauna: The human and cattle population density is varied in Bhandara district in and around the forest area. The habitat for wildlife also shows wide variation, the wild animals are unevenly distributed in the Bhandara forest, though the forest of Bhandara is by and large good. The forests of Bhandara division belong to miscellaneous forest and are devoid of natural grass lands, essential for the growth of herbivores. Most of the wildlife is confined to the compact forest blocks of Tumsar, Jamkandri, Lendejhari and Sakoli ranges adjoining to Nagzira Sanctuary and Navegaon National Park. Besides these areas wild animals like Blue Bull, Barking Deer, Chital, and Panther are found in Bhandara, Adyal and Pauni ranges. The minimum concentration of wildlife is in Pauni range. The data related to the population of Tiger and Panther seems to be not very realistic as it shows huge variation every year, it might be due to the overlapping areas of Bhandara division and the Nagzira Wildlife Sanctuary and the Navegaon National Park. The territorial field staffs needs to be oriented in the field of wildlife management.



Wildlife and its management in Bhandara Forest division have been discussed in detail in the Chapter XV, under Wildlife (Overlapping) Working Circle.



Chapter III

UTILIZATION OF THE FOREST PRODUCE

3.1 Agricultural Customs and Needs of the Population:

3.1.01 The district covers an area of 4083.43 sq km. It had, according to 2001 census, a population of 11,36,146. In terms of area and population, the district constitutes 1.21 percent of the State. The population of the district has increased in the last 10 years by 1.93% percent, distributed among 5 towns and 778 inhabited villages. The urban population constitute nearly 18% percent of the total as against the state average of 42 percent. Taluka-wise break-up of population as per 2001 census is, as follows:

Table No 3.1. Taluka - Wise Break-up of Population

Sr No	Taluka	Area in square kilometer	Population per Sq km	No of villages		Towns	Population		
				Inhabited	Uninhabited		Male	Female	Total
1	Tumsar	802.5	266	136	12	1	107335	106508	213843
2	Mohadi	572.66	252	100	8	0	72797	71824	144621
3	Sakoli	722.5	179	86	11	0	65457	64018	129475
4	Bhandara	538.14	486	142	28	3	132923	128722	261645
5	Lakhani	366.78	164	94	9	0	61256	60484	121740
6	Pauni	621.25	244	137	23	1	76706	74781	151487
7	Lakhandur	459.6	247	83	7	0	56971	56364	113335
	Total	4083.43	263	778	98	5	573445	562701	1136146

3.1.02 The population density of the district is 263 persons per sq.km. as against the state average of 256 persons per sq km and national average of 267 persons per sq km. Male-Female ratio in the district is 981 women for each 1000 men as against the state ratio 922 women per 1000 men.

3.1.03 The average literacy rate of the district is 78.50 percent, comprising 67.87 percent for women and 89.00 percent for men. Whereas, the literacy rate in the rural and urban areas is 76.50 percent and 88.80 percent respectively.

3.1.04 For administrative purposes Bhandara District has been divided into 7 talukas, comprising around 876 villages, including 98 as the uninhabited villages, organized into 75 Panchayat Samitees and 541 village panchayats.

3.1.05 The urban-rural break up of population reveals 15.47 percent as urban population while 84.53 percent forming the rural population.



Moreover, 39.82 % of the population is of labourers; and around 37.36 % of the labourers are engaged in primary sector such as agriculture and related works.

3.1.06 As per the Socio-economic survey of the Bhandara district for the year 2001-02 published by the Directorate of Economics and Statistics, Govt. of Maharashtra, Bombay in 2003 about 62.89% of the land of total geographical area is under cultivation. Out of the total cultivated area 76.76% is under double crops. The major portion of the cultivated area belongs to small and marginal farmers. 7.05 percent of the total area is under permanent pasture and grazing, while 4.58 percent of area is uncultivable and/or not available for agricultural use. The forest area, including, the Jhudpi jungles, in charge of the forest department, forms 23.77% of the total geographic area of the district.

3.1.07 Rice is the main crop of the district. It formed 78.03% of the total cultivated land in 2005-06. The cropping pattern in the district is 94.08 % food grains out of which 74.05 % pulses, 15.62 % oil seeds and 4.41 % other crops. There are 8 agricultural produce marketing committees where agriculturist brings their excess material for sale. Some private traders also purchase the excess material directly from the farmers. In the tribal sub-plan areas, as per the Maharashtra Tribal Economic Conditions (Improvement) Act, 1976. Govt has declared monopoly over the purchase of food grains as well as minor forest produce with the exception of Tendu. The Maharashtra Govt passed an act called Maharashtra MFP (Regulation of Trade) (Amended) Act, 1997 as Act No XIX of 1997 on 10th December 1997. According to the section 4 of the Act the ownership of the MFP in Govt lands in scheduled areas, excluding the National Parks and Sanctuaries, shall vest in the village Panchayat within its jurisdiction area. However, the ownership of MFP does not include the ownership of land or trees in that Panchayat areas. The list of MFP covered under the Act is specified in the schedule. **Tendu, Apta and Bamboo** has been excluded from the purview of this Act and still remains the property of the state Govt.

3.1.08 The irrigation in the district, about 28.94%, is through wells and rest of the 71.06% is by other modes like small, medium and major irrigation projects, tanks and lift irrigation through pumps fixed on the bank of nala and rivers. There are 2 major, 9 medium irrigation projects, namely; Gosekhurd, Bawanthadi, Chorkhamara, Rawanwadi, Bagheda, Tekepar (bod), Chandpur and Sarang, and over 257 minor irrigation projects and tanks in the district. In the near future the projects are expected to provide irrigation to over 110000 ha. in the district.



3.1.09 There are over 244 thousand households in the district, including 208 thousand households in rural areas and 36 thousand households in urban areas. About 778 villages inhabit in the vicinity of the forest areas; and over 74 percent of the inhabitants of these villages depend on the forests to sustain their livelihood. (1991 Census)

3.1.10 The rural population consists mainly of agriculturists and agricultural labourers such as *Mahars, Gonds, Kunbis, Telis, etc.* The way of life of the people in rural areas has direct bearing to the forests as they depend on forests for timber, poles, firewood and Bamboo for constructing their houses and cattle sheds and making agricultural implements. They also require fodder (grasses and other foliage fodder), flowers, fruits, roots as well as variety of other non timber forest produce such as Moha, gum, lac, honey, Tendu leaves, herbs-shrubs, roots and tubers etc. for food and medicinal purposes.

3.1.11 The cattle population of the district is largely dependent on the forest of the district for their fodder. The cattle population of the district is about 4.78 lakhs. Out of this around 48% are cows and bullocks, 19 % are buffalos, 32% are sheep and goats and about 1% are other cattle. In most of the villages, the grazing lands are either absent or insufficient. The land earmarked for grazing have been diverted for other land use or encroached upon by the villagers for agriculture. So, most of the cattle in the villages around the forest area, graze in the forest. There are 272 registered milk producing societies in the district.

3.2 Occupation and Industries: Though agriculture is the most important occupation, there are some people engaged in small occupations/industries in the villages and towns, some of them are linked to the forests. They are as below:

- i. **Bamboo Based Occupation:** There are 669 registered Burads in the district. These people make baskets, mats and dholis etc. from Bamboos and sell them in the market to earn their bread.
- ii. **Saw Mills:** There are 56 saw mills in the Bhandara district. The range wise distribution of sawmills is Bhandara 13, Lakhni 8, Jamkandri 7, Tumsar 9, Nakadongri 1, Sakoli 3, Lakhandur 6, Adyal 5 and Pauni 4. These saw mills depend upon the supply of timber from forests and private lands. List of Saw Mills is in the **Appendix-LIX**.
- iii. **Furniture Industry:** There are numerous furniture shops and small factories of furniture in the district. As the standard of living is improving even the rural people are going for good and fashionable



furniture. Thus increasing the number of these shops both in town as well as villages.

- iv. **Bidi Manufacturing:** Bidi manufacturing is one of the most important industries. This industry is dependent upon the forest for the supply of Tendu leaves, the important raw material for the industry. During 2005-06 about 29000 people were engaged in this industry.
- v. **Lac Production:** Traditionally some people of the district are involved in lac cultivation. Lac is cultured mainly on Palas trees.
- vi. **Collection of Non Timber Forest Produce:** Collection of NTFP from the forest is an important source of income for the poor population of the villages, specially the tribals. Mahua flowers and fruit, Charoli, gums, broom grass, Custard apple (Sita Phal), honey, wax, roots, barks, leaves (of medicinal value) etc. are collected and sold to the local traders. The forest department does not have the inventory of all these NTFPs. The financially weak people of the villages also collect grass and fuel wood from the forest and sell it to earn some additional money.
- vii. **Kosa Cultivation:** The Govt of India and the Govt. of Maharashtra is encouraging the silk industries and as a part of this the local villagers are doing the Kosa cultivation on *Terminalia alata* (Ain) leaves on the forest land. Kosa cultivation is done mainly in some of the villages of Bhandara taluka. About 450 ha. of forest land is currently under this project.
- viii. **Cattle Breeding:** It is especially carried out in Bhandara, Tumsar, Sakoli, Pauni and Lakhni talukas. It adds substantially to the income of the people of these talukas.

3.3 Market and Marketable Products:

3.3.01 Markets: The forests of Bhandara Division produce Timber, Poles, Fuel-wood and few Bamboos. Timber, Poles and Firewood after extraction of coupes are brought to sale depots for auction sale and minor supply. Therefore this forest produce is locally consumed through minor consumers or is purchased by traders from outside, mostly from Nagpur. Major timber depot is at Gadegaon and fuel wood depots are at Mangarli in Jamkandri Range and, Lendejhari in Lendejhari Range, Chicholi in Nakadongri Range, Sakoli in Sakoli Range, Madgi in Adyal Range, Koka in Bhandara Range and Vahi in Pauni Range.

Besides this, some material is obtained through offence cases are kept at range or round headquarters for local retail sale and Nistar supply. Some



Bamboo is obtained from the forest and partly it is brought from Gondia division for supply to Burads and farmers. The main consumption centres of timber, pole and fuel wood are Bhandara, Sakoli, Tumsar, Gangejhari and Pauni. Bullock carts and tractors are used for local transport while trucks are employed for longer distance. The other minor forest produce like Moha flowers, Charoli, Gum etc are collected by the locals and sold in the weekly markets at different villages. Tendu leaves are sold in auction along with other division of the state. Part of these leaves is purchased by the local manufacturers and rest are sold to the manufacturing units out side the district.

The weekly village markets are very important places for the sale and purchase of NTFPs other than Tendu leaves.

3.3.02 Marketable Forest Produce:

- i. **Timber & Poles:** There is a great demand of Teak timber and poles above 15 cm girth. But production of Teak timber in Bhandara forest division is negligible. Due to prohibitive cost and non availability of sufficient quantity of teak other species such as Ain, Bija, Dhaoda, Bhirra, Lendia, Kalam, Dhaman and Bamboo are used. For the manufacture of cart Teak is preferred for the body; Tiwas, Ain, Dhaman, Tendu for shaft; Dhaoda, Bhirra for axle; Tiwas, Kusum or Kadu for naves. For agriculture implements such as plough Tiwas , Khair and Babul are preferred in that order. Dhaoda and Dhaman are used for axe handles. Salai, Mowai and Semal logs above 45 cm are preferred for packing cases. Semal logs above 75 cm are also used in match industry.
- ii. **Firewood:** There is a great demand of firewood throughout the division. Dikamali, Garadi, Dhaoda are considered to be the best fuel species. Due to heavy demand inferior firewood of soft wood species like Salai and Mowai are also exploited. Due to increase in number of small Dhabas on highway and in small townships, it is a common site to see a lot of local people collecting firewood from the adjoining forest and selling it to these dhabas.
- iii. **Bamboo:** Bamboo is in great demand, required by Burads for making Bamboo articles and by local people for construction and repairs of their houses. It is also used as scaffolding material. There are 669 Burad card holders in the division and the forest department is supposed to give them 1500 Green long Bamboos annually. The Bamboos rejected by the burads are either distributed among the villagers or sold in open auction.



- iv. **Tendu Leaves:** The collection of Tendu leaves provides an employment to the local people and it adds to their income. During the year 2005-06 the collection of Tendu leaves was 23,620 standard bags amounting Rs. 109.92 lacs.
- v. **Grass:** Grasses like Paunia, Sheda, Marvel and Mushan are used as fodder. The broom grass is collected and sold by the local villagers for broom making. Mainly green grasses are removed from the forest. Coarse grasses are used for thatching.
- vi. **Other Forest Produce:** The other forest produce which the villagers take from the forests are, edible flowers and fruits, fibres, gum, herbs, thorns, and leaves. They also use many plants of medicinal values. List of medicinal plants is in **Appendix-XXVI**. The main species of edible flowers and fruits are Mahua, Char and Tendu. Fibres are extracted from Palas, Palasvel. Thorns of Bharati, Hiwar, Eruni, Chilhati, Ghoti, Bor and Babul are used. Cordage and lashings are made out from the bark of Kuda, Palas and sometimes Piwarbel. Besides these, Murum and stones are also removed for building and roads.

3.3.03 Forest Depots: The depots in Bhandara division has the forest produce which is brought from different forest areas and auctioned thereof.

Table 3.2 Forest Depots in Bhandara division.

Range	Depots	Forest Produce	Species
Nakadongri	Chicholi	Timber, Poles, Fuel beat, Bamboo	Teak, Bija, Ain, Dhawada, Garadi, Shisham, Haldu, Bhirra, Saja, Khair, Rohan, Salai
Jamkandri	Mangurli		
Bhandara	Gadegaon, Koka		
Lendejhari	Lendejhari		
Paoni	Vahi		
Sakoli	Sakoli		
Adyal	Mhalgi		

3.4 Methods of Harvesting and Their Costs:

(A) Major Forest Produce (Timber and Firewood)

3.4.01 Agency for Harvesting: Till 1980 forest coupes for timber and firewood were worked through 3 Agencies, viz. The Forest Department, the Forest Labourer's Co-operative Society and the Contractors. However, as per the policy decision taken by Government of Maharashtra vide its R and FD No FCT/1581/93544/F-1, dated 04.04.1981, harvesting by contractors was totally stopped, with few exceptions, with effect from July 1981. Now main felling and thinning coupes are either worked departmentally or through Forest Labours Co-operative Societies (FLCS). The coupes of subsidiary



silvicultural operations are worked departmentally. There are 16 Forest Labour Co-operative Societies in the division. During the year 2005-06 and 2006-07, 30 coupes of Coupe No X and 28 coupes of coupe no. XI was allotted to these societies. These allotments are done by the Adl.P.C.C.F, Production & Management

Marking of coupes is, normally, done a year before the coupe is due for main felling. Estimates are prepared and approved by the competent authority as per due process before starting the coupe operations and the felling starts after the end of rainy season. Trees marked for felling are categorised as timber or fuel wood trees for the purpose of volume estimation of timber and fuel wood. Chalk timber is sold separately.

3.4.02 The timber and pole trees are felled first, followed by firewood species. Saw is used for felling and conversion of timber while axe is used for fashioning purposes. After conversion of the felled trees into logs of merchantable sizes, their measurements are taken after carting to the jungle depot and are embossed at the butt end of the logs using digit nails. The volume read off from the ready reckoner along with the tree number and the log number are also embossed on the butt end.

3.4.03 The firewood is cut into billets of length 1.2 m and stacked as standard sized beats 2 meter long, 1.2 meter wide and 1 meter high. The beat stacks are normally formed in distinct girth classes. After taking entry in the jungle register, timber, poles and firewood are transported to the main sale depots. At the depots, the logs are measured again and assigned new serial numbers. The difference in two measurements reconciled later to ensure the accuracy of the material produced in the coupes and transported to the sale depot.

3.4.04 All the logging operations are done by engaging local labourers in the departmental working and by the members of the FLCS in case of coupes worked by FLCS. Most of the items of work are done on fixed job rates.

3.4.05 Cost of Harvesting: All the coupe operations ranging from coupe demarcation and marking to the transport of forest produce and making lots in the sale depots, are carried out at the rates fixed by the Wage Board, for the current year. While fixing the wage rates for harvesting operations, wages sanctioned by the Government of Maharashtra and cost of living allowance (*Rahniman Bhatta*) are also taken into consideration. The piece-work rates are fixed at circle level in Wage Board meeting.

(B) Minor Forest Produce (MFP) or Non Timber Forest Produce (NTFP)

1. Grass: Grass from closed coupes and plantations are available as on cutting basis and are free or on rated passes.



2. Tendu Leaves: Tendu leaves trade has been nationalized by the Govt. of Maharashtra and its collection and sale is regulated by the provisions of the Act No.LVII of 1969. The area of Bhandara division is divided into 59 units which are sold on modified lump-sum basis by way of open tender. The rates of collection of tendu leaves and target are fixed by the Govt. The collection charges for 2005-06 season was Rs 680.00 in Govt. land and Rs 700 in private land for 1000 bundles of 70 leaves each i.e. one standard bag. The collection of tendu leaves commences from the last week of April each year and continues up to the first week of June. Tendu leaves are collected by engaging labourers who deliver the leaves at various collection centres called 'Phadis'. At each centre the leaves are then packed in gunny bags. The quantity of tendu leaves is measured in standard bags. A bag containing 1000 pudas is known as a standard bag. A small portion of these leaves is also used locally for manufacture of bidis. Bhandara division comprises of 59 tendu units having annual potential of over 30000 standard bags of sale value over 150 lakhs. During the year 2005-06 the collection of tendu bags in Bhandara Division was 23620 standard bags amounting to rupees 109.92 lakhs. (As per old Bhandara division records).

3. Other Minor Forest Produce: Gum units are sold in open auction and annual lease is given to the petty contractors for their collection. Gum unit coincides with the round boundaries. There are 15 gum units.

Gum Collection: The total collection of gum during 2006-07 was 120 quintals, approximately. The Maharashtra Government has recently passed an Act called Maharashtra Transfer of Ownership of M.F.P in the Scheduled Areas and the Maharashtra M.F.P (Regulation of Trade) Act, 1997 as ACT No. XIX of 1997 on 10th December 1997. According to section 4 of the Act the ownership of the M.F.P found in the Government lands in the Scheduled Areas, excluding the Nagar Panchayat and Samitee, shall vest in the Panchayat within whose jurisdiction such areas falls. However, the ownership of M.F.P does not include the ownership of land or trees in those Panchayats area. The list of M.F.P covered under the Act is specified in the schedule. The species of state significance such as Tendu, Apta and Bamboo have been excluded from the purview of the Act.

Line of Export: The division has a large network of railway lines and roads. It has 98 km of broad gauge of double railway line, 27 km broad gauge single line. The National Highway no.6 passes through the district to a length of 76 km. There are 430 km of State Highways, 609 km of main district roads, 900 km of other district roads and 1856 km of village roads. These roads are extensively used by timber merchants for transport of timber, firewood and other forest produce to the market places within the state and elsewhere in the country.



3.5 Past and Current Prices : Due to the increase in construction activities coupled with increasing requirement for furniture items for house interiors the demand for timber is steadily going up. As the supply position is not commensurate with the demand, the price of timber has shown a steep rising trend, over the years. The average rates for the timber, poles and fuel stages during 2001-02 to 2005-06 are given below:

Table No.3.3 Average Rate for Timber per m³ (Rs)

Year	Teak Pole	Non Teak Pole
2000-01	14145	3508
2001-02	14787	3350
2002-03	1782	4069
2003-04	4440	1664
2004-05	20069	4938
2005-06	18196	5486

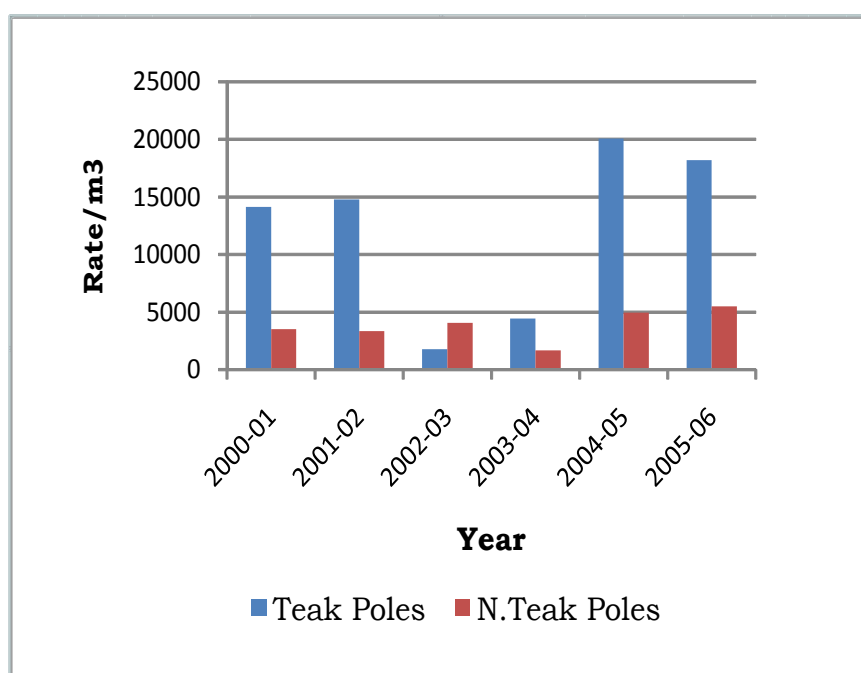


Table No.3.4 Average Rate for Each Pole (Rs):

Year	Teak Pole	Non Teak Pole
2000-01	136	52
2001-02	99	63
2002-03	155	48
2003-04	122	52
2004-05	102	33
2005-06	160	72

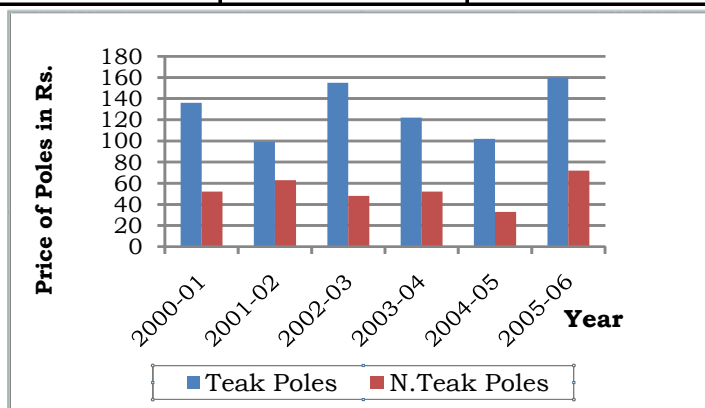
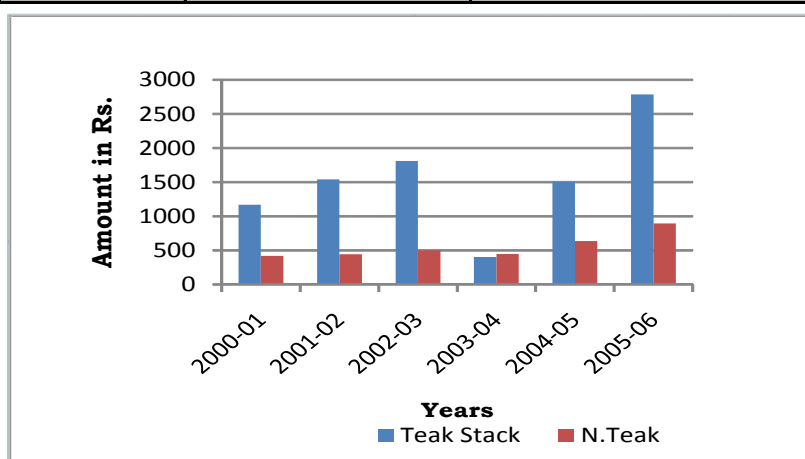


Table No. 3.5 Average Rate for each Fuel wood (Rs) per beat:

Year	Teak Stack	Non Teak Stack
2000-01	1171	421
2001-02	1539	445
2002-03	1810	502
2003-04	405	447
2004-05	1507	636
2005-06	2788	895





Chapter IV

ACTIVITIES OF THE FOREST DEVELOPMENT CORPORATION OF MAHARASHTRA.

4.1 Introduction: Large area of the Forest Department was earmarked to the Forest Development Corporation of Maharashtra Ltd. (FDCM) for its production forestry purpose in the past. Along with the production forestry, FDCM Ltd. carried out Afforestation activity also, aiming to improve the productivity of the forests & generate employment for the economically weaker communities of the area. The information given in this chapter is to give an idea of the forestry works in the erstwhile forest area of Bhandara Dn. The informations have been provided by the D.M. (FDCM) Bhandara, his letter No. FDCM/DM Bhandara/Thech/2622, Bhandara, Dated 13-12-2007.

4.2 Activities:

4.2.01 Forest Project Division, Bhandara was established in the year 1969. Forest area was allotted to this division in a phased manner as per policies adopted by the Govt. of Maharashtra from time to time. This area has been incorporated in the Management Plan and accordingly this division has total area of 33407.80 ha. which includes 33380.80 ha. of Reserved Forests (103 comppt.) and 27.00 ha Revenue land. This area includes the area of Bhandara, Lakhani, Sakoli and Pauni Tahsils of Bhandara district and Tiroda tahsil of Gondia district. Sanction to the Management Plan of this division is given by the Government of Maharashtra, vide its letter No.FDC/1097/CR-191/F-5 dated 11.12.1997 and by the Govt. of India vide letter No 12-29/97(FOR) 3165, dated 11.12.1999 and the period of Management Plan is 1995-96 to 2005-2006. The entire area is divided into six working centres which includes 15 rounds and 33 beats as per the following details



Table No. 4.1 Working Centre wise Area of FDCM Bhandara Division:

Name of Working Centre	No of Round	No of Beat	Area in ha
Chanrapur	2	6	8772.8
Dodmajhari	2	5	5391.2
Pitehari	2	5	3816.9
Umarjhari I	3	5	4173.3
Umarjhari II	4	7	5485
Lakhani	2	5	5768.6
Total	15	33	33407.80*

**There is a difference of about 90 ha. between the area statements given by the FDCM and the Bhandara Forest Div.*

4.2.02 Production forestry works such as thinning, Bamboo exploitation were carried out in the areas, added in the income of FDCM Ltd. The details regarding the revenue generated and expenditure incurred during 2000-01 to 2006-07 for thinning and Bamboo exploitation works as under-

Table No. 4.2 Year wise Production by Thinning:

Sr No	Year of Working	Area of Working (ha)	Expenditure Incurred	Revenue realized
			(Rs in lacs)	(Rs in lacs)
1	2000-01	4043.7	156.91	385.24
2	2001-02	2589.1	99.12	398.86
3	2002-03	3072.28	91.98	301.11
4	2003-04	3520.81	139.67	391.63
5	2004-05	2487.82	86.91	362.05
6	2005-06	2959.17	109.02	525.99
7	2006-07	1710.4	75.58	490.31
	Total	20383.3	759.19	2855.19



Table 4.3 Year Wise Bamboo Production:

Sl. No.	Year of Working	Area of Working (ha.)	Expenditure Incurred	Revenue Realized
			(Rs in lacs)	(Rs in lacs)
1	2000-01	2586.6	31.29	38.17
2	2001-02	4511.8	15.03	27.34
3	2002-03	4209.9	97.33	131.01
4	2003-04	1809	42.83	107.18
5	2004-05	2987.8	50.28	105.04
6	2005-06	2948	61.09	146.41
7	2006-07	2783	56.16	70.31
Total		21836.1	354.01	625.46

Table No. 4.4 Teak Reboisement & Plantation Working Circle:

Sl. No.	Year of Working	Area of Working (ha)	Expenditure Incurred	Revenue Realized
			(Rs in lacs)	(Rs in lacs)
1	2001-02	239.00	37.01	N.A.
2	2002-03	34.00	2.63	16.53
3	2003-04	330.00	59.07	228.42
4	2004-05	270.00	45.68	329.96
5	2005-06	208.00	22.22	98.07
6	2006-07	74.00	51.07	107.48
Total		1155.00	217.68	780.46

Table No. 4.5 Afforestation Working Circle:

Sl. No.	Year of working	Area of Working (ha)	Expenditure Incurred (Rs in Lakhs)	Revenue Realized (Rs in Lakhs)
			(Rs in lacs)	(Rs in lacs)
1	2001-02	0	0	0
2	2002-03	0	0	0
3	2003-04	75.00	0	0
4	2004-05	90.00	7.18	22.55
5	2005-06	0.00	0	0
6	2006-07	0	0	0
Total		165.00	7.18	22.55



4.2.03 The division has undertaken plantations under various schemes from the year 1970 to 2004 rains as per the following:

Table No. 4.6 Table Showing Scheme wise List of Plantations:

Sl. No.	Year	Name of Scheme	Area planted (ha)
1	1970 to 1973	Teak Plantation raised by F.D.B.	2173.98
2	1974 to 1980	Teak Plantation under Govt. Finance	5897.42
3	1981 to 1985	Teak Plantation Project Phase 1	4061.75
4	1986 to 1987	Teak Plantation Project Phase 2 Extension	1147.01
5	1987	Enrichment Plantation	216.75
6	1988 to 1991	WLDP Bankable	2060.5
7	1991 to 2001	Compensatory Plantation (FDCM)	512.00
8	1991 to 2001	Compensatory Plantation (Handed over to	243.00
9	1992	Bamboo Plantation under FDCM Fund	16.74
10	1989 to 1996	WFP Bamboo Plantation	
11		EGS Plantation	3628.50
		EGS Plantation handed over to Forest Deptt	3281.50
12		Afforestation Working Circle	236.00
13		Maharashtra Forestry Project	
		FP-1	1627.00
		FP-3	455.00
		FP-4	5900.00
		FP-5	850.00
		RDF-1	1641.50
14	2002	Conversion to Uniform Working Circle	239.00
15	2003	Conversion to Uniform Working Circle	34.00
		EGS Bamboo plantation	50.00
		Conversion to Uniform Working Circle	330.33
16	2004	EGS Bamboo plantation	850.00
		EGS Afforestation plantation	75.00
		EGS RDF Plantation	226.50
		Conversion to Uniform Working Circle	270.00
17	2005	EGS Bamboo plantation	225.00
		EGS Afforestation plantation	90.00
18	2006	Conversion to Uniform Working Circle	208.00
		EGS Mixed Plantation	50.00
		EGS Bamboo plantation	250.00
		EGS RDF Plantation	100.00
19	2007	Conversion to Uniform Working Circle	74.00

Table No 4.7 Govt. of India Accorded Sanction to the following Activities for 2007-08.

Sl. No.	Particulars	Total Area (in ha.)
1	Thinning	2126.55
2	Bamboo Exploitation	3018.50
3	Afforestation Working Circle	160.00
4	Teak Plantation & Reboisement	245.00
5	Improvement Worling Circle	30.00



Chapter V

FIVE YEAR PLANS

5.1 Plan Outlay for Forest:

5.1.01 Government of India has given priority to the forests in its priority items. Planning commission has given the target to increase forest cover over to the extent of 25% till 2007 & 33% till 2012 & to monitor the same, Govt. of Maharashtra vide its G.R. R&FD No. WLP 1002/CR.45/F-1, dt.- 14.11.03 proclaimed 'Forests & Wildlife' as priority sector. Revenue & Forests department vide its Circular No. MSC 2000/CR-63/F-2, dt- 29.5.04 issued instructions to raise plantations on forest land as well as non forest land to maximum possible to achieve target of 25% forest cover by 2007 & 33% forest cover by 2012. Although so much importance given to the Forests & Forestry sector; the out lay under plan schemes to forests comes to a very meager i.e. 1% of the total state out lay. 2% out lay of total state out lay in annual plan shall be made available to forests for Afforestation works as recommended in "Coimbatore Charter 2001" held under the Chairmanship of Hon. Union Minister of Environment & Forests, despite this, less than 1% out lay is being sanctioned to the Forestry sector.

5.1.02 The statement showing the Plan Outlay for Bhandara Division during 8th. -10th. plan is given below.

Table No 5.1 Plan Allocations and Expenditure for Three Five Year Plans:

Five year Plan	Period of plan	Sanctioned amount (Rs. in lakh)	Expenditure (Rs. in lakh)
8 th plan	1992-97	19.29	20.56
9 th plan	1997-02	31.89	33.30
10 th plan	2002-07	31.16	32.01



Table No. 5.2 Statement Showing Plan Outlay for Forestry
(Forests, Wildlife, Soil Conservation, Tourism, Housing and EAP)

Plan period	Year	Sanctioned Outlay of State	Sanctioned outlay of Forests	Outlay of EAP	Total outlay for Forests (Col. 4+5)	Percentage of outlay for Forests to State plan	
						(Col 3 to 4)	(Col 3 to 6)
1	2	3	4	5	6	7	8
8th plan 1992-93 to 1996-97	1992-93	3160	20.98	8.71	29.69	0.66	0.93
	1993-94	3804	21.93	33.76	55.69	0.57	1.46
	1994-95	4400	23.79	65.33	89.12	0.54	2.02
	1995-96	6069	32.33	71.02	103.35	0.53	1.7
	1996-97	8284	38.28	82.37	130.65	0.46	1.45
9th plan 19 97-98 to 2001-02	1997-98	8393	26.46	61.8	88.26	0.31	1.05
	1998-99	11600	28.39	60	88.39	0.24	0.76
	1999-00	12162	28.59	96	124.69	0.23	1.02
	2000-01	12330	52.1	10.5	62.6	0.42	0.5
	2001-02	11721	55.29	0.48	55.77	0.47	0.47
10th Plan 2002-03 to 2006-07	2002-03	11135	33.03	0	33.03	0.29	0.29
	2003-04	12650	34.61	0	34.61	0.27	0.27
	2004-05	19984	31.45	0	31.45	0.15	0.15
	2005-06	11000	23.44	1	24.44	0.21	0.22

5.1.03 Statement showing the **Plan Outlay** for Bhandara Division during the year 1992 to 2007 is given below:

Table No.5.3 Plan Outlay for Bhandara Division.

Sr No	Five Year Plan	Period of Plan	District outlay (in lakh)	Sanctioned outlay to Forest through DPDC (in lakh)	Outlay %	Actual Exp.	Sanctioned grant including CA &MFP (Rs in lakh)
1	8th. Plan	1992-97	0	0	0		1083.04
2	9th. Plan	1997-02	186	153.42	82.484	915.675	896.447
3	10th. Plan	2002-07	209.343	147.683	70.546	389.746	421.285
4	11th. Plan*	2007-08	36.64	34.64	94.541	72.24	72.24



Chapter VI

STAFF AND LABOUR SUPPLY

6.1 Staff:

6.1.01 Till 1960 Bhandara division covered all forest areas of Bhandara district. It was bifurcated in to two divisions namely; Bhandara and Gondia, in January 1961. Some of the compartments were handed over to Gondia division for their subsequent inclusion into Navegaon National Park. In the year 1982 reorganisation of the forest department took place with a view to remove the unwieldiness of administrative changes to make them manageable for efficient administration. Government vide its G.R. No FDN-1081/76/03-F-2, dated 11.6.1981 sanctioned reorganisation of ranges and beats with effect from 1.9.1981. Each range was provided with 1 Clerk and Accountant. The post of accountant was created vide GR No FDM-1879/CR-17-F-2 dated 11.6.1981. One post of Junior Statistical Assistant was created at each Division vide GR No. FDM-1081/76710/F-2 dated 12.5.1981 to collect accurate statistical data for forestry development programme. The Nagzira sanctuary was separated from the Bhandara division in 1984 and was handed over to Wildlife wing. Bhandara division is headed by an officer of the rank of Deputy Conservator of Forests and its head quarter is located at Bhandara.

6.1.02 On the basis of recommendations of the Tata Consultancy Services (TCS) the field charges up to Range level had been further reorganised into two distinct categories, namely, the Protection and the Development charges since 2000. The objective was to optimise the work load at Beat, Round and Range level with a view to improve efficiency of performance and ensure accountability.

6.1.03 Considering experiences of working in Protection Ranges and Development Ranges and based on difficulties faced during working; the Protection Ranges and Development Ranges have been merged into one single range.

6.1.04 The details of the manpower, including, the office and field staff in the Division is given in Table 6.1.



Table No. 6.1 Present staff position in the Bhandara Division after Reorganisation (As in 2007)

Designation	Sanctioned	Filled up	Vacant post
A. Gazetted Officers			
Dy. Conservator of Forests	1	1	--
A.C.F.	6	6	
Range Forest Officers	18	15	3
B. Non Gazetted Staff			
Surveyor	2	2	-
Forester	96	84	12
Forest Guard	286	249	37
Junior. Statistical Asstt.	1	1	0
Chief Accountant	1	0	1
Accountant	17	16	1
Clerk	29	20	9
Driver	12	6	6
Mechanic	2	2	0
Cleaner	7	2	5
Daftari	1	0	1
Peon	7	7	0
Chaukidar	5	5	0
Store keeper	1	0	1
Van Kamgar	232	232	0
Police -constable	1	1	0
Naik	1	1	0
Total	726	651	75

6.2 Labour Supply:

6.2.01 The labour supply is adequate, except in July and August when paddy is transplanted, after September the supply is adequate. But with proper planning of forestry work, during the above period, labour became available for forestry works. Paddy works are done when the rains are sufficient to fill the paddy fields. Therefore, if the plantations are started as soon as on set of rain they can be completed by the time the field are ready for paddy transplantation.

6.2.02 The erstwhile forest villages, which were established with the object of supplying adequate and assured labour for the various forestry operations have since been declared as revenue villages vide Govt. Notification No 3675/87519-F-6, dated 24.6.1977. The administration of these villages is with the revenue department. However, labourers from these villages are continued to be engaged for various forestry works in the division.



CHAPTER VII

PAST SYSTEMS OF MANAGEMENT

7.1 General History of Management: Bhandara district was formed in 1821. Before that, the Western and Southern parts of the district were parts of the Nagpur territory and the Northern and Eastern parts were parts of Waingangā with its headquarter at Lanji. In 1867, the Lanji and Hatta traps were transferred from Bhandara district to newly formed Balaghat district. Prior to 1853, it was ruled by Marathas except for a brief period from 1818 to 1830, when it was a British protectorate. It came under the British control in 1853.

After coming under British administration in 1853 the Govt. of India issued a proclamation to make a 20 years settlement and conferred *Zamindari* rights on such persons who held long possession of land or were cultivating the same; and who could pay regularly the government demand on them. As a result of this proclamation, proprietary rights were conferred on the *revenue farmers, village Patels and Malguzars*. After the enactment of the Indian Forest Act, 1878, a major chunk of forestland in possession of *Malguzars and Zamindars* was declared as Reserve Forest.

M.P. Abolition of Proprietary Rights (Estates, Mahals, Alienated lands) Act, 1950 (I of 1951) was passed in 1951 and, as a result, all the private forests of Bhandara district were vested in the State Government with effect from April 1, 1951. Initially they were taken over by the Revenue Department. Later on, however suitable areas were transferred to the forest department for management and were declared as Protected Forest under the section 29 of Indian Forest Act 1927.

7.2 Management of Forests and Tree Growth: The management of Bhandara forest division can be categorised into the following, three distinct periods.

7.2.01 Pre-Reservation Period (1853 to 1878): The areas adjoining to the villages were excessively harvested in an irregular manner to clear the forest land for cultivation by the aboriginal people. The remote and inaccessible areas also suffered. Thus, there was no regulation or control over the felling of trees in the forest. In 1862, the forest department was created and was entrusted with the duty to survey and demarcate the forest and prepare forest maps.

7.2.02 Early Reservation Period (1879 to 1893): Forests were declared as Reserved Forest in 1879, under the Indian Forest Act VII of 1878, there was a



ban on removal of certain species, such as *Teak*, *Bija*, *Shisham*, *Kusum*, *Haldu* and *Kowah*, without a licence. The felling of fruit trees of *Mahua*, *Harra* and *char* was also prohibited. Thus, there was no scheme to regulate the felling because of which purchasers could fulfil their requirements from any where they liked, which resulted in over harvesting of accessible areas as the purchasers could obtain their requirements from anywhere they liked. This resulted in over harvesting in accessible areas.

7.2.03 Period of Regular Working Under Different Working Plans: During this period the forest areas were surveyed and the forest officers tried to introduced the modern scientific management systems for these forests. In the process Working Plans were prepared with suitable prescriptions for the forest lands. Various working plans and their periods are given in the following table:

Table No.7.1 Working Plans and their Periods:

Sl.No.	Working Plans in Chronological Order	Plan Period
1	Range-wise Plan	1893 – 1910
2	Best's Working Plan	1910 – 1930
3	Chadha's Working Plan	1930 – 1940
4	Jagdamba Prasad's Working Plan	1940 – 1957
5	Trivedi's Working Plan	1957 – 1977
6	Patil & Sardar's Working Plan	1977 - 1996
7	Dr. Nandkishore & G.U. Bhaid's Working Plan	1996-97 – 2005-06

7.3 First Working Plan (1893 to 1910): The Reserve Forests of Bhandara district was divided into four ranges and a separate plan was written for each range.

Table No. 7.2 Range wise Working Plans and Their Periods:

Range	Year of Preparation	Remarks
Bawanthadi	1893	
Wainganga	1893	Now form a part of Bhandara Dn.
Gaikhuri	1896	
Pratapgarh	1897	Now part of Gondia Forest Division

The following 4 working circles were introduced into the forests of Bhandara division:

1. Improvement Working Circle.
2. Conversion to High Forest Working Circle.
3. Unworkable Working Circle.
4. Grazing Working Circle.

7.3.01 Improvement Working Circle: Well stocked forest of each range except remote and inaccessible areas, areas having large proportion of *Teak* and *Bija* and inferior areas were included in this Working Circle. Each felling series comprised of 30 compartments, one of which was to be worked annually. Keeping fixed number of standards reserved, improvement felling was prescribed. Only best stems were removed during 1893 - 94 to 1903 - 04. Coppice-with-standards system was adopted in 1906-07. Grazing was prohibited for 10 years in worked coupe of all felling series except Dudhara, which was completely closed to grazing. Coupe No 1 to 20 were worked during this plan period.

7.3.02 Conversion to High Forest Working Circle: The forest areas of superior quality consisting of larger proportion of *Teak* and *Bija* trees were included in this working circle. Badly grown *Teak*, *Bija* and inferior trees interfering with healthy *Teak* and *Bija* trees were prescribed for removal. Grazing was totally prohibited. Coupe No 1 to 20 were worked under this plan period.

7.3.03 Unworkable Working Circle: The remote and inaccessible areas were included in this working circle. Bamboo and dry wood was prescribed for removal. Grazing was permitted throughout the working circle but was light due to the inaccessibility and remoteness of the area.

7.3.04 Grazing Working Circle: It consisted of inferior forest. Bamboo and dead wood removal was prescribed. Unlimited grazing was permitted.

Bamboo areas were divided into number of felling series and Bamboos were harvested on three-year cycle.

7.3.05 Results: Only best stems were removed from the Improvement Working Circle. The earlier coupes were partially worked and the later coupes were almost completely worked. As per the prescriptions, seed sowing in felled areas was not carried out fully and wherever seed sowing was done, results were not encouraging. In the conversion into High Forest Working Circle, the inferior trees were not removed due to their low returns. On the other hand, in the name of badly grown trees, large areas were formed suitable for inclusion in high forest or Coppice-with-standard working circle. All this, coupled with the need to have a single plan for the whole district, resulted in the revision of the working plan.

7.4 Second Working Plan (1910 to 1930) Written by Best: This included all Reserved Forests of Bhandara district. The forests were divided into the following working circles.

1. High Forest Working Circle
2. Coppice-with-Standard Working Circle
3. Bamboo Working Circle



7.4.01 High Forest Working Circle: The areas of old Bawanthadi, Gaikhuri and Pratapgarh range, capable of growing large sized trees of valuable timber, were included in this working circle. Total area was 16862 ha. In Bawanthadi-Gaikhuri and Pratapgarh ranges these two felling series with 30 compartments in each were formed. Each felling series was to be worked in two felling cycle of 15 years each. Removal of matured and over-mature trees if silviculturally available combined with improvement felling was prescribed. The minimum harvestable girth prescribed for various species was as follows:

- Teak, Saja, Bija, Tendu, Semal, Anjan, Mahua and Kusum – 180 cm.
- Lendia, Dhaoda, Salai, Shiwan, Jamun, Haldu and Bhirra – 150 cm.
- Other species: 135 – 120 cm.

7.4.02 Coppice with Standard Working Circle: Area covered under this working circle was 121031 ha, included 32 felling series and 30 coupes in each felling series. Fellings were prescribed in 26 felling series. No fellings were prescribed in 6 felling series due to Lack of demand. But they were permitted to be worked if demand arose; separate numbers were given to compartments in each felling series. The species were classified into the following classes in order of their value.

1st Class – Teak, Bija, Tinsa, Mahua, Saja, Surya, Bhirra, Dhaman and Shisham

2nd Class – Anjan, Garadi, Lendia, Dhaoda, Tendu, Rohan, Khair, Hiwar, Amaltas, Shiwan, Haldu, Kusum and Harra

3rd Class – All the remaining trees not included in the 1st and 2nd class.

75 sound and straight trees per ha of 1st class, capable of producing large sized timber and Harra trees were to be reserved as standards, at the time of felling. In absence of 1st class trees, trees from 2nd class were to be reserved. In better quality area more number of standards kept reserved as safeguard against damage from wind. On hills, all sound 1st class trees below harvestable girth were to be reserved and rest of the trees were to be cut flush to the ground.

Thinnings were started in 1922 on small scale. Initially they were light but later on they were much heavier, carried out without any scheme. Thinning benefited the crop. Coupes No.21 to 30, in the above two working circles, were worked during the period of this plan.

7.4.03 Bamboo (Overlapping) Working Circle: Areas with exploitable Bamboo crop was divided into 12 felling series with 3 coupes in each series. Bamboos were cut above a height 0.9 mt. and green Bamboos less than 1 year old was not to be felled, as per felling rules. Not more than half of the green Bamboos were to be felled per clump.

7.4.04 Results: The felling under High Forest Working Circle was very light and caused congestion in the crop. Some of the valuable Teak bearing areas,



which were worked heavily during previous plan, was excluded for no apparent reasons. The felling generally beneficial to the growing stock in Coppice with Standard Working Circle resulted in straight, sound and well grown trees. Thinning benefited the crop and by the end of Best's plan, whole forest was covered once, except the unworkable areas. Thereafter, this working plan was revised by Chaddha in 1930 – 1940.

7.5 Third Working Plan by Chaddha (1930-1940): For the first time, the entire forest area was stock mapped on 4"= 1 mile scale. The whole forest area was divided into compartments forming the permanent units of forest management. On the basis of stock mapping the following working circles were formed.

1. High Forest Working Circle.
2. Simple Coppice Working Circle
3. Bamboo (Overlapping) Working Circle.
4. Miscellaneous Working Circle.

7.5.01 High Forest Working Circle: The compact forest area containing good percentage of Teak, Saja, Bija and Surya, capable of producing large size timber as well as the remote hilly areas with little demand of forest produce were included under this working circle. The area of this working circle was 17305 ha. and consisted of 8 felling series.

Two of these felling series were in Pratapgarh Range and rest were in other ranges. Major portion of this area formed part of High Forest Working Circle of Best's plan. The felling cycle for two felling series of Pratapgarh range was 20 years, while for the rest of the felling series it was 10 years. The treatment prescribed was slash and burn in mixed forest, where Teak was spreading. In the year of main felling, cutting back of suppressed, malformed and damaged advanced growth, opening of canopy in areas having established regeneration, removal of unsound crooked and malformed trees, thinning in congested crops, removal of matured trees above 120cm g.b.h. and clear felling of poor mixed quality was prescribed.

7.5.02 Simple Coppice Working Circle: This working circle included all the remaining mixed forest, worked in the past under coppice with standard working circle, excepts the area under forest villagers, mining leases, area with irrigation department, Lac cultivation and unworkable areas.

Total area under this working circle was 114355 ha. and 59 Felling series, 16 felling series were divided into 30 coups and 43 felling series were divided into 40 coupes. Rotation was fixed as 30 years for site quality IVA, 40 years for site quality IVB.

Production of poles was the main object of management. In the main felling coupe, clear felling was done except Mahua, Khirni, and Arjun trees along nalas. No clear felling was taken in the under-stocked areas.



Further the felling rules were amended in 1932; accordingly Semal trees up to 105cm gbh were retained. Thinning was prescribed at the half of the rotation age.

7.5.03 Bamboo (Overlapping) Working Circle: Area covered under this working circle was 109717 ha. This area was divided into 15 felling series and 4 coupes in each felling series. As per the prescriptions, all dead Bamboos were to be removed and all culms under one year to be retained and minimum of 8 culms over 1 year of age per clump also to be retained. The culms should be cut at the height not to exceed 45cm.

7.5.04 Miscellaneous Working Circle: The total area covered was 5627 ha. Unworkable areas and areas under forest villages, areas under mining leases, areas with irrigation department and Lac cultivation were included. No specific prescription laid down for these areas, except the propagation of Lac departmentally in Lac cultivation areas.

7.5.05 Result: As the size of coupes was large in High Forest Working Circle whole coupes could not be worked. The felling was confined to selected patches of Teak and other valuable miscellaneous spp. each year. And the remaining areas remained unattended, left to the nature. The area under Simple Coppice Working Circle Systems, after few years, was modified to the Coppice with Reserve system. Under this system, certain trees like Rohan up to 30cm gbh were reserved in certain felling series. Parad was also reserved. Retention of Rohan trees proved beneficial in eroded and calcareous area. The coppice growth of Saja in poor areas did not attain adequate height. The coppice regeneration in IVa and better areas, having good density, was satisfactory, but less dense areas were invaded by grasses. In clear felled areas Garadi predominated in the mixed crop and the valuable spp. like Bija and Saja suffered severe competition. Thinning helped in producing healthier and well grown poles. The working in CWR system was similar to the Coppice with Standard system in Best's plan. Since the plan period expired, it was revised.

7.6 Fourth Working Plan (1940-1957) by Jagdamba Prasad: Rajoli, Palastola and Dewangtola blocks were declared as Reserved Forest in 1938 and were divided into 32 compartments from 325 to 356 and were stock mapped for the first time, on 4" = 1 mile scale by enlarging 1" = 1 mile topo-sheets. Stock maps of High Forest Working Circle were also revised. For the remaining areas stock maps of Chaddha's plan were adopted. Based on the stock maps the following working circles were formed:

1. High Forest Working Circle
2. Improvement Working Circle
3. Coppice- with - Reserve Working Circle
4. Miscellaneous Working Circle



5. Bamboo (Overlapping) Working Circle
6. Semal (Overlapping) Working Circle
7. Plantation Working Circle

7.6.01 High Forest Working Circle: The part of the area of High Forest Working Circle of Best's and Chaddha's Plan included in this working circle. Area was considered suitable for conversion to uniform System and was worked under improvement felling. The total area of 8175 ha under this working circle was divided into 4 Felling Series. Most of this area was in present Bhandara division and Nagzira Sanctuary. Teak was the species to be favoured. The other important species to be favoured were Shisham, Tinsa, Bija and Semal. The conversion period for Tiroda Felling Series was fixed as 100 years while for the remaining it was kept as 80 years. Each Felling Series was divided into 4 periodic blocks with the following prescriptions for each periodic block:

P.B. I: Following operations were prescribed in these areas, besides climber cutting etc.

1. Clear felling was to be done in areas with sufficient established regeneration of seedlings or coppice origin, after retaining promising Teak saplings upto 37.5 cm g.b.h. in Tiroda F.S. and upto 50 cm. g.b.h. in remaining 3 F.S.
2. Felling was not prescribed in blanks and under-stocked areas.
3. The poor quality mixed forests were to be worked under Coppice with Reserve system as per the demand.
4. In remaining areas all Teak trees above 90 cm were to be removed and improvement fellings were to be carried out.
5. Teak plantations were to be done on suitable clear felled areas of mixed forests.
6. Cleaning in the 5th. year and first thinning in 11th. year of plantations were to be done.

PB-II: Crown thinning in favour of trees of 127.5 cm to 150 cm g.b.h. in Tiroda felling series and 112.5 cm to 150 cm g.b.h. in other felling series were to be done in the main felling coupes. Thinning was carried out in Tiroda felling series, 25 years in advance of main felling and 20 years in advance in other felling series.

P.B- III & IV: All dead, diseased and over matured trees above 150 cm g.b.h. were to be removed. Congested stands were to be thinned in favour of trees of 37.5 cm to 127.5 cm g.b.h. in Tiroda F. S and 50 cm to 112.5 cm. g.b.h. in other F.S. Thinning was carried out 50 years in advance of main felling, in Tiroda F.S. and 40 years in advance in other F.S.



7.6.02 Improvement Working Circle: The areas under Best's and Chaddha's Plan, which were not included in High Forest working circle, were included under the Improvement Working Circle. The total area of this Working Circle was 9091 ha. The area was divided into 4 provisional Felling Series, one in each range except Bawanthadi. The felling cycle was of 40 years. The fellings were purely silvicultural and were in favour of valuable spp. like Teak, Shisham, Tinsa Bija, and Semal. The harvestable girth for Teak, Saja, Mundi and Bija was 150 cm g.b.h. and for Lendia, Surya, Tinsa and Dhaoda was 90 cm g.b.h.

Climber cutting, removal of saleable dead and diseased trees, removal of silviculturally valuable trees, thinning of Teak poles, removal of overhead cover of Teak, Bija, Tinsa, and Shisham of 62.5 cm g.b.h. was prescribed.

7.6.03 Coppice-with Reserve Working Circle: All areas except the areas of High Forest, Improvement and Miscellaneous working circles were included in this working circle. Total area was 121574 ha. comprising 63 Felling Series with 40 years rotations.

Fellings were prohibited in the following areas:

1. Under-stocked areas
2. Areas, badly infested with climbers
3. Lac producing areas
4. Precipitous areas
5. Areas along large nalas.

In the remaining areas marking for reservations were to be done before the actual felling is carried out. Mahua trees in a coupe near inhabited villages, Khirni trees in Pauni range, Semal and Kullu trees of all sizes and Bija trees up to 90 cm g.b.h.; all seedlings and saplings up to 22.5 cm g.b.h., except Garadi, were kept as reserved in a coupe. All Garadi poles over 40 cm g.b.h. were to be felled.

Areas with Sufficient Regeneration by Seedling or Coppice: Isolated Teak trees and straight sound poles of Teak, Shisham, Saja, Tinsa, Haldu and Shiwan up to 60 cm g.b.h. were kept reserved in areas where regeneration by seeding or coppice was likely to be sufficient. In such areas standards to be left was 75 trees per ha.

Areas with Insufficient Regeneration by Seedling or Coppice: The area where regeneration by seedlings or saplings was likely to be insufficient, the trees more than 75 per ha, except Lendia, Dhoban, Gugal, Mokha, Mowai and Baranga, were to be kept reserved to protect the soil and to prevent invasion of weeds and unwanted grasses.



Crown thinning was prescribed in the 20th year of main felling. Under thinning operation,

A. All inferior spp. e.g. Salai, Dhoban as well as malformed trees of important species with non-commercial value of the future were to be felled.

B. Dense clumps of Bamboo were to be felled, but if the clumps were found scattered, were to be left.

The above prescriptions were modified soon after the introduction of the Plan. The revised prescriptions were as follows:

Improvement Felling: Improvement fellings were to be carried out in the following areas where only dead, dying and thoroughly over matured trees were to be removed:

1. Under stocked areas
2. Areas vulnerable to erosion
3. Areas badly infested with climbers
4. Areas of high quality mixed forest with large proportion of Saja
5. Areas bearing financially immature trees and
6. Areas with presence of high grasses

In rest of the areas following trees were to be reserved and rest of the trees were to be removed.

1. Fruit bearing tree like Mahua, Tendu, Imli and Mango near inhabited villages
2. All Semal and Harra trees and Bija trees under 90cm g.b.h.
3. All seedlings and saplings up to 22.5 cm. g.b.h., except Garadi.
4. All areas with adequate regenerations by seedlings and coppice, sound straight and well grown poles of Teak, Saja, Shisham, Tinsa, Haldu, Dhaoda, Shiwan, and Bhirra were to be reserved for large size timber and to preserve these species.
5. Trees between 37.5 cm. to 60 cm. g.b.h. were to be preferred for reservation and trees above 90 cm. g.b.h. were to be felled.

Retention of 75 standards per hectare was generally considered satisfactory.

In the open forest and areas with deficient regeneration, larger number of trees was to be retained to protect the soil and to reduce the growth of grass and weeds. The reserved trees may be of any size except of Garadi, Dhoban, Beheda, Baranga and Mowai.

Trees like Arjun should be reserved along all water courses.

7.6.04 Miscellaneous Working Circle: Total area of this working circle was 6112 ha. Forest villages, area under mining leases, area handed over to the



Irrigation department, area under Lac cultivation and unworkable areas (comptts. 224, 225B, 226B, 245B, 251& 252) were included in this working circle.

7.6.05 Bamboo (Overlapping) Working Circle: Total area of the Bamboo Overlapping Working Circle was 115817 ha., divided into 20 felling series with 4 coupes in each felling series. Working in the area done as per the prescriptions laid down for the same W.C in the 3rd Working Plan written by Chaddha. No culms less than one year of age was to be felled, a minimum of 8 culms over one year to be retained in each clump, all dead culms were to be removed, cuttings should be done below a height of 45 cms. These harvestings were supposed to be done on rated passes.

7.6.06 Semal (Overlapping) Working Circle: This working circle was formed by including all the areas having a Semal tree growth of harvestable quality and quantity. The working circle was divided into two felling series, one in Bawanthadi and other in the rest of the division. Each felling series was expected to contain about 1400 trees above harvestable girth of 120 cm g.b.h. The felling cycle was kept as 20 years. The annual yield was kept at 63 m³ per felling series.

7.6.07 Plantation Working Circle: The area of mixed forest of other working circles, suitable for growing Teak plantation, were included in this Working Circle. The total area proposed was 309 ha. It was proposed to begin with an annual planting of 2 ha. and subsequently raising it to 20 ha per year in 5 years.

7.6.08 Closure: P.B. I. Areas of High Forest, Improvement and Coppice-with Reserve Working Circles were closed for 7 years after the main felling and plantation were closed for 10 years. No. grazing enquiry was done during the preparation of the plan.

7.6.09 Results: The results due to the implementation of the plan were as follow:

I. High Forest Working Circle: There was no need to prescribe two different conversion period for these areas, as there was no appreciable difference in these areas. Results in different Periodic blocks were as under:

P.B. I. : As there was no provision to clear fell Bamboo, it hampered the growth of regeneration.

Under the pretext of retention of promising Teak, substandard and useless Teak trees were retained, as prescribed in the felling rule No.i.

Removal of Teak above 90 cm., as per the prescribed rule, resulted in forest becoming poorer in Teak and at many places without seed bearers and the Teak forest were converted in to mixed forest. Consequently the areas under Teak reduced and natural regeneration of Teak also could not come up.



Poor quality mixed forest was to be worked under Coppice With Reserve System but some good quality forests were also worked under CWR System, thus defeating the basic objective of High Forest Working Circle.

Although there was provision of cleaning and thinning in the 5th. and 11th. year respectively, it was not carried out in the prescribed year due to which the young crop lagged behind.

Prescription for PB-I areas did not provide any strategy to obtain natural regeneration or artificial regeneration if the natural regeneration failed. Reliance on coppice regeneration was contradictory to the fundamental objects of high forest system. As the Teak area was very small in extent in High Forest Working Circle, conversion to uniform system applied to all areas, under this Working Circle, was not suitable.

P.B. II.: Most of the areas allotted to P. B. II were on precipitous and very steep slopes and were unfit for any kind of working. Some of the suitable areas of Bhandara and Tiroda ranges were heavily thinned.

P.B. Un-allotted: Some of the areas of Tiroda Range were wrongly put under P.B. un-allotted, although it was ideally suited to P.B.I. Without considering silvicultural provisions, the over matured trees were scrupulously felled where as no adequate attention was paid to improve the growing stock by carrying out suitable thinning to favour the trees of specified girth class.

II. Improvement Working Circle: The crop in the working circle was mostly matured with great dearth of lower girth classes. Very liberal view of felling rules was taken and all the matured trees were removed. In some areas even though a fair number of trees before the selection girth were present, they were also cut without any apparent reason. Thus the area gave an appearance as if worked under CWR system.

III Coppice with Reserve Working Circle: Marking rules did not provide any concentrated working in Teak patches. At many places good quality miscellaneous forest was worked heavily, though a restriction was placed against any such heavy felling. Thinning was provided in 11th and 21st years after main felling, but 11th year thinning was not carried out as it was not found necessary. But Teak patches suffered suppression by coppice of miscellaneous trees and reserve trees. 21st year thinning was carried out regularly. In this thinning Garadi poles over 40 cm g.b.h. were to be removal with a view to get another coppice pole crop of 40cm g.b.h. during 2nd half of the rotation from the some stool. However, Garadi being a slow growing spp., very few stumps could reach the girth of 40cm than anticipated. The best stems having been removed, the remaining stems could not makeup for the lost stems. Thus the thinned areas did not have appreciable number of Garadi poles of the required size.

IV. Bamboo (Overlapping) Working Circle: Since all the felling in the area was to be done on rated passes directly through consumer, there was no



control over felling, resulting into formation of irregular and unsatisfactory clumps in the vicinity of villages and Bamboo clumps in remote areas remained un-worked.

V. Semal (Overlapping) Working Circle: During the year 1939-40 and 1955-56, a total of 4585 Semal trees were felled at an average of 306 trees per year.

VI. Plantation Working Circle: During the period of 1940-41 and 1955-56 a total area of 54.2 ha. were planted. The plantation did not come up well due to improper sites and Lack of care.

VII. Miscellaneous Working Circle: An area of 54.20 ha was planted during the year 1940-41 to 1955-56.

7.7 Fifth Working Plan (1957-1977), By Trivedi: Due to reorganisation of states, Madhya Pradesh state was formed on 1.10.56 and the compartments. 1-27 and 357 – 365 were transferred to Balaghat Forest Division of Madhya Pradesh. Compartment 284 was disforested. The old stock maps were checked and were corrected and revised, where ever found incorrect. On the basis of these corrected stock maps, the forests were divided into the following working circles.

1. Selection cum Improvement Working Circle.
2. Coppice with Reserves Working Circle.
3. Pasture Working Circle.
4. Miscellaneous Working Circle.
5. Bamboo (Overlapping) Working Circle.
6. Lac (Overlapping) Working Circle.

7.7.01 Selection cum Improvement Working Circle: This working circle comprised of the total area of 59680 ha. and was divided into 47 felling series, 28191 hectares were of Protected Forests, having Teak and mixed forest of IVa to III. Out of this 11829 hectares were worked either under Improvement of High Forest System during the last working plan, and remaining area of 26362 ha. was worked under Simple Coppice or Coppice with Reserve system.

Out of 16877 ha. of Tree Forests, consisting of Teak and mixed forest of IVa to III quality, 4417 ha. under the previous working plan, were worked either under Improvement or High Forest system and the remaining area of 12460 ha. was worked under Coppice or Coppice With Reserve system. 14612 ha. of Minor Forests, consisting of eroded areas of IVa and lower quality were worked under Coppice With Reserve system.

Out of these 47 felling series, 31 felling series were in Bhandara division and 16 in Gondia Division. The species to be favoured in order of their importance were Teak, Shisham, Bija, Semal, Tinsa, Saja, Haldu, Salai,



Bhirra, Dhaoda, Lendia, and Garadi. A felling cycle of 20 years was prescribed.

Table No. 7.3 The Exploitable Girths Fixed for Different Species:

Species	Exploitable girth	
	Better quality forest	Inferior quality forests
Teak, Bija, Saja, and Haldu	135 cm.	120 cm.
Shisham	120 cm.	105 cm.
Bhirra and salai	90 cm.	90 cm.
Garari	60 cm.	45 cm.

The Prescriptions and Marking Rules:

General Rules: Semal, Kullu, and Harra trees were not to be marked for felling,

Fruit trees Viz, Mahua, Tendu, Khirni, Char and Bilwa were to be given preference for retention if they were sound and local population was collecting their fruits and flowers.

A. Type I Areas: No felling was prescribed in the following areas except the dead and dying trees. The area consisted of:

1. Precipitous and steep slopes
2. Under stocked areas
3. Areas vulnerable to erosion
4. Banks of main water courses, one chain wide on either side.

B. Type II Areas: The remaining areas constituted this class and were as follows :

1. 50% trees of and over selection girth limits and silviculturally available were to be marked for felling
2. In the even aged crops, crown thinning was to be carried out
3. Patches of 0.8 ha and above having profuse regeneration of Teak were to be clear felled and malformed and suppressed advance growths were to be cut back
4. Dead dying and diseased trees were to be removed
5. Malformed young growth and saplings of valuable species which were not likely to develop well if left as they are, were to be cut back.
6. Singling of multiple coppice on stools to be carried out



7. Cutting back operations were prescribed only for the coupes that were worked through contractors
8. Climber cutting and cleaning in the sixth year and thinning in the 11th. year after main felling were prescribed.

7.7.02 Coppice with Reserve Working Circle: The forests worked under Coppice with Reserve system should not have been straight way included in the Selection - coming under Selection Cum Improvement system. A period of rest is always indicated whenever coppice forests to be converted into High forest. The best treatment should have been to work this forest under light improvement felling for one or two cycles to improve the growing stock and to build up trees of selection girth. These forests have further depleted due to removal of existing standards, as there were no trees of selection girth available for removal. In areas, worked under High Forest System and Improvement felling under Jagdamba Prasad's plan, trees of selection girth were available for removal. From these areas only 50% trees of selection girth should have been removed but for no apparent reasons most of the trees of selection girth and approach class have been removed. This can be conspicuously seen in Kalagaota felling series. As such these forests have also depleted in tree of selection girth. Thinning in the pole crop in favour of Teak and other valuable species has not been generally carried out. Trees interfering with the regeneration and advance growth of Teak were not removed. The total area included in this working circle was 65455 ha., further divided into 36 felling series (28 in Bhandara and 8 in Gondia division). The forests were mostly of IVa quality with inextricably mixed patches. The main purpose of management was to supply the demand of poles, small timber, fire wood, grazing and to grow large timber of Bija, Haldu, Semal, and Salai which were in demand in large sizes. The species to be preferred in order to their importance were Teak, Bija, Tinsa, Shisham, Haldu, Saja, Semal, Shiwan, Salai, and Siras. Rotation was fixed at 50 years.

Type I Areas: It included:

- i. Steep slopes and precipitous areas
- ii. Under stocked areas
- iii. Erosion prone areas
- iv. Banks of main watercourses

No trees except dead and dying trees were to be marked for felling in i,ii and iii.

In areas under iv apart from dead and dying trees, silviculturally matured trees were also to be marked for felling at the discretion of the Divisional Forest Officer.

Type II Areas: Area having good quality III and over site quality.

- i. In even aged crop, crown thinning was to be carried out,



- ii. Patches of 0.8 ha and above having profuse regeneration and advance growth of Teak were to be clear felled.
- iii. In remaining areas, dead, dying, diseased, malformed and unsound trees were to be removed.
- iv. Half the live matured and over matured trees were to be removed provided they were silviculturally available and their removal would not create permanent gaps in the canopy.

For removal of matured and over matured trees, the exploitable girths prescribed were as below:

Table No. 7.4 Exploitable Girth of Some Important Species:

Species	Exploitable Girth
Teak, Saja, Bija, and Haldu	120 cm.
Shisham	105 cm.
Bhirra and Salai	90 cm.
Garari	45 cm.

Suitable thinnings were to be carried in congested crops in such a way that after working, the density was not to fall below 0.6.

Type III: Areas having poor III and below site quality and were classified as below for working:

Type IIIa: Patches of 0.8 ha and above having profuse reproduction and advance growth of Teak

- i. Regeneration and advance growth if malformed and suppressed was to be cut back.
- ii. All miscellaneous species and Bamboos likely to interfere with the resultant crop were to be removed.
- iii. Some poles, upto 60 cm. in girth, of Teak, Semal, Saja, Bhirra and Dhaoda were to be retained for providing shade and protection to the young re-growth.

Type IIIb: Patches with immature pole crop were to be excluded from working to form future crops. The crop was to be thinned if required.

Type IIIc: Forests of medium and low stocking where coppice regeneration from the main crop and reproduction was not likely to be adequate,

- i. All sound trees of Bija and Haldu up to 90 cm, Shisham and Salai up to 60 cm. in girth were to be reserved.
- ii. Some better grown healthy trees except Garadi were to be reserved.
- iii. 100 to 125 standards per ha. including those reserved under rule i. above, were to be reserved.



- iv. Well grown advance growth of miscellaneous species except Garadi upto 30 cm. in girth and Teak up to 22.5 cm. in girth were to be reserved.
- v. All the remaining trees, except the trees reserved under rules i. to iii., were to be felled.

Type III d: Well stocked forests or forests with medium density, but containing adequate regeneration where the coppice regrowth from the main crop and advance growth was likely to be adequate:

- i. All sound trees of Bija and Haldu upto 90 cm, Shisham and Salai upto 60 cm. in girth were to be reserved,
- ii. Sound and well grown poles of Teak, Saja, Tinsa, Shiwan and Bhirra upto 90 cm in girth in IVa and below quality areas and Teak and Saja trees upto 105 cm girth in III quality areas were to be reserved. The total number of trees reserved including those under rule (i) above was not to fall below 75 per ha. and was to be of seedling origin.
- iii. All well grown advance growth upto 22.5 cm in girth except Garadi was to be reserved,
- iv. All the remaining tree growth except the trees reserved under rule (i) to (iii) were to be felled.

General: Following trees were to be especially reserved against felling in areas of Type I to III except in areas where clear felling was prescribed.

- i. All sound trees of Semal, Kusum, Palas, Ghont and Ber,
- ii. All Kullu and Harra trees,
- iii. Fruit bearing trees e. g. Mahua, Char, Tendu, Mango, Imli and Khirni, if the local population was collecting these fruits and flowers.

The above prescriptions, though very sound, were too much complicated and hence beyond the competence of the lower subordinates who carry out the marking to follow them. This has resulted in not following them. In general all the tree growth has been removed except upto 50 to 75 standards per ha of inferior species and advance growth. At places, under-stocked areas, have been excluded from working.

Saja, Bija, Dhaoda, Rohan, and Bhirra etc. are not good coppicers. As such coppice regeneration of the valuable species, except Garadi and Lendia, has mostly failed to come up. Annual fires may also be one of the reasons in not getting coppice regeneration of Saja, Bija, Dhaoda, Rohan, Bhirra etc. This has resulted in making these forests poorer in valuable timber species, fall in the density of the crop and increase in the under stocked areas.



Cutting back operations, sixth year cleaning, eleventh and twenty sixth year thinning were prescribed only for Teak patches. In marking, trees above 22 cm. girth are only marked for felling. As such it is absolutely necessary to cut back malformed reproduction and advance growth of valuable injaili species in cutting back operation. Also cleaning is necessary in mixed crop to free seedlings and saplings from suppression and to reduce coppice shoots to one or two good shoots per stool to get good sized pole. Reduction in coppice shoots is more necessary in case of Garadi to produce good sized poles. Mid rotation thinning i.e. twenty sixth year thinning is also necessary to favour trees of valuable species. As cutting back operations, sixth year cleaning and twenty sixth year thinning were not prescribed for mixed crop, the crop did not get any treatment. This has resulted in not getting good crop from malformed advance growth, and in suppression of the valuable species.

7.7.03 Pasture Working Circle: In this working circle compartments 158B, 159A, 161B, 162, 301, 302, 307, 308 from Bhandara division and 254B, 256, 283B, and 356 from Gondia division were included. These forests were worked under Trivedi's working plan. Due to heavy working, over grazing and failure of coppice and seeding regeneration to establish, the areas failed to restock satisfactorily. Due to heavy grazing, fodder grasses were also eliminated. As these areas were partly under stocked, Pasture Working Circle was formed and they were included in this working circle. The total area of this working circle was 4514 ha. and was divided into 10 grazing units. Each unit was divided into two sections and alternately one section was to remain closed to grazing during monsoon from 1st July to 31st October. Planting of fodder and shade trees and fodder grasses was also prescribed, exploitation of trees from fairly well stocked areas under the orders of Conservator of Forests was also prescribed if that was found necessary. Monsoon closure has not been effected, fodder and shade trees have not been planted. In compartment no. 301, an area of 108 ha. has been fenced and planted with fodder grasses such as Paunia, Shedgea, Marvel, Mushan, etc. Over 100 ha. of fodder plantation has been raised during 1970 and 1971 under fodder development scheme.

These areas needed more protection against grazing to restock the same and to reduce erosion hazards. By throwing open to grazing, these areas have further deteriorated.

7.7.04 Miscellaneous Working Circle: This working circle included areas of forest villages, areas in charge of irrigation department, areas under mining leases and grass birs. Total area of this working circle was 4817 ha. No prescriptions were made in this working circle except for grass birs. These grass birs consisting of compartments 170, 323 and 324 having areas 363.0 ha, 39.3 ha and 266.2 ha respectively, were formed. In the grass birs grazing was prohibited and the following operations were prescribed:



- i. Eradication of weeds and climbers.
- ii. Periodic burning of grass birs, once in five years in the last week of May, light soil working after burning and sowing seeds of Paunia, Sheda, Mushan, Marvel, and Sabai by broadcasting.
- iii. Canopy opening in dense patches of tree species.
- iv. Planting of fodder tree species viz. Anjan, Mowai and Pipal etc.

7.7.05 Bamboo (Overlapping) Working Circle: The working circle included all the areas that contained Bamboos in workable quantity. The total area of this working circle was 67321 ha and was divided into 17 felling series with felling cycle of 4 years. The prescriptions were as below:

All dead and broken Bamboos were to be removed.

The number of culms to be retained per clump was governed by the formula

$$N = (K+M)+2K.$$

Where, **N** = Total number of culms to be retained in a clump,

K = Number of culms of the current Season,

M = Number of culms of the previous Season.

- i. Peripheral culms were to be retained in preference to the central ones.
- ii. The Bamboos were to be cut between 1st and 2nd node but not below 22.5 cm and above 45 cm from ground level.
- iii. No Bamboos were to be exploited from clumps having less than 10 culms except dead and broken.
- iv. Exploitation of Bamboo from 1st July to 30th September was prohibited.
- v. Bamboo culms or clumps in flower were not to be felled till the seed is shed.
- vi. After gregarious flowering the areas were to be strictly fire protected and closed to grazing till the formation of the clumps.

According to the orders issued by the Chief Conservator of Forest, Maharashtra State, Pune under his No. D / LND /17/ (66-67) /11109 dated 19.9.1966, the felling cycle of Bamboo was reduced to 3 years from 4 years since 1967-68.

7.7.06 Lac (Overlapping) Working Circle: This working circle consisted of 1714 ha of Lac bearing areas. The Lac hosts found in these areas are Palas, Ghont and few Ber and Kusum trees. Lac cultivation was done from 1951 to 1954 but was found to be uneconomical. As a result the Lac cultivation was



stopped in the year 1954. In the plan under revision, it was proposed to lease out the Lac areas for Lac cultivation. No lessee had cultivated Lac. Actually very little Lac is found in Reserved Forest. The same is mostly collected from Palas trees from private lands, revenue waste, Dochand Forests and road site strips.

7.7.07 Results:

I. Selection cum Improvement Working Circle: The areas of C.W.R of previous plan included in this working circle during this plan did not have sufficient trees above selection girth and were suitable only for light improvement fellings, for one or two cycles before inclusion in this working circle. They have further depleted due to removal of existing standards.

In the areas of High Forest working circle and Improvement working circle of previous working plan, the retention of 50% trees above the harvestable girth was not followed, for an apparent reason and most of the trees above selection girth and approach class were removed. As such these forests also depleted in trees of selection girth.

Thinning in the pole crop in favour of Teak and valuable species and removal of trees interfering with the regeneration and advance growth to Teak were, generally, not carried out. Nor the malformed regeneration and advance growth of Teak was cut back.

In cutting back operation only badly damaged trees were removed. Other prescribed operation was not carried out. Cleaning in the 6th year and thinning in the 11th year in Teak patches, though prescribed were not carried out. Cleaning and thinnings were also necessary in the miscellaneous crop, but were not prescribed.

Due to annual fires, regeneration of fire sensitive valuable species did not come up adequately.

II. Coppice with Reserve Working Circle: Though the prescriptions were sound, but they appear to be theoretical and cumbersome and, hence, were beyond the scope of lowermost staff to understand and implement them. Due to this all the tree growth was removed except 50 to 75 standards per ha. including inferior species and advance growths, this resulted in the depletion of valuable species like Saja, Bija etc. in the resultant crop.

Saja, Bija Dhaoda, Rohan, Bhirra, Haldu etc. are not good coppicers. As such coppice regeneration of valuable species except Garadi and Lendia, mostly failed to come up. Annual fires also adversely affected the establishment of natural regeneration and coppice. As a result of this the forest became poorer in valuable miscellaneous species and the under stocked areas increased.

Cutting back operation, 6th year cleaning, 11th and 26th year thinnings were prescribed for Teak patches only, whereas they were required



for miscellaneous areas also. But in the prescribed areas also, these operations were not carried out scrupulously. This resulted in the suppression of the valuable species and malformed in advance growth.

III Pasture Working Circle: In compartment 301, 108 ha. was fenced and plantation of fodder grasses such as Paunia, Sheda, Marvel, Mushan etc. was taken over, 100 ha area during 1970 and 1971, 50 ha in 1972 and 50ha in 1973 was also taken under fodder development scheme.

In rest of the areas, neither plantation of superior grasses/fodder trees was taken nor was the monsoon closure effectively implemented. As a result these areas were further deteriorated.

IV. Miscellaneous Working Circle: The grass birs were not formed in the earmarked areas. They remained open to grazing, consequently leading to further deterioration of the area.

V. Bamboo (Overlapping) Working Circle: Felling rules were not observed by the rated pass holders. The fellings were very selective and only best green culms were removed. Dead and damaged Bamboos were not removed. As it was very easy to split current year Bamboos, they were also removed. Illicit cutting of Bamboo was heavy and maximum during rains. Actually even, during monsoon season, Bamboo was felled and splited on the sites and splits were removed on head loads. Due to annual fires green Bamboos on the outer periphery were killed and dead Bamboo got burnt during every fire season. Due to these factors, the quality of Bamboos deteriorated and clump formation was very irregular and unsatisfactory. Working was also very heavy during the last few years as there was no control over removal of culms. All the Bamboo clumps from Pauni and Tumsar ranges and around villages of other ranges have been completely ruined.

VI. Lac (Overlapping) Working Circle: In general the lessee did not cultivate Lac in the forest. Actually very little Lac was found in the forest. It was collected mostly from Palas trees from private lands, revenue wastelands, Dochand Forests and road strips.

7.8 Sixth Working Plan (1977 - 1996) by Patil & Sardar: This working plan was written by Patil and Sardar. During the currency of Trivedi's plan, Bhandara division was bifurcated into two divisions, namely; Bhandara and Gondia since January 1961. Therefore, this plan included the Reserved Forest of new Bhandara Division only. In addition to this, areas of Fazal forest and Dochand forest falling within the jurisdiction of Bhandara division and which were proposed for reservation were also included in this plan. The prior history of the proposed Reserved Forests is described later. The proposed reserves have since been declared as Reserved Forest. As per Govt. of Maharashtra Revenue and Forest Deptt. Resolution No. MFP/1365/13211-Y dated 6-12-1968 the whole forest was functionally classified into the following categories:



1. **Protection Forest:** This area included steep and precipitous slopes, the preservation of which was necessary for soil and water conservation as they formed main water and catchment areas of rivers, streams and nalas.
2. **Tree Forests:** This type included all the high forest areas capable of growing big sized timber.
3. **Minor Forest:** This category included all the low rotation forest areas which were capable of producing small timber, poles and firewood to meet the local demands.
4. **Pasture Forests:** This category included openly stocked areas that had ceased to yield even small timber but which were conveniently situated for providing grazing to the adjoining cattle population.
5. **Miscellaneous Forests:** This category included all the remaining forest areas.

Based on the above classification, the following working circles were formed:

- i. Conversion Working Circle.
- ii. Coppice with Reserve Working Circle.
- iii. Kuran Working Circle.
- iv. Miscellaneous Working Circle.
- v. Bamboo (Overlapping) Working Circle.
- vi. Wildlife (Overlapping) Working Circle.

7.8.01 Conversion Working Circle: This working circle included the Reserved Forest of quality IVa and above and which were partly worked under Selection-cum Improvement system and partly under CWR system in the previous plan. Fazal Forests, included in this working circle, were the areas worked under CWR. The total area included in this working circle was 50746.6 ha. and was divided into 12 felling series. The conversion period was kept as 80 years and the area was divided into 4 periodic blocks. Out of these, PBI and PBII were fully allotted and PBIII and PBIV were kept as PB unallotted. The yield was regulated by area. The working in each PB was as follows.

I. PBI: The whole coupe was to be divided into following categories:

Unworkable Areas: This included

- i. Steep and precipitous slopes and 20 m wide strips on either side of nalas and public roads.
- ii. Areas with natural regeneration of Teak of 0.4 ha or more in extent and containing 500 or more seedling per ha of Teak.
- iii. Teak plantations



- iv. Remaining Plantable Areas: This included:
 - a. Areas containing deep and well drained soil to be planted with Teak.
 - b. Areas having poor and eroded soil to be planted up with Khair and Sissoo.

Marking and Felling Rules:

- a. In the category (i) areas, only dead trees were to be removed on steep slopes. And on 20 m strip of nala or road in addition to dead trees, dying and over matured trees were also to be removed without creating permanent gaps.
- b. In the category (ii), all trees were to be removed, but no planting was to be done.
- c. Silvicultural operations were to be carried out in category (iii) areas.
- d. In category (iv) areas, clear felling was to be done followed by planting as per the suitability described above.

II. PBII: Besides climber cutting, thinning was also proposed to have a spacing equal to 1/3 rd. the height of the average trees. No fruit trees were to be felled.

III. PB Un-allotted: The following rules were prescribed for these areas, besides climber cutting

- i. All dead, dying, malformed and diseased trees were to be removed.
- ii. Only one vigorous and well grown coppice shoot was to be kept per stool in the case of valuable spp. like Teak. Whereas, in the case of Garadi, 2 or 3 best coppice shoots per stool were to be kept. Remaining shoots were to be cut.
- iii. All Garadi poles above 45 cms were to be felled.
- iv. Inferior species and Bamboo's interfering or likely to interfere with the regeneration and advance growth of Teak and other valuable species were to be removed.
- v. Malformed advance growth of Teak and other valuable species was also to be cut back.
- vi. Thinning was to be done to get the resultant spacing equal to 1/3 rd the average height of the trees, where the crop is congested.

IV. Subsidiary Silvicultural Operations: Cutting back operations in the next year of felling were to be carried out in category (b) areas of PBI and PB un-allotted. Two thinnings in the 9th year and 15th year, respectively, of main felling were prescribed. Both these thinnings were to be mechanical thinning. Besides this, climbers were also to be cut. The areas of PBI were to remain



closed for grazing for the next 10 years and were to be protected from fire for a period of 10 years after the main felling. The areas of PBII were to be closed to grazing for a period of three years after working.

7.8.02 Coppice with Reserve Working Circle: The remaining areas were included in this working circle, generally of site quality IVa. areas. The total area of this working circle was 15221 ha. and was divided into 10 felling series. The rotation was kept as 40 years. The yield was regulated by area.

The system of working was as follows:

The coupe was to be divided into the following categories:

Type I: Unworkable areas containing steep slopes above 25°, under stocked areas - below 0.4 density, eroded areas, 100 m. wide strip on either side of nalas and areas around a radius of 50 m. of natural cave, shelter and hiding place of wildlife.

Type II: Patches of 0.4 ha or more having 500 and more seedlings and saplings of Teak per ha.

Type III: Patches of 0.4 ha or more having well stocked good quality Teak.

Type IV: Teak plantations.

Type V: Remaining areas containing mixed forest.

Marking Rules for Different Categories, Besides Climbers Cutting:

Type I:

- i. All dead and dying trees, malformed and crowded poles and saplings of Teak, trees interfering or likely to interfere with the resultant coppice shoots of Teak and all live high stumps were to be marked for felling.
- ii. All coppice shoots except one vigorous and well-grown shoot per stool were to be marked for felling.

Type II: All the tree growths were to be marked for felling and suppressed seedlings and saplings of Teak were to be cut back.

Type III & IV: Silvicultural thinnings were to be carried out.

Type V: All the tree growth was to be marked for felling after keeping the following reserves:

- i. All healthy edible fruit bearing trees of Mango, Chinch, Jamun, Kawath, Khirni, Bhilawa, Char, and Aonla.
- ii. All healthy trees yielding minor forest produce of economic importance namely, Mahua, Tendu, Harra, Kullu, and Khair.
- iii. All sandal trees and well grown straight and sound trees of Semal.
- iv. Well grown saplings and poles of superior species which are not good coppicer, upto 60 cm. in g.b.h.



Subsidiary Silvicultural Operations: Cutting back operations in the next year of main felling, cleaning in the 5th year from the year of main felling and mid rotation thinning in the 20th year were prescribed. The main felling coupes were to remain closed to grazing for 5 years after main felling. The areas of Teak plantations were to be fire protected for 10 years.

7.8.03 Kuran Working Circle: The total area included in this working circle was 981.9 ha and 5 grass birds. The whole area was formed as one grass series and was divided into 20 annual coupes. Soil conservation works were to be taken in heavily eroded areas or areas liable to erosion. A treatment map was to be prepared showing area above 10° slope and areas having light, medium and heavy soils. The following works were to be carried out in all the areas except in the areas with slope above 10°.

(A) Before the Monsoon:

- i. Climber cutting.
- ii. Drastic opening of canopy so as to have average spacing of trees as 10 m * 10 m. Fodder trees namely Bija, Neem, Pipal etc. were to be given preference for retention.
- iii. The brush wood was to be used for soil conservation works and remaining was to be collected on tree stems and burnt.
- iv. Light ploughing of the area upto 15 cm. in depth along the contour.

(B) After the Monsoon:

- i. Harrowing of the area after the soil has become wet to a depth of 10 cm. and weeds have germinated. After this, sowing of seeds of grasses either in lines 30 cm apart or through broadcasting was to be done. Sheda on light soils, Paunia and Mushan on medium soils and Marvel on heavy soils was to be sown.
- ii. Fodder trees such as Anjan, Bija, Sissoo and Pipal were to be planted at a spacing of 15m * 15m through two year old potted plants.
- iii. Obnoxious weeds were to be uprooted before flowering. The grass birds were to be strictly closed to grazing and were to be rigidly protected from fire.
- iv. Cutting of grass was allowed after the seeding.

7.8.04 Miscellaneous Working Circle: This working circle included the remaining areas. The total area included in this working circle was 49523.5 ha. , consisting of following categories:

- i. Areas earmarked for Forest Development Board and later to FDCM and partly handed over. The area of this category was 29900.3 ha.
- ii. Nagzira wildlife sanctuary consisting of 15373.5 ha.



- iii. Forest villages consisting of 905.7 ha.
- iv. Area in charge of Irrigation Department, 1818.8 ha.
- v. Area under mining leases, consisting of 18 mining leases, 282.7 ha.
- vi. Area under forest research station Mohgata, 445.6 ha.
- vii. Area under Gadegaon depot, 91.4 ha.
- viii. Area under forest nurseries, 78.5 ha.
- ix. Area under Railway line, 2.4 ha.
- x. Area to be submerged under Bawanthadi Project, 771.2 ha.

No treatment was prescribed except clear felling in areas to be submerged under Bawanthadi Project.

7.8.05 Bamboo (Overlapping) Working Circle: This working circle overlapped the conversion working circle and included all the compartments containing Bamboo in workable quantity. The total area of the working circle was 4121 ha and was divided into two felling series. The felling cycle was 3 years. One felling series i.e. Ballarpur was allotted to Ballarpur paper mill and the other was Nistar Felling Series, which was to be worked departmentally.

The Felling Rules prescribed were:

- i. Cutting of dead, diseased, malformed, bent and illicitly cut culms.
- ii. No clump having a minimum of 8 mature culms of more than one year old was to be considered fit for harvesting.
- iii. Only mature culms i.e. more than one year old were to be removed. A minimum number of culms of 8 or equal to current year's recruitment, whichever was more, of more than one year were to be retained.
- iv. The felling was prohibited from 16th June to 15th October.

The felling was to be started from inside to outside of the clump after making a wedge shaped opening of 0.75 m width in the clump. The height of felling was to be kept lower than first inter-node and not higher than second inter-node. Digging of rhizomes, cutting of Bamboos for fodder and use of tender Bamboos for bundling was prohibited.

The prescriptions for gregarious flowering were also made. In case of flowering of clumps or culms, the felling was to be deferred till seeding was completed. Whenever gregarious flowering took place, the area was to be strictly protected from fire and was to be closed to grazing for a period of 10 years. The flowered area was to be divided into 3 categories.

Category A: Areas where the regenerated Bamboo crop is 1 to 3 years old. It will contain thick seedlings without clump formation.



Category B: Areas where the crop is 3 to 8 years old. It will contain immature clumps.

Category C: Areas where the crop is more than 8 years old. It will contain enough matured clumps fit for harvesting.

- i. In area 'A' and 'B' tending operation was to be carried out.
- ii. In category A, the thick seedling growth was to be reduced to 250 uniformly distributed foci per ha of 0.6 m diameter.
- iii. All growth around these foci up to a radius of 1.5 m was to be removed.
- iv. In the category 'B' these foci were to be reduced to 200 per ha by removing the badly grown or inferior foci.
- v. And the cleaning and climber cutting was to be done as in category 'A'. These operations were to be repeated annually or at a maximum interval of 3 years depending upon the availability of funds.
- vi. Category 'C' was to be treated as per the regular harvesting of Bamboos described earlier.

7.8.06 Wildlife (Overlapping) Working Circle: This working circle covered the entire area of the Bhandara division. The aim of this working circle was to ensure the maintenance of viable population of wildlife and preservation of areas of biological importance as a National heritage.

The prescriptions included protection of wildlife, providing amenities to tourists and erection of watchtowers. Salt licks were to be kept at places frequented by wildlife. No harvesting was to be done in the sanctum sanctorum of Nagzira wildlife sanctuary. A vigilant watch was to be kept on poachers and gates were to be erected at suitable places. Hoardings on the importance of wildlife were to be exhibited at strategic places. In water scarce areas, water holes were to be created.

7.8.07 Results:

I. Conversion Working Circle: The main objective of management of this working circle was to convert the existing mixed forest to uniform even-aged crop of Teak and other valuable species. Bamboo was to be under planted in Teak areas. Clear felling and planting of Teak was done in the PB I areas except on the steep slopes. But the plantations have not come up successfully mainly because of poor look after, fire and grazing.

Degraded areas were also planted with Teak. Bamboo was also planted with Teak at 6m x 6m, which is one of the main reasons of suppression of Teak plantations.

Clear felling has been stopped since 1987-88 and no operations are being carried out in the unconverted areas.



Grazing closures have not been followed scrupulously. Annual fires are regular features, which has caused maximum damage to the crop. The Teak plantations as well as the naturally regenerated crops have become stunted due to regular fires. The subsidiary silvicultural operations have not been followed and could not be carried out in the field. Since no prescriptions for planted Bamboos were given, the Bamboo areas were not worked as a result the clumps have become congested and at places they were being damaged by illicit cutters and grazing, especially by goats. Thus the crop in PB I areas can be divided into following categories:

Areas with Successful Teak Plantations: These are confined to a particular coupe or part of a coupe in different felling series. In these patches, Bamboo has either not been planted or has failed. The survival in such areas is around 50 to 60%. Some miscellaneous trees, through coppice as well as seedlings, have also come up with the Teak plantations.

Areas with Successful Bamboos: These areas are covered with Bamboos and other species planted as well as naturally regenerated have been suppressed. Very few seedlings have good growth. The forests appear as Bamboo forests. They are found in almost all felling series. This type of areas is more prominent in coupe No. 7, 8 and 9 in all felling series except Kanhargaon.

Areas with Failed Bamboo and Teak Plantations: Such areas are found where the soil is degraded and which were unsuitable for Teak plantations. The survival of Teak is below 40% and the growth is stunted. The coppice shoot of inferior miscellaneous species have come up in these areas. The areas of Pauni range are more in this category. In some better areas also the plantations have failed due to fires. In such areas regeneration of miscellaneous spp. through coppice as well as seedlings have come up and has covered the whole area. In such areas coppice of Dhaoda and other misc. spp. was also seen. Sodhipur felling series is a typical example of this.

Unconverted Areas: In the unconverted areas the crop was mostly middle aged miscellaneous crop and is unattended since the stoppage of felling.

Thus in the **PBI** areas, the conversion has reduced the forest either into Bamboo forest or coppice forest with large open patches. The successful Teak plantations are very less.

In the **PBII** and **PB Unallotted** areas, the felling operations were confined mainly to removal of dead, diseased and malformed trees. Those areas became congested, where fire damage is less. In the areas subjected to heavy fires, the growth of young crop has become stunted and becoming open. Massive afforestation works have been taken in many areas, but it is not successful.

II. Coppice with Reserve Working Circle: There is not much of difference in the quality of the forest in this working circle and the Conversion Working



Circle, except that here the quality IVb areas are more. Most of these forests specially in Jamb-Kandri and Tumsar ranges are capable of producing large sized timber. The natural regeneration by seedling is also adequate in these areas. Only in few compartments of Paoni and Adyal ranges, falling in this working circle, the crop is of IVb quality and is open. But there also this system has not been successful as these areas are subjected to annual fires and heavy grazing. The regeneration also does not come satisfactorily.

As the valuable miscellaneous species like Bija, Saja, Haldu, Surya, Dhaoda, Bhirra are not good coppicers, this system is not suitable for these species and has resulted in the increase of species like Garadi, Lendia etc.(strong coppicers) in the growing stock. Teak is very less in the Bhandara Forest Division; its regeneration through coppice is also not satisfactory.

The prescriptions were complicated and were not properly implemented by the staff, resulting into a uniform type of marking throughout the coupe. Initially the reserves were kept less, but their number is increased now. But no specific norm is followed. Reservation entirely depends upon the judgement of the marking staff. The marking is confined mainly to superior species. In the areas where natural regeneration through seedling is present, the areas have been restocked and the crop has become congested. But the areas where the seedling regeneration is absent, the crop has become open after working. The subsidiary silvicultural operations have not been carried out as per the prescriptions. The cutting back operations have been mainly confined to removing of marked trees but not felled. Cleaning operations have been carried out in major parts.

Thus the working of forest has resulted in conversion of high forest into low forest in well stocked areas and increase in the open areas in low quality forest.

III. Kuran Working Circle: These areas were not closed to grazing and the operations, as prescribed, have not been carried out. In most of the areas massive afforestation works have been taken. But most of it is not very successful.

IV. Bamboo (Overlapping) Working Circle: There were only two felling series, one Nistar and one Commercial. The commercial felling series was allotted to Ballarpur paper mill. Though the working of Bamboo coupes was satisfactory, but due to illicit cutting the Bamboo, clumps have deteriorated and the yield of Bamboo has reduced. Both these felling series are now not being worked. But the illicit cutting of Bamboos is still continued.

7.9 Seventh Working Plan (1996-2005) By Dr. Nandkishore & G.U.Bhaid: This working plan was written by Dr. Nandkishore and G.U Bhaid during the currency of the plan written by N.R.patil and M.G.Sardar. This plan included the Reserved Forests of new Bhandara Division only. In addition to this, areas of Fazal forest and Dochand forest falling within the jurisdiction of



Bhandara division and which were proposed for reservation were also included in this plan. The prior history of the proposed reserves is described later. The proposed reserves have since been declared as Reserved Forest. As per Govt. of Maharashtra Revenue and Forest Deptt. Resolution No. MFP/1365/132211-Y dated 6-12-1968 the whole forest was functionally classified into following categories.

A. Protection Forests: This area included steep and precipitous slopes and catchment areas important to be preserved for soil and water conservation.

B. Tree Forests: This type included all the high forest areas capable of growing big sized timber.

C. Minor Forests: This category included all the low rotation forest areas which were capable of producing small timber, poles and firewood to meet the local demands.

D. Pasture Forests: This category included open areas that had ceased to yield even small timbers or fire wood, but which were conveniently situated for providing grazing to the cattle population of adjoining villages.

E. Miscellaneous Forests: This category included all the remaining forest areas.

Area Included in the Previous & the Present Plan: The total area mentioned in the Nandkishore's Plan is 125521.595 ha. which should have been 125603.039 ha. This was due to miscalculation of area. These areas included 34125.833 ha of FDCM and 362.558 ha. of disforested Forest area, whereas the area of 67.320 ha of compartment No.363B was not included. The area of PF should have been 30245.111ha. whereas due to typing mistake it has been mentioned as 30307.222 ha.

While calculating the area for the present plan, the area of FDCM, the disforested area and the area transferred to the Gondia Dn. have been excluded.

Based on the above classification, the following working circles were formed:

Table No. 7.5. Details of Working Circles and Their Areas:

Sr. No	Working Circle	Area in ha.
1	Selection – cum – Improvement Working Circle.	43744.495
2	Improvement Working Circle.	40005.318
3	Fuel-wood, Fodder and Pasture Working Circle.	11610.239
4	Miscellaneous Working Circle	30161.547
5	Bamboo(Overlapping) Working Circle.	5664.474
6	Wildlife (Overlapping) Working Circle.	125521.599
7	Tussar – Cultivation (Overlapping) Working Circle	175.509

7.9.01 Selection-Cum-Improvement Working Circle:

General Constitution of the Working Circle: The areas included in this working circle were as follows:

- The PBII and PB unallotted areas of Conversion working circle of previous plan, which were of better quality i.e. III and IVa.
- Some of the felling series, consisting of III and IVa areas, of Coppice with Reserve Working Circle of the previous plan.
- Some areas of Protected Forest which had better quality crop i.e. III and IVa.
- This type of forests occurred in all ranges of the division. The total area included in this working circle was 43744.495 ha. The felling cycle of 20 years was adopted.
- The total area allotted to this working circle was 43744.495 ha. Out of this 41334.703 ha was Reserved Forest and 2558.528 ha was Protected Forest. The Reserved Forest was divided into 20 felling series and Protected Forest was divided into 2 felling series. Each felling series was divided into 20 coupes.

Special Objectives of Management: The forest allotted to this working circle belonged to the category of Tree forest. The special objectives of management of these forests were:

- To produce large sized trees to meet the requirements of timber.
- To improve the proportion of timber trees in the composition of the present crop by suitable tending operations of the natural regeneration and by planting timber spp., mainly Teak, where the natural regeneration is not sufficient to restock the area.
- To plant Bamboos wherever possible to increase the yield of Bamboos.
- To ensure maximum sustained yield of, timber, fire wood and Bamboo.

Silvicultural System: The Selection cum Improvement system was applied to achieve the objective as it is expected that the selection felling would allow the growth of the left over trees to come to the selection class and improvement felling would allow the proper growth of advance growth and establishment of natural regeneration. Patches with insufficient natural regeneration, it was to be supplemented with artificial regeneration i.e. plantation of good timber species. It was also prescribed that Bamboo should be planted at all the suitable sites to increase the yield of Bamboo.

Harvestable girth for various species applicable for selection trees, were as follows:

- Teak, Bija, Saja, Haldu --- 120 cm.
- Garadi and Lendia --- 45 cm.
- All other timber species --- 90 cm.

Agency for Harvesting: The main coupes due for felling were either to be harvested by the F.L.C.Ss or by the Forest Department itself. The subsequent Silvicultural operations, like thinnings, soil and moisture conservation works, plantations and fire protection works were to be done by the forest department only.

Demarcation of Coupes, Preparation of Treatment Maps and Marking Technique:

Demarcation: The coupes expected for felling was to be demarcated one year in advance of the main felling.

Preparation of Treatment Map: Soon after the demarcation of main felling coupe, a treatment map was to be prepared by the R.F.O, after thoroughly inspecting the area, it was to be verified by the A.C.F. The treatment map will show the following areas distinctly:

Type A: Protection areas: These included:

- (i) Slopes above 25°
- (ii) 1 chain wide strip on either side of the water courses.

Type B: Blank and Under-stocked areas: They included all areas below 0.4 densities.

Type C: Old plantations and group of young poles.

Type D: well stocked areas.

- i. In Type A and B areas, Teak, other misc. spp. and Bamboo were to be planted as per availability of suitable lands. Soil and moisture conservation works were also proposed.
- ii. In Type B areas only dead trees retaining two trees per ha. to be removed
- iii. In Type C areas of old plantation and group of young poles, silvicultural thinning was proposed.
- iv. In Type D areas all trees above selection girth and approach classes was to be enumerated for felling.

Regeneration Methods Proposed:

- i. Plantings were to be carried out in the under stocked areas.
- ii. Subsidiary silvicultural operations were to be carried out to get the desired natural regeneration.



- iii. Cut back operations in the next year of main felling.
- iv. Cleaning in the 6th year of main felling.
- v. Thinning in the 11th year from main felling

Other Regulations: The forests were to be protected from fire, uncontrolled grazing and illicit felling to get the desired results of the management.

7.9.02. Improvement Working Circle:

General Constitution of the Working Circle: The following types of forest areas were included in this working circle.

- All PBI area of the previous working plan.
- All the areas of CWR working circle not included in SCI working circle.
- The Protected Forests capable of producing small timber, poles and fuel-wood.

The total area included in this working circle was 40005.318 ha. and was spread over all the ranges of the division.

Special Objectives of Management: The objectives of management of this working circle were

- To improve the existing growing stock.
- To conserve the soil and soil moisture.
- To meet the demand of local people of small timber, poles, fuel wood and fodder.

Silvicultural System: System adapted was improvement felling supplemented with plantation in the degraded and under stocked areas. The required treatments, like thinning, cleaning etc. were to be given in case of old plantations in this area. Tending, CBO and singling were to be carried out to improve the existing natural regeneration and root stock.

Harvestable Girth: Technically no harvestable girth was to be prescribed, but considering the local requirements of the people it was considered necessary to fix the harvestable girth, which was as follows:

- Garadi and Lendia --- 45 cm.
- All other species --- 90 cm.

Felling Cycle: The felling cycle was fixed as 20 years.

Formation of Felling Series and Coupes: The total area allotted to this working circle was 40005.314 ha. out of which 25353.589 ha was Reserved Forest and 14651.725 ha was Protected Forest. The Reserved Forest was divided into 20 felling series and the Protected Forest was divided into 10 felling series.



Demarcation of Coupe, Preparation of Treatment Map and Marking Technique:

Demarcation: Main felling coupes were to be demarcated one year in advance of the main felling.

Preparation of Treatment Maps: Soon after the demarcation of main felling coupes, a treatment map was to be prepared by R.F.O. after thoroughly inspecting the area. It would be verified by the A.C.F. The treatment map would show the following areas distinctly:

Type A: Protection areas included:

- (i) The areas with 25° and above slope.
- (ii) Nala banks and river courses 1 chain wide on either side and at the top.

Type B: Under stocked areas: They included the remaining areas with density below 0.4 and blanks.

Type C: Old plantations and group of young poles.

Type D: Well stocked areas: These areas included all areas above 0.4 densities. To facilitate the preparation of the treatment map, each coupe, in general, were to be divided into 4 sections. Each type of area were to be marked only if its extent at one place is more than 5 ha., except the nala banks, which were to be marked irrespective of its area. The treatment map was to be submitted to the DCF, Bhandara, who after careful scrutiny, would approve the treatment map. No area was to be treated as unworkable as some kind of work was to be required in each type of the areas mentioned above.

Marking Technique: Marking was to be done in the same year in which demarcation was to be done. Soon after the receipt of approved treatment map, marking was to be done. The marking technique was described in detail in the miscellaneous regulations. The marking rules for each type of areas, besides climber cutting and Bamboo clump working was as follows:

Type A: Protection areas: Marking was not to be done.

Type B: Under stocked areas: All edible fruit and flower yielding trees were to be reserved. The following trees were to be marked for felling:

- i. All dead and malformed trees.
- ii. All but one vigorously growing coppice shoots per stool.
- iii. All live high stumps.
- iv. The rules for Bamboo working were the same as in Bamboo (Overlapping) Working Circle.

Type C: Old plantations and groups of young poles: In the young natural crop, thinning marking was to be done so as to make the average spacement



equal to 1/3rd of the average height of the crop. In the plantations thinning was to be done as per the procedure described.

Type D: Well-stocked areas: All edible fruit and flower yielding trees of Mahua, Char, Tendu, Aonla, Chinch, Bel, and Sitaphal and trees of Kullu were to be reserved.

The following trees were to be marked for felling:

- i. All dead and malformed trees above 2 trees/ha. A tree was to be treated as malformed if it does not have a clean bole up to at least 2 m. above the breast height.
- ii. All live high stumps.
- iii. All, but one vigorously growing coppice shoot/stool.
- iv. 50% of the trees above harvestable girth and uniformly spread over the whole area. Marking was to start from highest girth class downwards. While choosing the trees for marking, the priority of species for retention was to be decided as per the order described under the heading of choice of species.
- v. All inferior growths interfering or likely to interfere with the growth of Teak and other valuable miscellaneous species.

Soil and Moisture Conservation Works: Soon after the receipt of approved treatment map, soil and moisture conservation works were also to be taken along with marking and was to be completed before the onset of monsoon in the next year. Details of these works are given in the miscellaneous regulation.

Regeneration: In C & D type of areas, Artificial Regeneration was not to be taken.

Teak and Miscellaneous Plantations: Artificial planting of Teak or naturally occurring miscellaneous species as per suitability of soil, rainfall, temperature etc. were to be done in areas of type A & B in next year of felling. The pre-monsoon works were to be taken in the year of main felling.

Bamboo Planting: In the next year of main felling, Bamboo planting was to be done at all suitable sites in A & B type of areas. The maximum of which were not to be less than 50% of the area of the coupe, except in areas where Bamboo was already existing, planted or natural.

The details of planting techniques were given in the miscellaneous regulations.

7.9.03 Fuel-wood, Fodder and Pasture Working Circle:

General Constitution of the Working Circle: This working circle included the areas incapable of producing small timber and fuel-wood to an appreciable extent. These areas were located in the immediate vicinity of the villages and had very heavy demand of grazing, which was the main reason



for their deterioration. Very small patches of forest, which could not be taken up for regular working had been excluded from this working circle. Some well stocked forests, which could not be accommodated in the previous working circles, had also been included here. These areas are spread over in all the ranges. The total area included in this working circle is 11610.239 ha.

Special Objectives of Management: The special objects of management were as follows:

- To provide good grazing site to the local cattle without deterioration of the productive capacity of the site.
- To improve the quality of fodder by introducing superior grasses, legumes etc.
- To improve the existing tree growth.

Formation of Pasture Series and Coupes: The total area allotted to this working circle was 11610.239 ha. Out of this 752.165 ha was Reserved Forest and 10858.074 ha was Protected Forest. The whole area was divided into 8 pasture series. Each pasture series had been divided into 20 coupes. The annual coupes were to remain closed for grazing for a period of 5 years, to enable the fodder development works to be taken in it.

Demarcation and preparation of Treatment Maps:

Demarcation: The coupe due for working was to be demarcated one year in advance, by cutting 3 m. wide lines and erecting pillars at suitable intervals. The pillars inside the compartment were to be different than the boundary pillars to differentiate the compartment boundary and coupe boundary. The details of live hedge fencing were given in miscellaneous regulations.

Treatment Maps: After demarcation, the area was to be thoroughly inspected by the R.F.O. and a treatment map was to be prepared showing the following areas:

- Protection areas such as steep slopes above 25°, nala banks and river courses 1 chain wide on either side at the top.
- Areas suitable for the introduction of better fodder grasses, legume and fodder trees. These areas will be selected from blank patches of the coupe.
- Areas with fairly good tree and shrub growth. The treatment map was to be submitted by the R.F.O. to the D.C.F. territorial, who after careful scrutiny was to approve the treatment map.

7.9.04 Miscellaneous Working Circle:

General Constitution of the Working Circle: This working circle included the remaining areas of the Reserved and Protected Forests. The following areas were included in this working circle:



Area with Assistant Silviculturist: A total of 445.4 ha. of Reserved Forest at Mohgata in Pimpalgaon range is in charge of Asstt. Silviculturist, Nagpur

Area with Irrigation Department: A total area of 2469.9 ha.

Area under Gadegaon Depot: A total area of 363.0 ha under Gadegaon depot where logging unit is situated this area was to be fire protected.

Area under Railway Line: An area of 0.8 ha is under Railway line this area was to be fire protected.

Small Scattered Patches of Forest: A total of 2097.289 ha of forest is small scattered in small patches and which could not be accommodated in previous working circles Demarcation, Protection from illicit cutting and encroachment by taking afforestation works in suitable area was proposed.

Area under Mining Lease: A total of 10.9 ha area is under mining lease.

Thus the total area of miscellaneous working circle was 30161.547 ha.

Treatments Prescribed:

Area with Assistant Silviculturist: This area was to be tackled by Assistant Silviculturist, Nagpur, as per the research programme. No other work was required in this area.

Area with Irrigation Department: In this category two types of areas are there viz; (i) Area submerged under various projects (ii) Areas to be submerged under the projects where permission for diversion of forests land was granted under the Forest Conservation Act 1980. No work was to be taken in category (i) area. The category (ii) area was to be clear-felling. For this the DCF, Bhandara was to prepare a scheme, as per the progress of work of the project for the land which was to be diverted.

Area under Gadegaon Depot and Railway Line: These areas were to be protected from fire.

Small Scattered Patches of Reserved and Protected Forests: Most of these patches of the forest, were very small in size and surrounded by cultivation. At many places were encroached. The boundaries were also not clear. In these areas following works were to be carried out:

- i. Demarcation of the areas
- ii. Protection of the areas from illicit cutting and encroachments and removal of encroachments in the encroached areas
- iii. Taking of afforestation works in suitable areas as per the site condition and local demand by involving gram panchayats or village forest protection committees.

The Deputy Conservator of Forest was to prepare a scheme of afforestation in consultation with the gram panchayat or the forest protection committees and works were to be taken up as per that scheme. Since the



area involved was small and scattered, all the areas were to be considered in the first year of operation of this plan.

Area with Forest Development Corporation: Area with the FDCM will be managed by the FDCM as per their management Plan's prescriptions.

7.9.05 Bamboo (Overlapping) Working Circle:

General Constitution of the Working Circle: It included all the workable Bamboo bearing areas, both natural as well as planted. The total area of this working circle was 5564.474 ha. and was spread in all ranges except Bhandara range.

The crop was treated on clump basis. Since the Bamboos are required for local people, there were no commercial felling series. The Bamboos were to be harvested on a cutting cycle of 3 years. Each cutting series will be divided into 3 coupes viz. A, B & C and each cutting series will be worked annually. Since the harvesting of Bamboo requires close supervision it will be worked departmentally. The position of Bamboos in plantations varies greatly. In the PBI areas of previous plan, Bamboo has overlapped the other crop, in many coupes and the growth is luxuriant. Some of the patches appear as pure Bamboo forest, specially in coupe no. VII, VIII and IX of almost all felling series of previous plan. In addition to this, Bamboos have been planted in PBII, PB unallotted and CWR coupes of previous plan. There, the survival and growth of Bamboo varies differently. In most of the places clumps have become congested. In some areas, cleaning of clumps has been done in the past. But the work has been taken arbitrarily. Therefore, all the areas need immediate attention. In some areas clumps of planted Bamboos are also being damaged by illicit cutting.

Blocks and Compartments: The details of compartments allotted to this working circle were given in Appendix.

Special Objectives of Management:

- To work Bamboos scientifically
- To ensure their uniform growth
- To obtain maximum sustained yield.
- To meet the local requirements of Bamboos.

Methods of Treatment: The crop was to be treated on clump basis. i.e. each clump was to be treated independently as per the requirement. Since the Bamboos were required by the local people, there were no commercial felling series.

Cutting Cycle: The Bamboos were to be harvested on a cutting cycle of 3 years. Each cutting series was divided into 3 coupes viz; A, B and C and each coupe was to be worked annually.



Agency for Harvesting: Since the harvesting of Bamboo required close supervision, it was to be worked departmentally. The harvested Bamboos were to be brought to sale depots for further disposal.

Method of Executing the Treatment:

Demarcation: The coupes due for working were to be demarcated before the onset of monsoon, in the year in which they became due for harvesting, by erecting poles at suitable intervals. On the poles, compartment number, coupe number and name of cutting series were to be written.

Estimation of Clumps: Most of the areas included in this working circle contain planted Bamboos at 6m x 6m. The growth of Bamboos differs from compartment to compartment. In the natural Bamboo growth, the clump size varies.

Soon after the demarcation, the whole coupe due for working was to be thoroughly inspected by the R.F.O. The inspection was to be carried out compartment wise and the area containing Bamboo was to be shown on the map. 5% enumeration of Bamboos was to be done and the Bamboos were to be classified into above 3 categories. Since in plantation, Bamboos are planted at 6m x 6m, therefore, exact estimate of Bamboo clumps could be made. In case of natural Bamboos also, the approximate estimate can be made as the Bamboos in this case were confined to nalas or slopes. As per the enumeration the estimate of various works and yield of Bamboo could be made.

Method of Working: The method of working will be as follows:

Rules for Bamboo Harvesting Works, 1994: Present practice of working Bamboo forest areas on three years felling cycle should continue. The following were the prescriptions for the Bamboo coupe working:

- No harvesting works should be permitted between 15th. June to 30th. September.
- No clump should be considered fit for harvesting unless it contains more than 12 mature culms (one year as well as two years included).
- No culms below the age of two years will be felled.

Following culms shall be removed from all clumps:

- All dead, decayed and dry Bamboos to be removed.
- Culms whose half or more top part is broken or damaged.
- Twisted or malformed culms.

In a mature clump the following types of culms (green and living) would be retained:

- All current season's i.e. less than one year old culms.



- From the rest culms equal in number to the current season's (i.e., less than one year old) culms or eight, whichever is more.

The remaining culms will be considered available for harvesting.

- The cutting height of culms will be between 15 cms to 45cms above ground level i.e. above the first internode above the ground. The cut shall be made with a sharp instrument.
- In case of any flowering, no clump from flowered clump shall be felled in the year of flowering.
- Harvesting of Bamboos shall be done in a manner so as to ensure that the retained culms are evenly spaced and that some mature culms i.e. more than two years old are retained on periphery for the purposes of support to the new culms.

Following Acts will be strictly prohibited:

- Digging of rhizome.
- Lopping of Bamboo culms for fodder.
- Use of tender Bamboo culms for bundling.
- Climbers infesting the growth of Bamboo clumps shall be cut.

Subsidiary Silvicultural Operations: In the year following, the year of felling, cleaning will be done around the clumps. If there is any fire damage to clumps and dressing of such clumps will be carried out.

7.9.06 Wildlife (Overlapping) Working Circle:

General Constitution of the Working Circle: This was an overlapping working circle and includes the whole area of the division. The total area of the working circle was 125521.599 ha.

General Condition of Flora and Fauna: The general condition of the vegetation was described in the respective working circles. The position of wildlife in Bhandara division was fairly good. But the distribution of wildlife is uneven. The distribution of wildlife was described in detail in Chapter VII of Part I.

Method of Treatments: Since Navegoan National Park and Nagzira Sanctuary adjoin the Bhandara division, which are being managed exclusively for wildlife conservation and protection, no regular schemes were prescribed for the management of wildlife in Bhandara division. However, for the effective protection of wildlife in the division, following prescriptions were made, to help not only in the protection of the wildlife, but in making the forest as a corridor for the free movement of wildlife from the park and sanctuary to adjoining forests and PAs.



While preparing the treatment map of a coupe for felling in any of the working circles potential habitat of wildlife and existing waterholes was also to be identified and shown on the treatment map.

Treatments:

- i. The details of riparian habitats along various water courses were to be prepared along with the treatment map.
- ii. Marking of dead, wind-fallen and malformed trees in any felling coupe will be done only if their number was more than 2 trees/ha. left for nesting and resting of the wildlife. Trees of commercially low utility may be used for the purpose.
- iii. During harvesting some unsound and hollow logs of commercially low utility, not exceeding 3/ha were to be left in the forest to serve as shelter for wildlife.
- iv. In the plantations few trees of fruit species like *Ficus* spp. etc. would also be planted to provide food to the wildlife specially birds.
- v. The waterholes very frequently visited by wild animals would be excluded from grazing by making a special mention of such areas in the grazing permit/licence.
- vi. Suitable locations would be identified where forest tanks will be constructed to provide water to the wildlife.
- vii. Efforts will be made to inoculate the cattle grazing near about the waterholes.
- viii. A vigilant watch will be kept on poachers also at the checking gates erected to check/prevent the transport of illicit forest produce.
- ix. The labour camps and transit depots will be established away from the high wildlife density areas.
- x. Hoardings on the importance of wildlife and its protection will be exhibited at strategic locations.
- xi. The provisions contained in the Wildlife (Protection) Amendment Act 1991 will be enforced rigidly.
- xii. These prescriptions will be explained to the staff and will be monitored during the working of coupes in other working circles.
- xiii. Information about Wildlife Management as per Wildlife Management Plan (Yet to be approved at that time.)
- xiv. The information about Nagzira Wildlife Sanctuary and Navegoan National Park was obtained from the management plans of these areas, which were not approved at the time when these plans were written.

There are two wildlife areas, which were formerly part of Bhandara Division, but now they form part of Wildlife Division, Bhandara, now Gondia, specially formed for management of wildlife. The areas are as under-

- Nagzira Game Sanctuary -No. of compmts. 40 and area is 15373.50 Ha.
- Navegaon National Park - No. of compmts. 15 and area is 4634 Ha.

Special Objectives of Wildlife Management: The management Plans for these areas were not so far approved.

A. The draft plan which was submitted before the committee, for approval, has defined the objectives of Nagzira Game Sanctuary as under:

- i. To preserve and conserve the various features of these PAs. in an unimpaired state for posterity as a national heritage.
- ii. To maintain essential ecological process and life support systems as to preserve the natural environment in the sanctuary
- iii. To promote and encourage tourism
- iv. To ensure maintenance of viable population of the existing wildlife of the sanctuary.
- v. To protect key watershed areas of the adjoining lakes.

B. Similarly the objectives decided for management of Navegaon National Park were as under:

- i. To conserve the biodiversity representing the bio-geographic zone 6 B central plateau.
- ii. To identify and to protect endangered plant and animal communities that exists in the area.
- iii. To protect the catchment of Itiadh medium Irrigation project, Nawegaon Lake and many small irrigation tanks that exists near the conservation unit.
- iv. To impart nature education and promote environmental awareness in students and local people.
- v. To promote wildlife tourism.
- vi. To study various aspects of floral communities and their management.

Present and Proposed Works: The schedule of various operations which were undertaken and also proposed for future in Nagzira Game Sanctuary were as under:

- i. Maintenance of Boundaries.
- ii. Roads and nature trails - the works of Tarring, maintenance of metalled road, maintenance of fair weather roads, construction of culverts etc.
- iii. Creation of electric fencing.



- iv. Purchase of Fire Arms/weapons.
- v. Fire protection works: Cutting and burning of fire lines, creation of fire fighting squad, erection of fire watch towers, purchase of modern fire fighting equipments.
- vi. Resolution of Man animals conflicts - Purchase of equipments and medicines.
- vii. Provision of salt licks.
- viii. Provision of Wallows.
- ix. Wildlife health - Purchase of vaccines for cattle.
- x. Transport facilities - Purchase of mini buses, fuel and its maintenance.
- xi. Creation of interpretation centres.
- xii. Creation of library - Purchase of books.
- xiii. Audio - visual aids - Purchase of film of wildlife.
- xiv. Hides & Machans
- xv. Nature camps
- xvi. Purchases of Binoculars, Cameras.
- xvii. Training of employees.
- xviii. Improvement of existing office buildings.
- xix. Staff housing.
- xx. Provision of motorcycle etc.

As regards works, undertaken in Navegaon National Park, it is pertinent to note that a very small area of Bhandara Division is included in the core zone. Core zone will be the area where all sorts of activities will be prohibited and biotic interference will be reduced to minimum. Main objective of this zone will be to preserve the nature as it is. However, some works like soil and moisture conservation, water hole development will be taken up in the interest of wildlife only. Maximum protection will be imparted to this area and disturbance due to human activities will be minimised. Research and education activities will be permitted.

7.9.07 Tassar - Cultivation (Overlapping) Working Circle:

Constitution of the Working Circle: Tassar i.e. Kosa Cultivation is traditionally done in few villages of Bhandara Division. Sixty three families from 9 villages in two ranges were involved in this activity. Generally, each family manages 2Ha or 5 acres area for Kosa cultivation. The extent of such area was 175.59 Ha. These areas were included in this working circle. Distribution of these areas was as under -



Table No. 7.6 Range wise–Village wise area under Tassar Cultivation:

Range	No. of villages	Area of W.C. in ha.
Pauni	4	125.03
Pimpalgaon	5	50.56
Total	9	175.59

In Pauni Range, Kosa cultivation is done in 4 Compartments of Reserve Forests and in 2 Khasra Numbers of Protected Forests. In Pimpalgaon Range, Kosa cultivation is done in 9 khasras of Protected Forests.

General Characteristics of Vegetation: Kosa cultivation areas were mostly situated near villages. The crop in these areas mostly consisted of Ain, Dhaoda, Tendu, Kasai, Char, Mahua, Jondhurli, Palas, Bharati etc. Growth of these species was found to be mostly stunted, with density of crop less than 0.4. The average height of crop was about 1 to 2 meters. Most of the ain, Arjun trees pollarded. The soils of Kosa cultivation areas are suitable for undertaking Ain Plantations or plantations of host trees, for Kosa worms. Besides these areas, Bhandara division has raised Ain/Arjun plantations over 164 ha. In some of the plantations, dying back phenomenon was observed in Arjun plants and therefore growth of plantations is retarded. Out of 164 ha., of Arjun plantations, 104 ha., are in Reserve Forest and 60 ha., in Protected Forests. The details of plantations are as under:

Table No. 7.7 Details of Arjun Plantations:

Plantation Year	Range	Comptt No. P.forest	Area in Ha.
1986	Pimpalgaon	Comptt No.377	40
1987	Pimpalgaon	Comptt No.377	20
1988	Pimpalgaon	Palaspani P. F.	40
1989	Pauni	Comptt No. 393	40
1991	Pauni	Comptt No. 323	24
Total			164

Besides above plantations of Bhandara Forest Division, DCVL also raised 80 ha. plantation at Siregaon in Pimpalgaon Range. This plantation is excellent, having almost negligible casualty, due to special care taken by the DCVL. One more plantation of 50 ha. was taken by DCVL at Siregaon (H) in Pauni Range.

Kosa Cultivation Practice: Tassar i.e. Kosa cultivation is practiced in Bhandara Division traditionally. Villagers are utilising Forest lands for this purpose. People of Dhiwar community are mostly engaged in this trade. As per information gathered from Bhandara Division/office, 63 families in 9 villages are engaged in this work. These 9 villages are -1 Singori Hamesha 2.



Jogikheda Kamesha 3. Nishti and 4. Thanegaon in Pawani Range & 1. Bhivkhidki 2. Chandori 3. Dongargaon (Nyaharvani) 4. Baradkinhi and 5. Belde (Wangi) in Pimpalgaon Range. The families engaged in this practice, earn their livelihood from this cultivation.

Traditional Method of Kosa Cultivation: Larvae which are used for formation of Kosa cocoons are of two types. One is Mulki & others is Sukinda. Mulki is local variety while Sukinda is from M.P. Interstate Tassar Project, at Armori supplies these larvae to cultivators through societies. These larvae are placed on leaves of ain or other host plant which bear new flush of leaves, emerged due to pollarding. These larvae convert themselves into pupae. Cocoons are formed within a month, which are harvested by the end of next month. Three crops taken in this manner, they are as under -

1st crop - From July to August.

2nd crop - From September to October.

3rd crop - From November to December.

Cocoons so formed are purchased by the society, at the centres situated at Nishti, Ekode and M. Arjuni etc.

Market : The units for measuring the cocoons are as under -

10 Cocoons - 1 Muth.

20 Muths - 1 Tor

20 Tor - 1 Khandi

It means that 4000 cocoons make one Khandi. The cocoons are purchased at Rs. 500 to 1000/- per Khandi.

Returns: Good quality cocoons are purchased at rate upto Rs.1000/- per Khandi. Low quality cocoons are called as Chalpats and broken cocoons are known as Dudri. These Chalpats and Dudri are purchased at the rate upto Rs.500/-. Bijai cocoons are purchased at Rs. 1500/- to Rs. 1700/- per Khandi. DCVL prepare yarn out of these cocoons. The rate of preparing yarn is Rs. 13/- for 100 cocoons and one labour can take out yarn from 100 to 125 cocoons per day & Therefore the labour gets about Rs. 20/- day, which include 8.33% Bonus. Kosa cloth is woven by handloom, which can fetch upto Rs. 200/- meter, depending on the quality of cloth produced.



Table No. 7.8 Village wise area Distribution of Kosa Cultivation:

Sr. No.	Name of Village	Range	Comptt No. Survey No.	Area	RF/PF
1	Singori Hamesha	Paoni	393	79.31	R.F
2	Jogikheda Hamesha	Paoni	391,392	23.87	R.F
3	Nishti	Paoni	324	11.33	R.F
4	Thanegaon	Paoni	S.No.87,100	10.52	P.F
5	Bhivkhidki	Pimpalgaon	S.No.338, 1&2	8.09	P.F
6	Chandori	Pimpalgaon	S.No.147,541,543	14.97	P.F
7	Dongergaon	Pimpalgaon	S.No. 63	8.9	P.F
8	Baradkinhi	Pimpalgaon	S.No. 141,142	14.56	P.F
9	Bolde (Wandi)	Pimpalgaon	S.No. 55	4.04	P.F
			Total	175.59	

The earning of a Kosa cultivator, on sale of Kosa Cocoons can be from Rs. 1000 to Rs. 3000/- per acre, depending on climatic conditions.

Special Objectives of Management: Tassar cultivation is being practised in villages mentioned in the table No. 7.8, since many years. The quality of forest, where this cultivation is practiced is totally degraded, due to continuous pollarding of crop, haphazard working and total Lack of scientific knowledge of Kosa cultivation. The status of these forests should be and can be upgraded by taking help of Kosa cultivators, who are totally dependent on this cultivation. Considering this, the objectives are decided as under -

- Upgradation of the forests degraded due to Tassar cultivation in past by planting food plants of Tassar worms.
- Economic upliftment of Kosa cultivator by their participation in management, of forest under Kosa cultivation.

7.9.08 Results of Implementation of Dr. Nandkishore's Working Plan:

This working plan was sanctioned in the year 1998 and the first coupe worked was coupe No.III in 1998-99. The coupes I, II and VII could not be worked and were left un-worked. When the implementation side of this plan is examined it is found that this plan too was never fully implemented even for one single year. The plan was for 1996-97 to 2005- 06, but the first two years were lost due to late approval of the plan and in the year 2002 – 2003 no work could be carried out in the coupe VII due to non availability of funds, as reported by the territorial division. In this way, out of ten years three years i.e. 30%, were completely lost. In the rest of the years also all the prescriptions mentioned in the plan were never implemented in any of the working Circles. Another problem was that during the preparation of this plan, the **Dy.C.F. Bhandara, failed to give most of the important information related to the working and implementation of the last**



working plan, like various Control Forms. Under these circumstances it is not possible to assess any considerable result due to the implementation of this working plan and coming to any conclusion, positive or negative, would not be justified.

It is observed that it has become a standard practice to carry out only the revenue yielding operations prescribed in the plans and the subsequent operations, vital for the health of the future crop, like **CBO, Cleaning, Thinning, Singling, protection from fire and grazing etc.** have been neglected, leading to the general deterioration of the forests.

I. Selection cum Improvement Working Circle (SCI):

- Most of the time over felling have been done in patches and was not spread all over the coupe, thus creating opening in the forest
- The valuable species were given priority in marking and felling leading to felling of some rare trees like Haldu and Shisham.
- The forest allotted to this Working Circle, at times did not have sufficient matured trees for marking and many times the area was rich in young congested crop. These crops needed proper thinning, which was not carried out in time thus adversely affected the crop.
- The areas from CWR of the previous Working Plan, most of the time did not have sufficient stock of matured trees for marking as per the prescriptions of the plan. This led to removal of whatever matured trees were available in the area leading to reduction in matured trees in the area.
- Thinning and cleaning in the pole crops and old plantations were not carried out, leading to congestion in the crop, retarding the growth of valuable species and encouraging the growth of inferior species.
- The malformed regenerations and advance growths were also not cut back leading to increase in the number of malformed and damaged tree growth in the coupe.
- To regenerate the worked areas, important subsequent operations after main fellings, like stool dressing, CBO, singling, cleaning and thinning operations were prescribed in the plan but were not implemented properly, leading to deterioration of the crop.
- A considerable part of forest allotted to this working circle was also heavily damaged due to regular fire and uncontrolled grazing. The prescriptions regarding protection of worked and regenerated areas from fire and grazing were not implemented. Grazing by goats has very badly damaged the natural as well as artificial regenerations.
- The major technical problem faced while carrying out the prescriptions like, demarcation, marking, logging and subsequent silvicultural



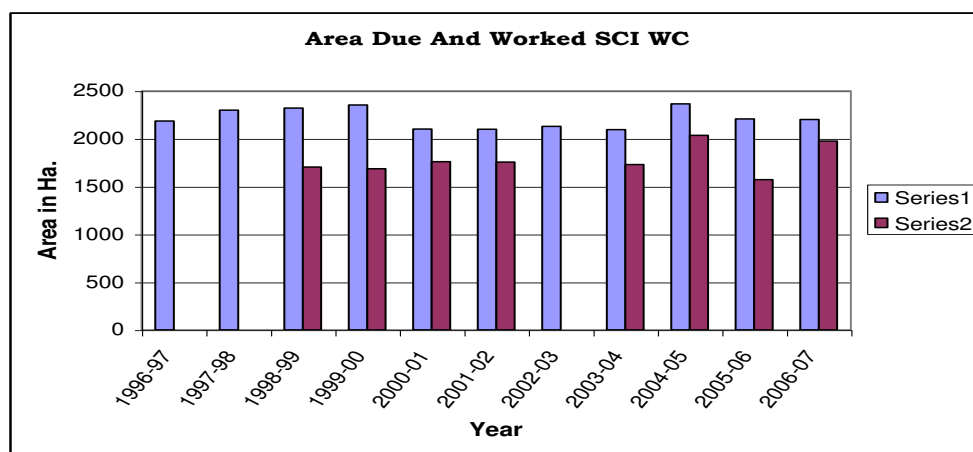
operations, of SCI working circle was that the working of coupe was left to the lowest level field staff like forest guards or foresters. Marking rules were little complicated for the field level staff, specially, the forest Guards and foresters, to understand and practice in the field. The important operation of marking has been neglected as most of the times this has been left to the junior most forest staffs.

The details are as follow:

During the entire plan period, 24346.800 ha area was due for working, but the actual area worked was only 14214.033 ha. So, the percentage of worked area is 58.38%.

Table No. 7.9 Table showing Actual Working in SCI during the Working Plan period 1996-97 to 2006-07:

Year of Demarcation	Due for main felling		Actually worked (in ha)	% of working	Production	
	Coupe No	Area (ha)			Timber in cum	Fire wood in
1996-97	I	2184.627	0	0	0	0
1997-98	II	2298.425	0	0	0	0
1998-99	III	2319.379	1703.013	73.43	2015.00	10161
1999-00	IV	2352.843	1685.600	71.64	2003.00	7313
2000-01	V	2099.834	1758.840	83.76	805.00	6629
2001-02	VI	2099.178	1754.870	83.60	1423.00	10290
2002-03	VII	2128.815	0.000	0.00	0.00	0
2003-04	VIII	2094.166	1729.903	82.61	1317.00	9974
2004-05	IX	2363.532	2035.730	86.13	1592.00	10745
2005-06	X	2206.854	1571.140	71.19	1536.00	22014
2006-07	XI	2200.147	1974.937	89.76	1780.00	19677
	Total	24347.800	14214.033	58.38	12471.00	96803



- Regarding the regeneration operations, a total of 2044 ha i.e. 8.40 % of plantations under various schemes were taken during the period of this working Plan. Many of these plantations, in the areas adjoining to the villages, are in very bad shape due to fire and grazing.
- At places it was noticed that plantation sites are not properly selected, Teak plantations have been done in dense forest areas leading to suppression of the plantations.

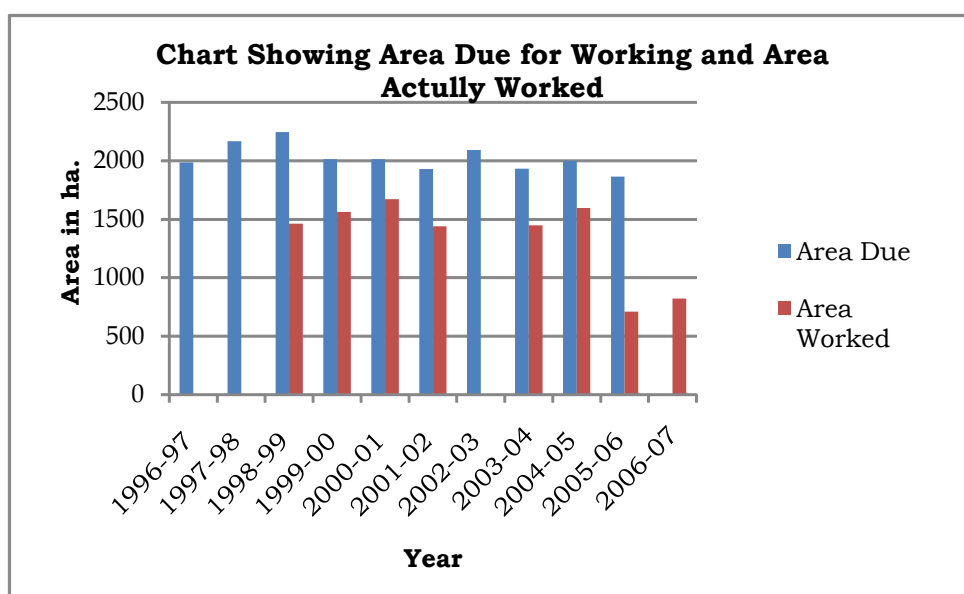


- Besides this the areas prescribed for working in the working plan in a particular year was also never completed.

ii) Improvement Working Circle: The observations of SCI WC are also applicable to this working circle. The forest staff failed to execute effective improvement felling in favour of desirable species. Thus the required positive effects of improvement felling were not observed in most of the areas, specially in areas near villages. The statement of actual working of IWC coupes during the working plan period is given in the following table:

Table No.7.10 Table Showing the Actual Working under IWC during Working Plan Period 1996-97 to 2006-07:

Year of Demarcation	Due for main felling		Actually worked (in ha)	% of working	Production	
	Coupe No	Area (ha)			Timber in cum	Fire wood in beats
1996-97	I	1985.671	0	0	0	0
1997-98	II	2166.168	0	0	0	0
1998-99	III	2244.254	1461.202	65.11	731.00	6647
1999-00	IV	2012.323	1562.870	77.66	456.00	3956
2000-01	V	2014.219	1671.860	83.00	485.00	8876
2001-02	VI	1930.518	1440.247	74.60	333.00	6089
2002-03	VII	2091.064	0.000	0.00	0.00	0
2003-04	VIII	1932.701	1447.771	74.91	2247.00	8792
2004-05	IX	1998.643	1596.580	79.88	619.00	9154
2005-06	X	1864.203	710.526	38.11	772.00	9387
2006-07	XI	2028.543	823.142	40.58	425.00	6926
Total		22268.307	10714.198	48.11	6068.00	59827



The working under this working circle was also not properly monitored, which is apparent from the condition of the crops. There are plenty of damaged and malformed trees present in the area, large areas are still under inferior spp. and valuable spp. are suppressed.

Like the SCI Working Circle areas, under IWC were never worked completely and all the prescribed treatments were never given to the crops, as a result the crop does not show signs of improvements.

The table indicates that out of 22268.307 ha due for working, only 10714.198 ha area was worked i.e. 48.11% area was worked. Regarding regeneration in this Working Circle, only 1089.40 ha have artificially regenerated i.e. only 4.89% . Due to the proximity of these lands to villages, most of these plantations have been damaged by fire and grazing.

As most of the areas are around villages, it had lot of pressure of grazing, head loads and fire. Like SCI working Circle, the prescriptions of the working plan related to protection and regeneration could not be implemented effectively. As a result the regeneration status in the areas adjoining the villages, is not satisfactory, where as the areas away from the villages, it is comparatively better.

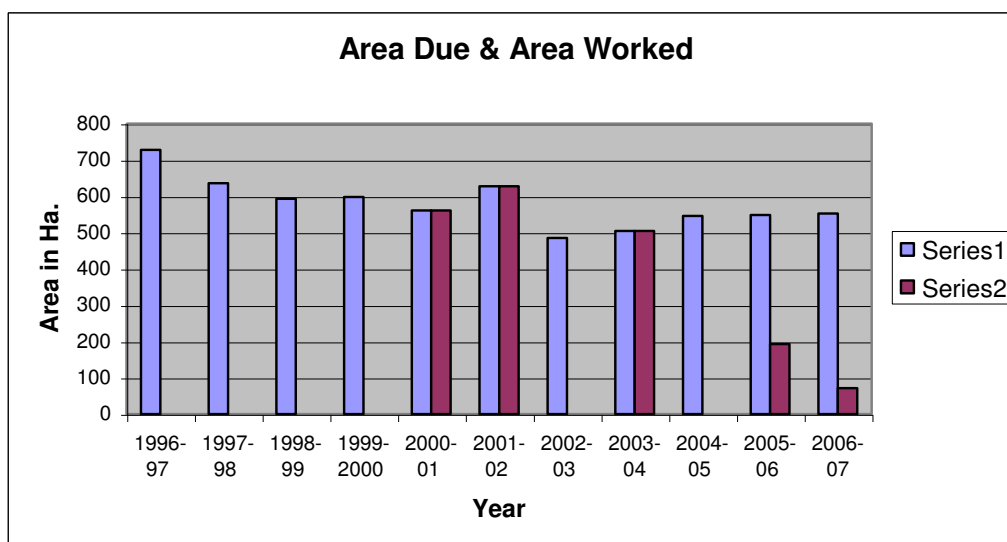
iii) Fuel Wood, Fodder and Pasture Working Circle: The area under this working circle was not properly taken care of. As per the prescriptions, the area was supposed to be closed for grazing, high quality grasses were supposed to be planted and protected from fire and grazing, but none of these operations were carried out properly. At places the root stocks have come up and suppressed the grass stock. Due to the above reasons the area under this working circle further deteriorated. During the period between 1996-97 and 2006-07, out of 6377.097 ha., only 228 ha. of land was planted with grass and rest of the area was left unattended. These plantations are failure due to uncontrolled grazing and fire.

The statement of actual working of FFP working circle coupes during the working plan period is given in the following table. The working in this working circle was carried out only in five coupes and that too, only to extract whatever timber and firewood was available in the coupe. Like other Working circles, no subsequent treatments were given leading to further deterioration of the crop.



Table No.7.11 Showing the Actual Working in FFP Working Circle:

Year of Demarcation	Due for Main Felling		Actually worked (in ha)	% of working	Production	
	Coupe No	Area (ha)			Timber in cum	Fire wood in beats
1996-97	I	727.846	0	0	0	0
1997-98	II	635.443	0	0	0	0
1998-99	III	592.454	0.000	0.00	0.00	0
1999-2000	IV	597.937	0.000	0.00	0.00	0
2000-01	V	560.942	560.942	100.00	0.00	465
2001-02	VI	627.308	627.308	100.00	13.57	644
2002-03	VII	484.886	0.000	0.00	0.00	0
2003-04	VIII	504.02	504.020	100.00	79.95	1219
2004-05	IX	545.529	0.000	0.00	0.00	0
2005-06	X	548.252	193.043	35.21	0.00	701
2006-07	XI	552.48	71.388	12.92	0.00	583
	Total	6377.097	1956.701	30.68	93.52	3612



iv) Miscellaneous Working Circle: The rest of the areas of the division were allotted to this Working Circle. A total of 30161.547 ha. area was allotted to this Working Circle, out of which 2097.289ha was small scattered patches of forest land with the forest deptt. And rest of the areas were with other agencies as mentioned in the para 7.9.04. The prescriptions for the lands with other agencies were only demarcation and fire protection etc. Prescriptions for the land in charge of the Forest deptt., were also the same in addition plantation was also proposed, but no considerable works were carried out in these areas.

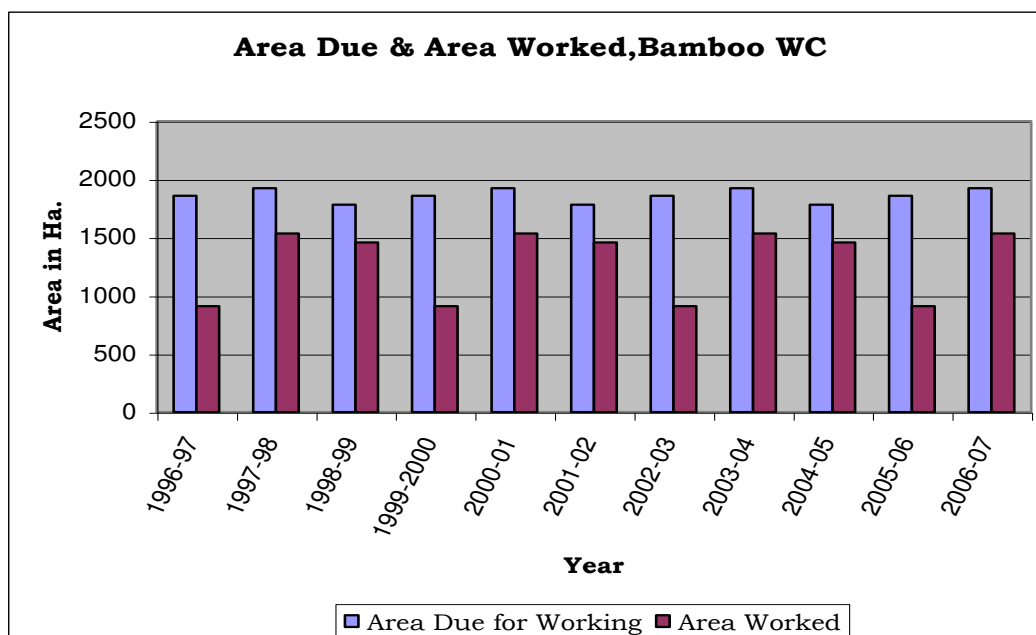
v) Bamboo (Overlapping) Working Circle : The total area allotted to this working circle was 22596.509 ha., with only 5564.474 ha. area with Bamboo crop. The area was divided into 10 cutting series. Each cutting series was



divided into 3 coupes viz. A, B, C and one of the coupe from each cutting series was to be worked annually. Felling of Bamboo is given in table. Total number of coupes due for working were 10 each years.

Table No.7.12 Year Wise working of Bamboo Coupes During 1996-97 to 2006-07.

Year of Demarcation	Due for main felling		Actually worked (in ha)	% of working	Production	
	Coupe No	Area (ha)			Long bamboo	Bamboo Bundles
1996-97	A	1857.774	909.870	48.98	319100	4554
1997-98	B	1924.500	1534.200	79.72	25286	720
1998-99	C	1782.200	1457.200	81.76	305261	5157
1999-2000	A	1857.774	909.870	48.98	746000	29400
2000-01	B	1924.500	1534.200	79.72	539770	27301
2001-02	C	1782.200	1457.200	81.76	761300	51100
2002-03	A	1857.774	909.870	48.98	438500	17999
2003-04	B	1924.500	1534.200	79.72	207800	53590
2004-05	C	1782.200	1457.200	81.76	270390	16275
2005-06	A	1857.774	909.870	48.98	87320	746
2006-07	B	1924.500	1534.200	79.72	58000	6230
	Total	20475.696	11703.810	57.16	3414341	207798



Bamboo working was mainly confined to the traditional Bamboo areas where the coupe working had been carried out for several cycles, like in Tiroda range, but the areas under plantation could not be worked and left to its fate. The result is that inspite of good survival the clumps have become so

congested that now it has become very difficult to work. Some of these clumps are dying due to congestion and recurrent fire.

Table No.7.13 Supply of Bamboo to Villagers and Burads:

Year	No.of Burads	No. of Agriculturist	Total	No. of Bamboo supplied	Revenue Realised
1	2	3	4	5	6
1996-97	1753	17	1770	121817	706359
1997-98	3436	660	4096	125087	649295
1998-99	1736	1283	3019	207007	1073402
1999-2000	1441	732	2173	147054	838960
2000-01	1481	988	2469	159847	892988
2001-02	1269	1915	3184	182858	1114319
2002-03	1243	1669	2912	153729	828520
2003-04	436	785	1221	110811	829123
2004-05	795	525	1320	63006	523515
2005-06	2025	289	2314	89363	846675
2006-07	824	643	1467	67196	495748
Total	16439	9506	25945	1427775	8798904

As shown in Col. No. 2 large number of Burads is in the division who prepare Bamboo articles for their livelihood.

Natural Bamboos are confined to a small area of this division, which too have deteriorated due to illicit cutting. But large scale plantations have been taken throughout the division, which are successful in varying degrees. At some places clump formation has started but no systematic working has been done in these areas, due to which clumps have become congested and even dead, in many places. While carrying out Bamboo plantation no proper care was taken and seeds of different spp have been sown in the same poly pots. This can be seen in the field as there are many clumps with more than one spp. of Bamboo.

Bamboo plantations in general are satisfactory so far the survival and growth is concerned. The Bamboos of these plantations could not be utilised as these clumps were never worked in time and now it is not possible to work due to over congestion of these clumps.

vi) Wildlife (Overlapping) Working Circle: The position of wildlife in Bhandara division is fairly good but the distribution of wildlife is uneven.

The forests of Bhandara dn is extremely important as it lies between five major wildlife Protected Areas ie. Tadoba, Nawegaon, Nagzira, Kanha, Pench (MS) and Pench(MP). This forest should have been given much more importance for wildlife habitat management and corridor management point of view. But unfortunately the case was reverse.



There were several important prescriptions in the said working plan but as per the information provided by the Dy.C.F. Bhandara, most of these prescriptions could not be implemented, hence it is not possible to analyse the impact of this working plan on the health of wildlife.

vii) Tassar Cultivation (Overlapping) Working Circle : Tassar cultivation is traditionally done in few villages of Bhandara division. 63 families from 9 villages in two ranges, are involved in Kosa cultivation works. The total area of this working circle is 175.59 ha. The table showing present position of Tassar cultivation in this division.

Table No. 7.14. Area Distribution under Tassar Working Circle:

Year	Work to be done			Actual work done			No of beneficiaries
	Name of village	Comptt/ Survey No.	Area in ha	Name of village	Comptt/ Survey No	Area in ha	
1986	Kesalwada	377	40.00	Kesalwada	377	40.00	0
	Pimpalwada			Pimpalwada			
1987	Kesalwada	377	20.00	Kesalwada	377	20.00	0
1988	Palspani	65, 67, 68	40.00	Palspani	65, 67, 68	40.00	30
1989	Nishti	393	40.00	Nishti	393	40.00	12
1991	Nishti	323	24.00	Nishti	323	24.00	10
2003	Nishti Part-I	309	25.00	Nishti Part-I	309	25.00	0
2004	Nishti Part-II	393	25.00	Nishti Part-II	393	25.00	0
2005	Nishti	393	25.00	Nishti	393	25.00	0
2005	Nishti	393	25.00	Nishti	393	25.00	0
Total			264.00			264.00	52

The table indicates that there is increase in area under Tassar cultivation. **The quality of the forest, where this cultivation is practised is highly degraded,** due to continuous pollarding of the crop.

The Maharashtra forest department, as requested by the Tassar Board, took Arjun plantations with an objective to allow the traditional Kosa cultivators to practice Kosa cultivation in concentrated Arjun plots. Now these Kosa cultivators say that Arjun is not the right species for Kosa. All



Crop Damaged due to Pollarding for Kosa Cultivation.



Cocoon of Kosa worm on a Saja branch.

these plantations are now wasted. In spite of that Arjun plantations have been taken till 2005.

Viii. Tendu Leaves Collection: Total Units, groups of units are 30. The following table shows the collection in revenue from Tendu in the previous plan period:

Table No. 7.15 Year Wise Yield of Tendu:

Sr No	Season	Total sold units /groups of units	Actual production (Std. Bags)	Revenue (Rs.in lakhs)
1	1996	30	46333	219.32
2	1997	30	40849	193.87
3	1998	30	34551	115.09
4	1999	30	47468	231.17
5	2000	30	45910	232.53
6	2001	30	43163	254.4
7	2002	30	45117	257.98
8	2003	30	43700	259.2
9	2004	26	42400	150.71
10	2005	18	23620	122.08
11	2006	28	31880	NA

7.9.09 Yield of Forest Produce during the Plan:

Estimated yield and actual yield of forest produce during previous plan operation period are as follows:

Table No. 7.16 Estimated and Actual Yield of Timber:

Year	Estimated Yield of Timber in cu.m.	Actual yield in cu.m.	Achievement in %	Remarks
1996-97	6901	0	0	Not worked
1997-98	6901	0	0	Not worked
1998-99	6901	2746.219	39.79	
1999-2000	6 6901	2459.529	35.64	
2000-01	6901	1291.176	18.71	
2001-02	6901	1769.593	25.64	
2002-03	6901	0	0.00	Not worked
2003-04	6901	3644.678	52.81	
2004-05	6901	2210.897	32.04	
2005-06	6901	2308.848	33.46	
2006-07	6901	2205.207	31.95	
Total	75911	18636.147	24.55	



Table No. 7.17 Estimated and Actual Yield of Fuel Beats:

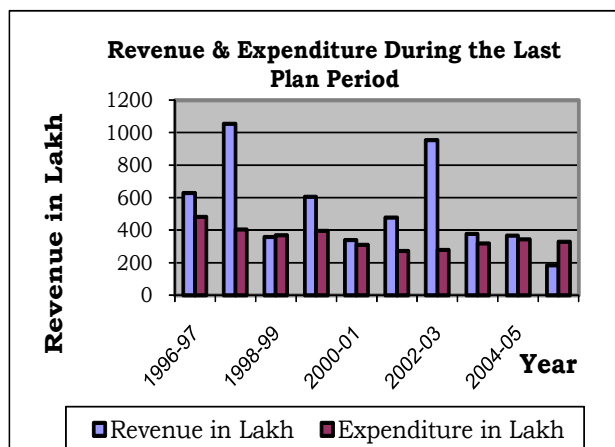
Year	Estimated Yield in	Actual yield in	Achievement in %	Remarks
1996-97	0	0	0	No work
1997-98	0	0	0	No work
1998-99	34505	16809	48.71	
1999-00	34505	12269	35.56	
2000-01	34505	15970	46.28	
2001-02	34505	17023	49.33	
2002-03	34505	0	0.00	No work
2003-04	34505	19986	57.92	
2004-05	34505	19899	57.67	
2005-06	34505	32102	93.04	
2006-07	34505	27186	78.79	
Total	379555	161244	42.48	

Table No 7.18. Estimated and Actual Yield of Tendu and Bamboo:

Year	Estimated Std. Bags	Actual collection In std bags	Estimate d yield of Long Bamboo	Actual yield of Long Bamboo	Estimat ed yield of Bamboo bundles	Actual yield of Bamboo bundles
1996-97	46500	46333	350000	319100	NA	4554
1997-98	46500	40849	350000	25286	NA	720
1998-99	46500	34551	350000	305261	NA	5157
1999 - 00	46500	47468	350000	746000	NA	29400
2000-01	46500	45910	350000	539770	NA	27301
2001-02	46500	43163	350000	761300	NA	51100
2002-03	46500	45117	350000	438500	NA	17999
2003-04	46500	43700	350000	207800	NA	53590
2004-05	46500	42400	350000	2703930	NA	16275
2005-06	46500	23620	350000	87320	NA	746
2006-07	46500	31880	350000	58000	NA	6230
Total	511500	454879	3850000	3758727	N.A	213072

Table No 7.19 Revenue and Expenditure during the Plan Period:

Year	Revenue in Lakh	Expenditure in Lakh
1996-97	629.06	482.49
1997-98	1056.15	405.15
1998-99	357.83	368.78
1999-00	607.34	395.87
2000-01	338.95	310.84
2001-02	478.95	272.86
2002-03	953.51	278.45
2003-04	377.77	318.69
2004-05	366.609	343.95
2005-06	185.62	330.17
Total	5351.789	3507.25



Estimated revenue from execution of plan operations of previous plan is given in the table



Chapter VIII

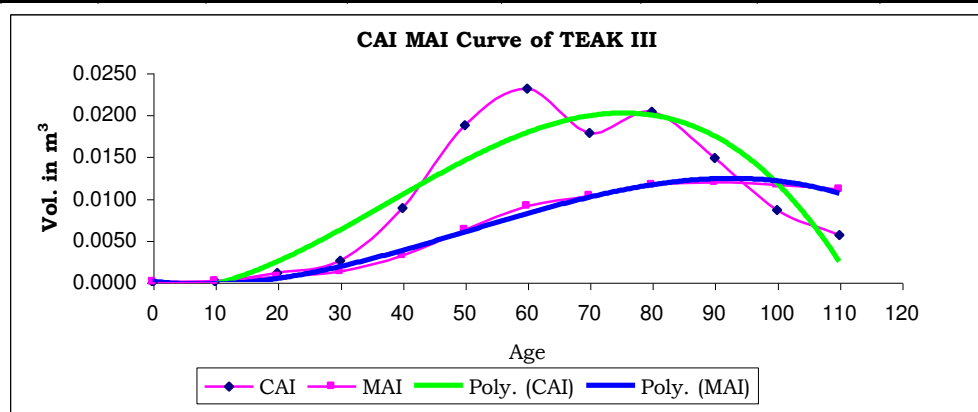
STATISTICS OF GROWTH AND YIELD

8.1 Statistics of Rate of Growth of Teak: Exercise of Stem analysis was carried out in the Bhandara Div. by the Nagpur Working Plan Dn. to calculate the growth and yield of teak and some other important species. The CCF Nagpur granted permission vide his letter No.Desk-1/5Land/06-07/8579, dated 24.03.2007.

8.1.01 Stem Analysis of Teak III: Site Quality III is found in very few patches of the Bhandara division. The work was carried out in the compartment No. 63 PF of Tiroda range and its result applied for Bhandara division and reproduced in the Table 8.1.

Table No. 8.1 Results of Stem Analysis for Teak Site Quality III

Sr. No.	Age in Years	Height in Meters	DBH(ob) in cm.	GBH(ob) in cm.	Volume in M ³ .	CAI in M ³ .	MAI in M ³ .
1	0	0	0.00	0.00	0.000	0.0000	0.0000
2	10	4.25	3.50	11.00	0.001	0.0001	0.0001
3	20	8	8.00	25.14	0.012	0.0011	0.0006
4	30	11.2	16.70	52.47	0.037	0.0025	0.0012
5	40	13.6	26.20	82.32	0.125	0.0088	0.0031
6	50	15.5	31.80	99.92	0.312	0.0187	0.0062
7	60	16.7	35.30	110.91	0.543	0.0231	0.0091
8	70	18.2	37.00	116.25	0.721	0.0178	0.0103
9	80	19.4	38.50	120.97	0.924	0.0203	0.0116
10	90	20.6	40.90	128.51	1.072	0.0148	0.0119
11	100	21.7	42.60	133.85	1.158	0.0086	0.0116
12	110	22.5	44.10	138.56	1.214	0.0056	0.0110



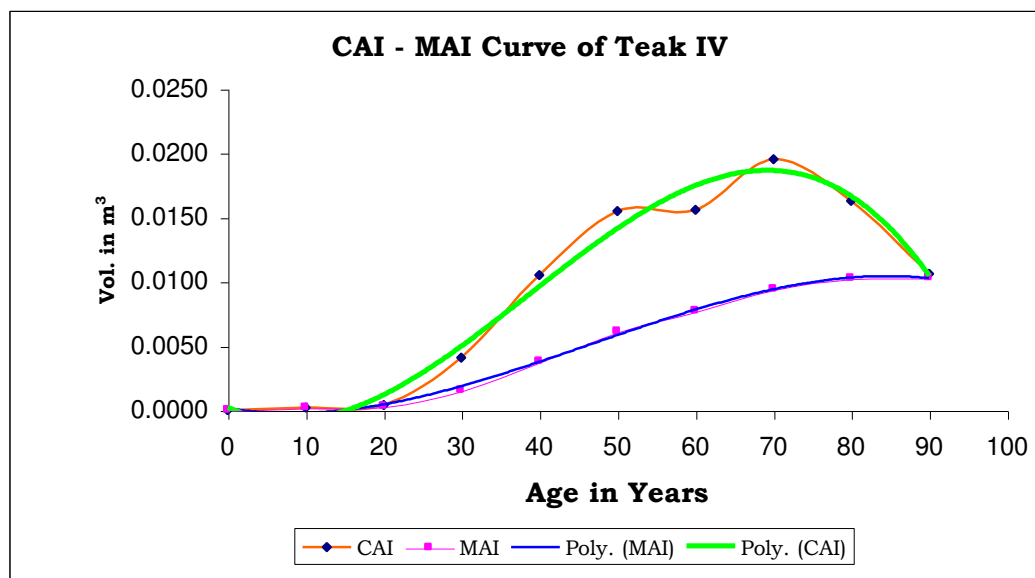
The CAI/MAI curves for Teak III intersect at 99 years of age and girth (OB) corresponding to this exploitable age is 134 cm. The exploitable girth is hence fixed at 135 cm.

Teak patches of site quality III is found in Tiroda range, which was earlier part of Bhandara Range but after reorganisation it has been transferred to the adjoining Gondia Forest Division.

8.1.02 Stem Analysis of Teak IV A : For Stem analysis exercise trees were selected in compartment No. 30 RF and 63 PF of Jamkandri and Tiroda ranges, respectively. The Stem analysis carried out by CF, Working Plan, Nagpur and its result applied for Bhandara division and reproduced in the table 8.2.

Table No. 8.2 Results of Stem Analysis for Teak Site Quality IV.

Sr. No.	Age in Years	Height in Meters	DBH (ob) in cm.	GBH (ob) in cm.	Volume in M ³ .	CAI in M ³ .	MAI in M ³ .
1	0	0	0.00	0.00	0.000	0	0
2	10	4.8	4.95	15.55	0.002	0.0002	0.0002
3	20	7.6	12.51	39.31	0.006	0.0004	0.0003
4	30	10.3	20.24	63.59	0.047	0.0041	0.0016
5	40	11.7	25.72	80.81	0.152	0.0105	0.0038
6	50	13.1	28.37	89.14	0.307	0.0155	0.0061
7	60	14.8	34.93	109.75	0.463	0.0156	0.0077
8	70	15.9	37.28	117.13	0.658	0.0195	0.0094
9	80	17.2	38.64	121.41	0.821	0.0163	0.0103
10	90	18.5	39.20	123.17	0.927	0.0106	0.0103



The CAI/MAI curve for Teak IV intersect at the age of 90 years girth (OB), corresponding to this exploitable Girth is 123 cm. (OB). The exploitable girth is hence fixed at 120 cm.

8.2 Growth of Miscellaneous Species : Stem analysis of miscellaneous species like Bija, Ain, Dhaoda in site quality III and IV areas was carried out by the CF, Working Plan, Nagpur by selecting sample trees form different



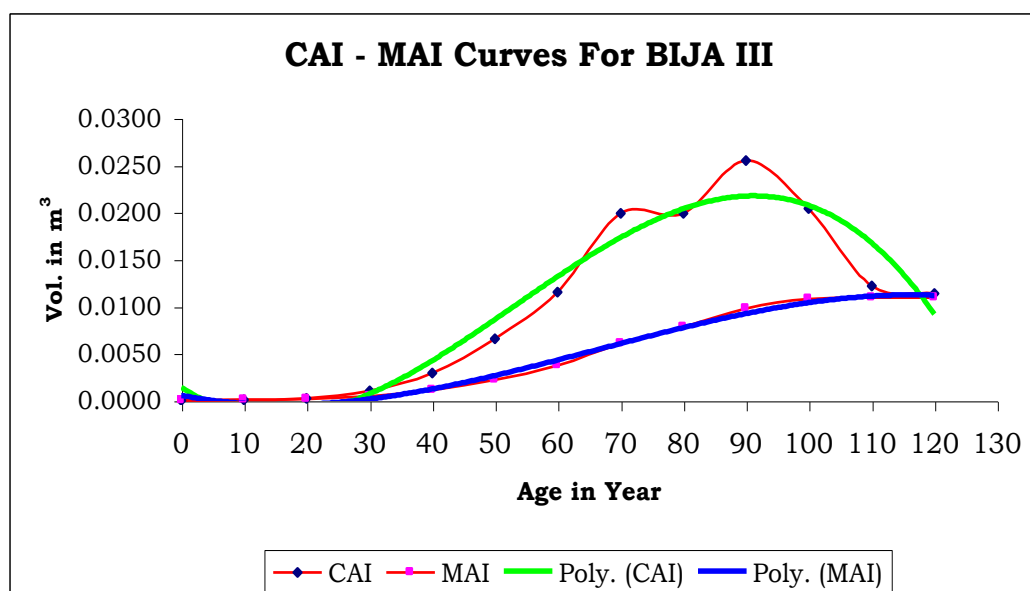
sites of the division. The results of this exercise are given in the following table.

8.2.01 Results of Stem Analysis for Bija Site Quality III.

Table No.8. 3 Stem Analysis Results of Bija III

Compartment No. 108 RF and 204 RF of Tiroda and Sakoli Range Respectively

Age in Years	Height in Meters	DBH(ob) in cm.	GBH(ob) in cm.	Volume in M ³ .	CAI in M ³ .	MAI in M ³ .
0	0.00	0.00	0.00	0.0000	0.0000	0.0000
10	1.37	3.51	11.03	0.0007	0.0001	0.0001
20	3.70	6.55	20.58	0.0031	0.0002	0.0002
30	7.20	12.50	39.28	0.0134	0.0010	0.0004
40	10.15	18.05	56.71	0.0425	0.0029	0.0011
50	12.70	24.45	76.82	0.1081	0.0066	0.0022
60	15.20	30.40	95.52	0.2232	0.0115	0.0037
70	16.15	36.75	115.47	0.4219	0.0199	0.0060
80	19.60	38.70	121.60	0.6204	0.0199	0.0078
90	21.65	39.80	125.05	0.8754	0.0255	0.0097
100	22.85	40.70	127.88	1.0790	0.0204	0.0108
110	24.50	42.00	131.96	1.2006	0.0122	0.0109
120	25.00	43.00	135.11	1.3145	0.0114	0.0110



The CAI/MAI curve intersects at 118 years of age and the girth (OB) corresponding to this exploitable Girth is 134 cm. The exploitable girth is hence fixed at 135 cm.

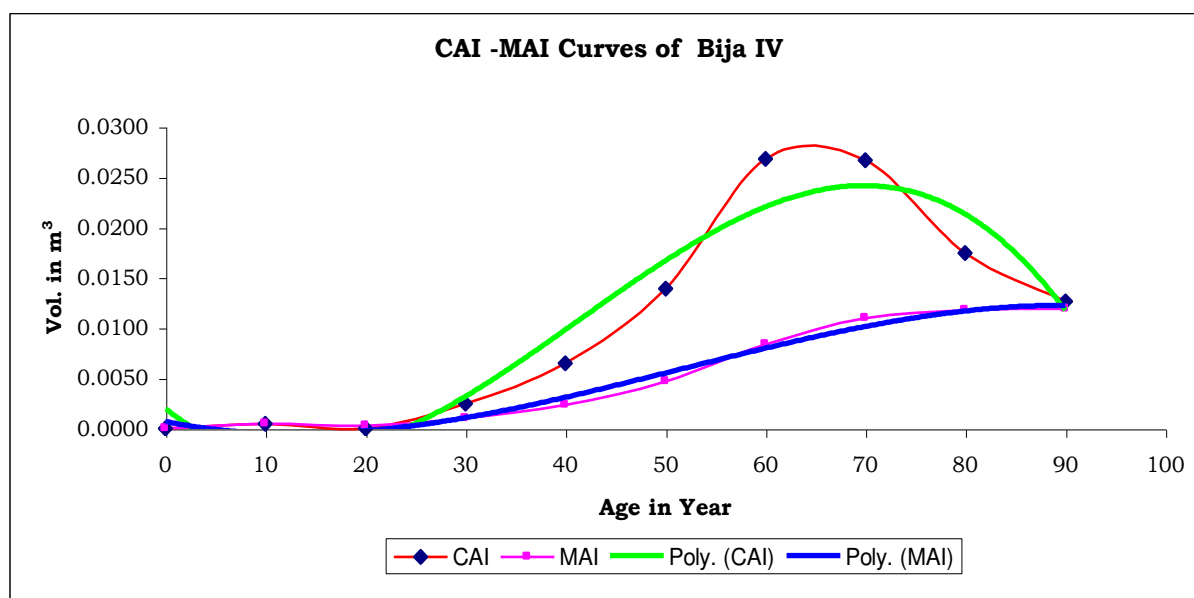
8.2.02 Stem analysis of Bija for Site quality IV

Table No. 8.4 Results of Stem Analysis for Bija Site Quality IV

Compartment No. 108 RF of Tiroda Range

The CAI/MAI curve intersect at 89 years age girth (OB) corresponding to this exploitable Girth is 120 cm. The exploitable girth, hence is fixed at

Sr. No.	Age in Years	Height in Meters	DBH(ob) in cm.	GBH(ob) in cm.	Volume in cum.	CAI in M ³ .	MAI in M ³ .
1	0	0.00	0.00	0.00	0	0	0
2	10	1.37	3.50	11.00	0.0050	0.0005	0.0005
3	20	4.34	5.15	16.18	0.0049	0.0000	0.0002
4	30	8.72	12.47	39.18	0.0295	0.0025	0.0010
5	40	12.64	18.74	58.88	0.0941	0.0065	0.0024
6	50	14.95	24.92	78.30	0.2334	0.0139	0.0047
7	60	15.40	31.34	98.47	0.5016	0.0268	0.0084
8	70	17.74	35.30	110.91	0.7682	0.0267	0.0110
9	80	19.15	37.55	117.98	0.9427	0.0175	0.0118
10	90	20.34	38.70	121.60	1.0689	0.0126	0.0119



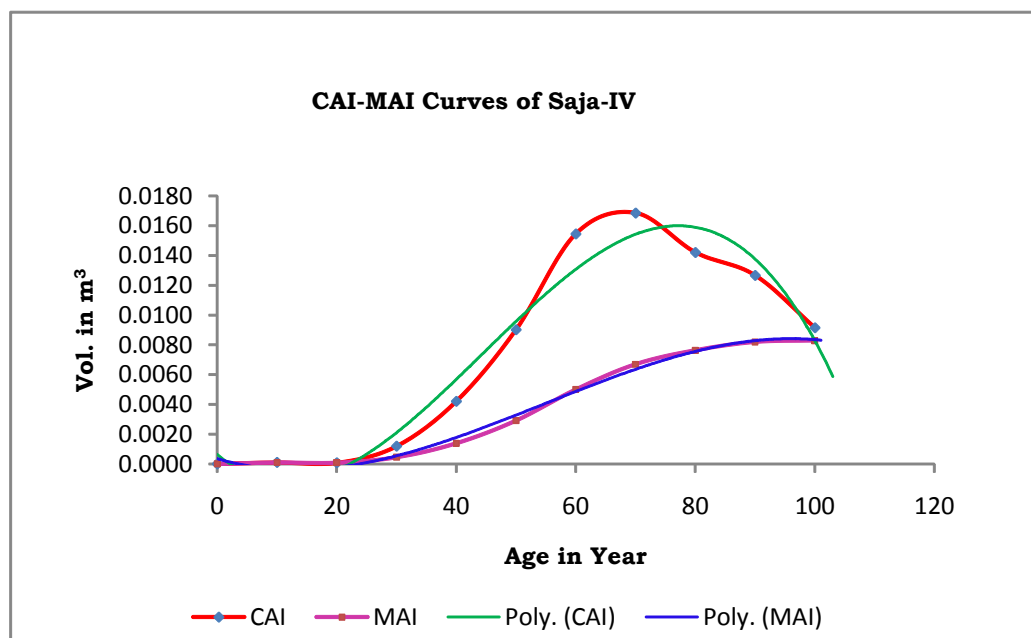
120 cm.

8.2.03 Stem analysis of Saja (Ain) for Site Quality IV

Table No. 8.5 Results of Stem Analysis for Ain Site Quality IV

Compartment No. 204 RF and 63 PF of Sakoli and Tiroda range

Sr. No.	Age in Years	Height in Meters	DBH(ob) in cm.	GBH(ob) in cm.	Volume in m ³ .	CAI in m ³ .	MAI in m ³ .
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	10	1.37	2.75	8.64	0.001	0.0001	0.0001
3	20	7.32	6.71	21.08	0.0017	0.0001	0.0001
4	30	12.59	12.48	39.21	0.0136	0.0012	0.0005
5	40	15.54	19.19	60.29	0.0556	0.0042	0.0014
6	50	17.35	25.16	79.05	0.1458	0.0090	0.0029
7	60	18.25	31.20	98.03	0.3003	0.0155	0.0050
8	70	19.25	35.77	112.39	0.4689	0.0169	0.0067
9	80	20.38	38.64	121.41	0.6110	0.0142	0.0076
10	90	21.17	40.18	126.25	0.7376	0.0127	0.0082
11	100	22.36	41.3	129.76	0.8291	0.0091	0.0083



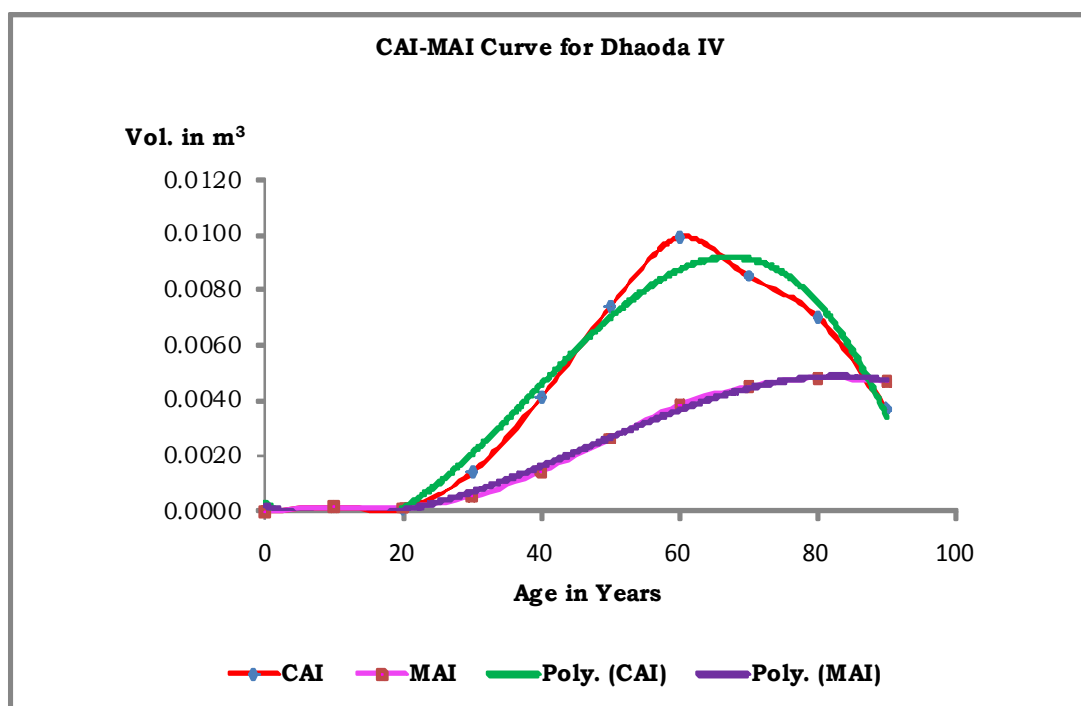
The CAI/MAI curve intersect at 100 years age, girth corresponding (OB) to this exploitable girth is 129 cm. The exploitable girth is hence fixed at 120 cm.

8.2.04 Stem Analysis of Dhaoda for Site quality IV

Table No. 8.6 Results of Stem Analysis for Dhaoda Site Quality IV

Compartment No. 312 RF of and Paoni Range

Sr. No.	Age in Years	Height in Meters	DBH(ob) in cm	GBH(ob) in cm	Volume in cum.	CAI in cum.	MAI in cum.
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	10	2.65	1.72	5.40	0.0015	0.0002	0.0002
3	20	7.54	7.34	23.06	0.0024	0.0001	0.0001
4	30	10.37	12.25	38.49	0.0165	0.0014	0.0006
5	40	13.28	17.15	53.89	0.0578	0.0041	0.0014
6	50	15.24	21.32	66.99	0.1319	0.0074	0.0026
7	60	16.32	26.50	83.26	0.2311	0.0099	0.0039
8	70	16.94	28.45	89.39	0.3162	0.0085	0.0045
9	80	17.31	29.52	92.75	0.3864	0.0070	0.0048
10	90	17.52	30	94.26	0.4235	0.0037	0.0047



The CAI/MAI curve of Dhaoda site quality IV intersect at 88 years of age girth (OB) corresponding to this, exploitable age is 93 cm. The exploitable girth is hence fixed at 90 cm.

**STEM ANALYSIS EXERCISE CARRIED OUT
BY THE STAFF OF WORKING PLAN DN. NAGPUR**



SELECTION OF TREE FOR STEM ANALYSIS



DHOADA TREE BEING FELLED



FELLED BIJA TREE



FELLED SAJA TREE



*SLICES OF TEAK, BIJA, SAJA & DHAODA,
BROUGHT TO NAGPUR OFFICE*

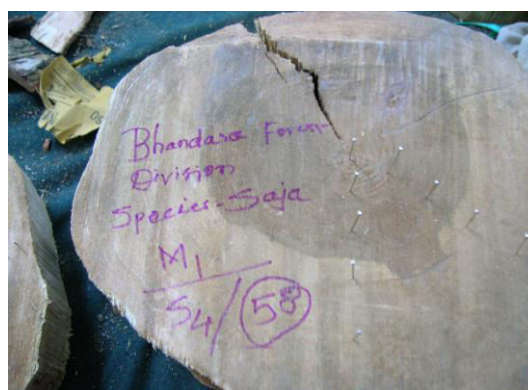


SLICE OF TEAK





COUNTING OF RINGS - TEAK



COUNTING OF RINGS - SALAI

8.2.04 The growth data of Garadi, Tinsa, Bel, Lendia, Khair, Rohan and Salai obtained from various working plans of neighboring Division is reproduced below.

Table No. 8.7 Table Showing year and Girth of Misc. Species.

Age in years	Mean Girth (OB) at breast height in cm for species						
	Garadi	Tinsa	Bel	Lendia	Khair	Rohan	Salai
10	16.7	12.7	19.1	15.7	10.0	13.7	9.8
20	26.4	25.4	28.2	28.7	24.0	25.4	12.4
30	35.4	35.8	33.5	33.0	38.0	34.3	(23.0)
40	40.9	(43.0)	(37.2)	38.1	51.0	(38.0)	(30.3)
50	44.00	(48.0)	(39.2)	40.6	65.0	(40.0)	*(38.3)

**The figures in the brackets are obtained by extrapolation*

8.3 Local Volume Tables:

8.3.01 The following Local volume table for Teak, Ain, Bija, Dhaoda and Garadi has been applied for Nagpur Forest division. Bhandara Forest division is adjoining to the division; hence it will be applied to this division. The Local volume table is given in Table 8.8

Table No.8.8 Local Volume Table for Teak, Ain, Bija, Dhaoda and Garadi (IVA Quality)

Girth Class (cms)	Mid-girth (cms)	Volume per Tree in Cubic Metres		
		Teak	Ain,Bija,Dhaoda and Tendu	Garadi
16-30	23	0.0166	0.0185	0.0134
31-45	38	0.034	0.0374	0.0272
46-60	53	0.0784	0.0862	0.0627
61-75	68	0.1483	0.1631	0.1186
76-90	83	0.2437	0.2681	0.195
91-105	98	0.3646	0.4011	0.2917
106-120	113	0.5111	0.5622	0.4089
121-135	128	0.6831	0.7514	0.5465
136-150	143	0.8806	0.9687	0.7045



8.3.02 Local volume table for few miscellaneous species has been prepared by the staff of Working Plan Division Nagpur. The field data for this has been collected from Ramtek and Deolapar ranges of Nagpur (T) division is given in

Table No.8. 9 Local Volume Table for Other Miscellaneous Spp.

Girth Class (cms)	Shisham	Surya	Haldu	Kumbhi	Khair	Babul	Mowai	Shiwan	Beheda
Volume (M ³ .)									
10-20	0.060	0.18	0.05	0.16	0.04	0.075	0.025	0.005	0.15
20-30	0.180	0.36	0.15	0.36	0.1	0.163	0.075	0.05	0.4
30-40	0.58	0.82	0.3	0.56	0.26	0.5	0.3	0.31	0.7
40-50	1.34	1.62	0.5	0.98	0.62	1.31	1.375	0.94	1.15
50-60	2.54	2.76	1.1	1.76	1.2	3.125		2.2	1.8
60-70	4.9	4.66	2.25	2.98	2.08				2.55
70-80			4.4	4.58	4.6				3.5

8.4 Enumeration:

- The enumeration of trees and the regeneration survey of the forest crop in the division is carried out by Forest Resources Survey Unit, Amravati during December 2004 to March 2005. The sampling design was systematic line-plot survey and the intensity of sampling was 1(one) percent.
- Systematic line-plot sampling was carried out at the intersections of 600-meter grid. Species and girth distribution (15 cm girth classes) of trees counting were done in 0.36-hectare plots (60 meter x 60 meter).
- Regeneration count of seedlings and coppice shoots of teak and other miscellaneous species was done in three height classes (0.3 to 1.0; 1.0 to 3.0 and above 3.0 meters) in 0.04-hectare (20 meter x 20 meter) sub-plots.
- Recording of forest types, site quality, density have been included as an integral part of the enumeration exercise.
- Enumeration data was analysed and enumeration results have been computed separately for each working circle. Stem density, basal area and frequency of each species have been calculated. The results of enumeration and regeneration for various working circle compartment wise are given in **Appendix – XXX**.

8.5 Statistics of Rate of Growth of Teak, and Miscellaneous Species:

(A) Growth of Teak :

- (i) **Stem Analysis:** In the Patil and Sardar's plan the growth data for teak was compiled from stem analysis of 65 trees. Twenty eight of these trees fall in all India quality III and 37 in quality IV. The results of stem analysis are reproduced below.

Table No. 8.10: All India Teak Site Quality III.

Age in years	Height In Mts.	Diameter O.B. at Breast height cm.	Girth O.B at Breast height cm.	MAI M ³	CAI M ³
10	5.5	5.5	17.3	0.0005	0.0005
20	11.25	14.5	45.6	0.00325	0.0060
30	15.25	22.0	69.1	0.00683	0.0140
40	18	28.4	89.3	0.010625	0.0220
50	20	33.6	105.6	0.0133	0.0240
60	21.5	37.5	117.9	0.01483	0.0225
70	(22.25)	(40.3)	126.7	0.01557	0.0200
80	(22.8)	(41.8)	131.4	0.01568	0.0165
90	(23)	(42.5)	133.6	0.01555	0.0145

Table No. 8.11: All India Teak Site Quality IV.

Age in years	Height in Mts.	Diameter O.B. at Breast height cm.	Girth O.B.	MAI M ³	CAI M ³
10	5.5	3.2	101	0.0003	0.0003
20	7.5	8.6	27	0.0011	0.0019
30	10.5	13.3	41.8	0.002083	0.00405
40	12.7	18	56.6	0.0030	0.00575
50	14.2	22	69.1	0.00416	0.0088
60	15.5	25.5	80.1	0.0051	0.0098
70	16.3	29	91.1	0.00594	0.0110
80	17	31.6	99.3	0.00666	0.0117
90	17.4	34	106.9	0.00745	0.01375
100	17.7	36	113.1	0.008125	0.01420
110	(18)	38	119.4	0.008636	0.01375
120	(18.1)	39.5	124.1	0.008958	0.0125
130	(18.2)	(41)	(128.9)	0.00915	0.01145
140	(18.2)	(42)	(132)*	0.00921	0.0100

**The figures in the brackets are based on extrapolation of the curves.*



From the above tables following conclusions can be drawn.

(a) All India Quality III :

- (i) The areas capable of growing sound trees up to 23 m in height and 42.5 cm diameter over bark at breast height in 90 years.
- (ii) The CAI and MAI curves intersect at the age of 82 years.

(b) All India Quality IV :

- (i) The areas are capable of growing sound trees upto 18.20m in height and 42.0 cm in diameter over bark at breast height in 140 years.
- (ii) The CAI and MAI curves intersect at the age of 145 years.

The teak trees falling in quality IV were mostly, from hilly and poor areas. Also they had grown under adverse conditions and had suffered suppression at various periods for want of proper treatment. It will attain a diameter of 38.2 cm (girth 120 cm) over bark at breast height in 90 years, with proper treatment.

Teak Plantations: The growth data of teak plantations compiled by Patil and Sardar is reproduced below:-

Table No 8.12.Age Girth Relation of Teak Plantation:

Age in Years	Height (Mt.)	G.B.H. (O.B) (cm.)
10	9.06	34.8
20	14.7	57.5
30	18.57	79.3
40	26.67	100.4

The above table shows that -

- (i) Teak plantations on an average are of quality III.
- (ii) The height and girth increment during young age is much faster in teak plantations compared to the growth of teak trees in natural teak forest of quality III.

B. Growth of Miscellaneous Species:

- (i) **Growth of Bija :** Results of stem analysis of Bija by Patil and Sardar are reproduced below:-

Table No. 8.13 Result Of Stem Analysis of Bija IV B:

Age in Years	Height at Breast height in mts.	D.B.H(O.B.) in cm.	G.B.H. (O.B) in cm.	MAI M ³	CAI M ³
10	3	4	12.6	0.0002	0.0002
20	5.9	10	31.4	0.00075	0.0013
30	8.5	15.7	49.3	0.001833	0.004
40	11.1	20.9	65.7	0.00325	0.0075
50	13.3	25.9	81.4	0.00474	0.0107
60	15.6	30.8	96.8	0.006416	0.0148
70	17.7	35.2	110.6	0.008543	0.0213
80	19.8	38.8	121.9	0.00985	0.019
90	(21.8)*	41.2	129.5	0.01	0.0112

**The figures in the brackets are based on extrapolation of the curves.*

On the basis of above table it can be concluded that -

- The areas capable of growing sound trees upto 21.8 m in height and 41.40 cm in diameter and 130 cm. girth (OB) at breast height in 90 years.
- The CAI and MAI curves intersect at 91 years.

Growth of Ain: Growth data of Ain as given in the working plans of Bhandara, East Chanda and Noth Khandwa (M.P.) written by Patil and Sardar, Kartar Singh and Nigam respectively, are reproduced in Table No.8.14

Table No. 8.14 Age Girth Relation of Ain in Different Divisions:

Age in Years	Mean Girth O.B. at Breast Height in cms.		
	Bhandara	East Chanda	North Khandwa
10	11.9	11	16.5
20	26.7	21	29.5
30	38.5	30.0	40.6
40	50.3	39	45.7
50	59.7	49.	48.3
60	(70)	58.0	0
70	(80.0)	67.5	0
80	(91)	78	0
90	(102)	88	0
100	(112)*	99	0

**The figures, in the brackets are obtained from extrapolation.*

(iii) Growth of Bhirra: Growth data of Bhirra obtained from various working plans is reproduced below:-



Table No. 8.15 Table Showing Age - Girth Relation of Bhirra in different Divisions:

Age in Years	Mean girth O.B at breast height in cm. As per W.P. of		
	Nagpur	East Chanda	North Khandwa
10	7.5	7.5	16.0
20	17.6	16.0	27.9
30	30.2	24.0	39.6
40	45.3	30.0	55.0
50	61.6	37.0	70.0
60	74.2	43.0	83.0
70	86.7	51.0	95.0
80	96.8	59.0	105.0
90	104.3	67.0	113.0
100	118.9	75.0	121.0

(iv) Growth of Dhaoda: The growth data of Dhaoda obtained from different working plans is reproduced below:-

Table No .8.16 Table Showing Age-Girth Relation of Dhaoda in Different Divisions:

Age in Years	Mean girth O.B at breast height in cm. as per W.P. of Dr. Nandkishore		
	Bhandara	East Chanda	Indore
10	11.0	0	11.0
20	24.5	26.4	21.0
30	33.5	0	31.5
40	39.6	45.0	42.0
50	43.7	52.5	50.0

(v) Growth of Other Misc. Species: Growth data of Garadi, Tinsa, Bel, Lendia, Khair, Rohan and Salai obtained from various working plans is reproduced below:-

Table No. 8.17 Table Showing Age-Girth Relation of Some Misc. Spp:

Age in years	Mean Girth O.B. at Breast Height in cm. for specific years						
	Garadi	Tinsa	Bel	Lendia	Khair	Rohan	Salai
10	16.7	12.7	19.1	15.7	10.0	13.7	9.8
20	26.4	25.4	28.2	28.7	24.0	25.4	12.4
30	35.4	35.8	33.5	33.0	38.0	34.3	(23.0)
40	40.9	(43.0)	(37.2)	38.1	51.0	(38.0)	(30.3)
50	44	(48.0)*	(39.2)	40.6	65.0	(40.0)	(38.3)

**The figures in the brackets are obtained by extrapolation.*

8.6 Stock Mapping: Stock mapping was done during previous plan preparation. But the records were not available in the office and those records could not be compared with the fresh stock maps.

During the course of revision of the plan, fresh stock mapping have been carried out and data is given in **Appendix – LIV**.

With help of GIS compatible Software entire data pertaining to watershed, soil, Classified scene of vegetation, road, range, beat, division boundaries, stock maps, important features like village, tank, rest houses, headquarters of range, round beats, Tahsils etc. have been digitised and maintained in the form of different layers. The digital data related to forest have been analysed to get the extent of area and other features to arrive at the fixation of different working circles. **These digital maps are meant only for Forest Management purposes and not for any legal disputes or court cases etc.**

The Classified scene of 2004 LISS data have been procured from FSI, Nagpur and analysed at GIS Cell in the Office of the Conservator of Forests, Working Plan, Nagpur. Stocking of the forest, as per Satellite data analysis and as on the ground, have been ascertained by conducting Ground Truthing during preparation of Draft Plan Report. On that basis management map has been prepared. User officer will also be provided digital data to have better information, which can not be seen on the hard copies, about the division.

8.7 Annual Yield: The annual outturn of Forest Produce is given in the **Appendix - LXXIV and LXXV**. Based on the past workings, the Form Factors will be prescribed for calculating the yield.



Part-II

Chapter IX

Future Management Discussed and Prescribed

BASIS OF PROPOSAL

9.1 Introduction: This Working Plan is prepared for the scientific management of the Forests of Bhandara Division. The primary management objectives for the Forests of Bhandara Division, has been to restore the Forest Resources to its best condition. This plan is intended to focus on future management and sustainable use of the Forest Resources of this Division. The Plan includes the Reserved, Protected, Unclassed forests, and Jhudpi Jungle of the Division. Long term Strategic Goals has to be established to guide our steps towards sustainable, ecosystem based forest management. Under the Eco-system based management, equal emphasis is given to ecological, social and economic aspects of the Forest resources.

9.1.01 Ecological Goals :

Goal-1: *Practice Sustainable, Ecosystem-based Management:* Resource Planning and operations will be conducted to maintain the long term integrity, representation, diversity and productivity of terrestrial and aquatic ecosystems; with recognition of valued human activities and uses derived from these systems. Fundamental processes and values of ecosystems shall be protected or rehabilitated. In doing so the following sets of Objectives shall be followed:

- **Objective-1:** *Conserve the Geophysical Processes:* Emphasise conservation and rehabilitation of geo-physical processes such as soil formation & conservation, geomorphic sedimentation, carbon dynamics, hydrologic dynamics and nutrient dynamics. Such processes are the foundation of the habitat conditions required to sustain desired biological assemblages.
- **Objective-2:** *Conserve Biodiversity:* Encourage the management of intact, functional landscapes, ecosystems, and communities that will achieve the conservation of representative biological assemblages, including rare species; maintaining local biological diversity at ecosystem, species and genetic level.



9.1.02 Socio-economic Goals: The management of the forests of the Bhandara Division will be carried out with the following Goals and objectives:

Goal-2: *Maintain Essential Ecosystem Services* : The resource planning and operations shall ensure the variety of ecosystem services which includes – natural environment produce resources that are useful to people, including maintenance of air and water quality, ground water recharge, soil conservation, nutrient cycling, carbon sequestration, provision of habitat and biodiversity and attenuation of drought and flood conditions.

Goal-3: *Sustain Social-economic Values*: The resource planning and operations shall encourage the efficient and sustainable production of desired forest products to provide a range of social and economic benefits.

Goal-4: *Provide Public Access*: Resource Planning and operations shall be done through participatory management under the JFM scheme to protect and preserve the natural, historic and cultural features of the forest resources while providing access to these resources. While doing so the following sets of objectives shall be followed :

- **Objective-1:** To meet the bona fide requirements of the local peoples, which includes small timber, firewood, fodder and other NTFPs.
- **Objective-2:** To provide ecological education and recreation through Eco-tourism.
- **Objective-3:** To allow the Cultural uses by the indigenous peoples.

9.2 Factors Influencing the General Objectives of Management: Working Plans are supposed to be technical documents prepared to manage a particular area of forest land on a sustainable basis, with an objective to conserve the bio-diversity, soil and water. Various standard scientific treatments, suitable for a particular land, are prescribed to conserve and improve the quality and productivity of the forest to meet the national and global needs in general and the bona fide needs of the local people in particular. While preparing and implementing the plan it is necessary to examine the National Forest Policy and all relevant laws, Rules, Court orders and various administrative orders issued by the Governments of India and Maharashtra, so that all the prescriptions should be in accordance with them.

9.2.01. The National Forest Policy: The National Forest Policy was first enunciated in 1894 and was revised in 1952, after independence. It was again revised in shape of the National Forest Policy 1988, which is, presently, in force.



The basic objectives and thrust areas enshrined in the National Forest Policy 1988 are given as under:

- Maintenance of environmental stability through preservation and where necessary, restoration of the ecological balance that has been adversely disturbed by serious depletion of forests.
- Conserving the natural heritage of the country by preserving the remaining natural forests with the vast variety of flora and fauna, which represents the remarkable biodiversity and genetic resources of the country.
- Checking the soil erosion and denudation in the catchments area of the rivers, lakes and reservoirs in the interest of soil and water conservation for mitigating flood and droughts and for retardation of siltation of reservoirs.
- Checking the extension of sand dunes in the desert areas and along the coastal tracts.
- Increasing the forest/tree cover in the country through massive afforestation and social forestry programmes, especially, on all denuded, degraded and unproductive lands.
- Meeting the requirements of fuel wood, fodder, minor forest produce and small timber of the rural and tribal populations.
- Increasing productivity of forests to meet essential national needs.
- Encouraging efficient utilization of forest produce and maximizing substitution of wood.
- Creating a massive people's movement with the involvement of women, for achieving these objectives and to minimize pressure on the existing forests.

The principal aim of the Forest Policy must be to ensure environmental stability and maintenance of ecological balance including atmospheric equilibrium which is vital for sustenance of all life forms, human, animals and plants. The derivation of direct economic benefit must be secondary to this principal aim.

9.2.02 Essentials of Forest Management embodied in the National Forest Policy 1988 are given as follows:

- Existing forests and forest lands should be fully protected and their productivity improved. Forests and vegetative cover should be increased rapidly on hill slopes, in catchments of the rivers, lakes, reservoirs, ocean shores, on semi arid, arid and desert tracts.



- For conservation of biodiversity, network of national parks, sanctuaries, biosphere reserves and other protected areas should be strengthened and extended adequately.
- Provision of sufficient fodder, fuel and pasture, especially, in areas adjoining to forest is necessary in order to prevent depletion of forests beyond sustainable limit.
- Minor forest produce provides sustenance to the tribal population and other indigenous population residing in and around the forests. Such produce should be protected, improved and their production should be enhanced with due regard to generation of employment and income.
- Schemes and projects which interfere with forests on the steep slopes, catchments of rivers, lakes and reservoirs, geologically unstable terrain and other ecologically sensitive areas should be severely restricted.
- No forest should be permitted to be worked without the approved working plan, which should be in keeping with the National Forest Policy.
- The rights and concessions enjoyed by the tribal and other rural poor living within and near the forests should be fully protected. Their domestic requirements of fuel wood, fodder, minor forest produce and construction timber should be the first charge on forest produce.
- Inculcate in the people, a direct interest in forests and make them conscious of the value of trees, wildlife and nature in general through forest extension, education and training.

9.3 National Forestry Action Plan:

9.3.01 Introduction: Having about 2.5% of world's geographic area, India at present is supporting 16% of world's human population and 18% of cattle population. About 41% of forest cover of the country has already been degraded and dense forests are losing its crown density and productivity continuously. A large number of India's livestock population graze in the forests causing serious damage to soil, ground flora, including regeneration, and productivity of the forests. The use of forests beyond its carrying capacity and encroachments are the main cause of continuous degradation of forests. At present major portion of the forests have no natural regeneration and are prone to fire.

9.3.02 To reverse the process of degradation and for sustainable development of forests, the Government of India has prepared National Forestry Action Plan (NFAP), a comprehensive strategic programme. These programmes are as follows:

- i. Protect Existing Forest Resources
- ii. Improve Forest Productivity



- iii. Reduce Total Demand of Forest Produce
- iv. Strengthen Policy and Institutional Framework
- v. Expand Forest Area

Conclusion:

- i. For sustainability and productivity of forests, the production to be increased at least 3 to 5 m³ per ha per year by promoting regeneration and enrichment plantations.
- ii. Hygiene of forests to be improved through suitable silvicultural practices.
- iii. Efforts to be made to bring one-third geographic area of the country under forest and tree cover by plantations on all categories of wastelands and agro forestry.
- iv. Plantations on non-forest wastelands to be done mostly with fuel wood species as 70% of the wood produced from forests are used as fuel wood. Species of pulpwood and other industrial wood may be encouraged in farm forestry.

9.4 National Wildlife Action Plan:

9.4.01 Ministry of Environment and Forests, Govt. of India has formulated National Wildlife Action Plan (2002-2016) , based upon the decision taken in the 21st. meeting of the Indian Board of Wildlife held in January 2002. The plan had outlined the strategies and action points for wildlife conservation. The strategy for action is to be adopted under wildlife action plan on the following parameters:

- i. Strengthening and Enhancing the Protected Area Network
- ii. Effective Management of Protected Areas
- iii. Conservation of Wild and Endangered Species and Their Habitats
- iv. Restoration of Degraded Habitats outside Protected Areas
- v. Control of Poaching, Taxidermy and Illegal Trade in Wild Animal and Plant Species
- vi. Monitoring and Research
- vii. Human Resource Development and Personnel Planning
- viii. Ensuring People's Participation in Wildlife Conservation
- ix. Conservation Awareness and Education
- x. Wildlife Tourism



- xi. Domestic Legislation and International Conventions
- xii. Enhancing Financial Allocation for Ensuring Sustained Fund Flow to the Wildlife Sector.

9.4.02 Division has to identify and prioritize degraded habitats outside PAs for the natural regeneration of forests/wetlands, identify and restore linkages and corridors between wildlife habitats using a combination of satellite imageries and ground truthing. The budgets allocated by different sectors can be streamlined and used to enhance the process of natural regeneration outside PAs through carefully monitored soil and water conservation works and effective protection activities. Plantations of appropriate indigenous species coupled with the removal of unwanted exotic plants should be done wherever necessary, apart from working with scientific institutions specializing in ecological restoration of degraded Eco system.

9.5 Court Judgments and Related Committees:

9.5.01 Hon'ble Supreme Court passed an order in writ petition (202 of 1995) in the matter of "Godavarman Thirumalkpad" V/s Union of India. The order speaks about the felling of trees in all forests is to remain suspended except in accordance with the working plans of the State government, as approved by Central government.

9.5.02 Hon'ble Supreme Court passed an order on 22.09.2000 in Inter-Locutory application No 424 saying that regeneration of forest should commensurate with felling carried out under a working plan. To achieve this, it must be ensured that no felling be carried out without allocating necessary fund to regenerate the felled areas. In the event of failure in regeneration or any shortfall in carrying out regeneration operation no further felling shall be undertaken until the failure/shortfall is made up.

9.5.03 Following the directions of Hon'ble apex court in their order dated 22.09.2000 in IA No 424; a core group was constituted to decide the extent of felling. Central government shall be strictly complied with and felling to be carried out by the State governments only after obtaining the permission from core group constituted by the Ministry of Environment and Forests, New Delhi.

9.5.04 Peoples' Participation through JFM: Joint Forest Management approach was adopted for degraded forest area of the state vide GR dated 16 March 1992 and now new guidelines vide Govt. of Maharashtra GR No MSC./2000/C.R.-143 /F-2, dated 25.04. 2003, regarding Joint Forest Management have been issued. It has authorized the Forest Department to take-up JFM activities in well-stocked areas also on experimental basis, and to share usufruct with the villagers. **All JFM activities should be in consonance to the prescriptions of the Working Plans.**



9.6 The Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006:

After the enactment of this Act, the administration of the forest will be greatly affected, as this act recognises several individual as well as the community rights over the forest land and its produce. All the provisions of this Act will have to be taken into consideration while managing the forest.

It is presumed that the standard practice of Silviculture will be applied to manage the Forest, irrespective of the ownership of the forest and its produce, as the forest can be managed on the sustainable basis only if it is managed under proper silvicultural system.

The following rights are recognised under the section 3(1) of this Act :

- a. Right to hold and live in the forest land under individual or common occupation for habitation or self cultivation for livelihood.
- b. Community rights such as Nistar etc. including those used in erstwhile princely states, Zamindaris or such intermediaries.
- c. Right of ownership, access to collect, use and dispose of Minor Forest Produce, traditionally collected within or outside the village boundaries.
- d. Community rights of uses or entitlements such as fish and other products of water bodies, grazing (both settled or transhumant) and traditional seasonal resource access of nomadic or pastoralist communities.
- e. Rights of community tenures of habitat and habitation for primitive tribal groups and pre-agricultural communities.
- f. Rights in or over disputed lands under any nomenclature.
- g. Right for conversion of Pattas or leases or grants issued by any local authority or any State Government on forest lands to titles.
- k. Right of access to biodiversity and community right to intellectual propriety and traditional knowledge related to bio-diversity and cultural diversity.
- l. Any other traditional rights customarily enjoyed by the forest dwelling Scheduled Tribes and other traditional Forest Dwellers, as the case may be, which are not mentioned in the clauses (a) to (k), excluding the traditional right of hunting or trapping or extracting a part of the body of any species of wild animal.
- m. Right to *in situ* rehabilitation including alternative land in case where the Scheduled Tribes and other Traditional Dwellers have been illegally evicted or displaced from forest land without



receiving their legal entitlement to rehabilitation prior to the 13th. December 2005.

9.7 General Objectives of Management:

9.7.01 Following general objectives of forest management have been identified in pursuance of the National Forest Policy, 1988; and other directives issued by the state and the union governments, from time to time:

- i. To preserve forest cover on hill slopes, along streams, watercourses and water bodies in order to prevent soil erosion and to check siltation in reservoirs; and to maintain their essential protective and life support functions, including, regulation of the water regime.
- ii. To meet expectations of wild life protection and biodiversity conservation from managed forests.
- iii. To restore and augment tree cover in under-stocked and degraded forests, and to improve productivity and growing stock of natural forests using appropriate modes of management and techniques.
- iv. To alleviate poverty in the forest dependent villages.
- v. To enhance productivity of firewood, fodder, non-wood forest produce, small timber and other construction wood required for meeting local household demands, particularly, of the tribal communities.
- vi. To involve women community in forestry management.
- vii. To ensure optimum sustained yield of desirable forest produce and services consistent with other objectives as well as National and State forest policies.
- viii. Ecotourism
- ix. The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Rights) Act, 2006 and JFM

9.7.02 The Main Objectives of Management are Listed Below :

- i. The forests are primarily mixed in nature and poor in quality, having low proportion of valuable species like Teak and need enrichment by miscellaneous species in the stocking. A large chunk of forest tract is under stocked, open and degraded that needs improvement in stocking through tending of existing rootstock and plantations.



- ii. The coppice vigour of Teak and miscellaneous species have declined due to repeated coppicing under coppice systems for over 3 to 4 rotations leading to deterioration in growth and quality of Teak and other valuable species. It also has led to increase in proportion of prolific but unwanted coppicers like Garadi and Lendia in the stocking.
- iii. The natural regeneration of Teak and miscellaneous is not satisfactory. Natural regenerations were observed at places but far short of required numbers as to established natural regeneration to serve as normal future crop.
- iv. A large extent of forest areas fall in the catchments of irrigation projects and water bodies, thereby need specific treatment in the interest of longevity of these water bodies, having focus on soil and moisture conservation to check siltation.
- v. A large portion of forests of the division adjoins the Protected Areas, namely, Navegaon National Park and Nagzira Wildlife Sanctuary, hence, require treatments in conformity with the wildlife and bio-diversity conservation and eco-tourism.
- vi. The Bamboo is the most sought after forests produce in the division by the local communities especially the Burads. The uncontrolled Bamboo exploitation has resulted in shrinking of Bamboo areas in the division. The Bamboo areas require special focus and treatment to reverse this trend.
- vii. The forests suffer heavy biotic pressure, like, uncontrolled grazing and fire, resulting in destruction of natural regeneration and humus. Besides this the soil becomes compact and unproductive. Excessive grazing and uncontrolled fires are the main adverse factors causing degradation of forests in the division. The situation requires some bold measures to minimise these adverse influences.
- viii. The NTFP (MFP) species form a substantial proportion of the forest crops that contribute substantially to the livelihood of local communities especially the tribal. The forest areas rich in NTFPs require special thrust for their sustainable management and use in the interest of the local communities, by involving them through JFM and local NGOs having the skill of processing and value addition.

9.8 Special Objectives of Management:

- i. To gradually convert stunted Teak coppice crop with reduced coppicing vigour into 'High Forests' by suitable silvicultural



techniques and tending operations in existing natural regenerations and rootstocks

- ii. To improve the existing crops by applying improvement measures aimed at nursing back these forests to normalcy.
- iii. To restore the vegetative cover of degraded and open areas and to increase their productivity, through suitable measures like site protection, tending of natural regenerations & rootstocks, supplementing it with plantations, wherever, necessary, possibly through JFM.
- iv. To prevent the siltation of the dams and other water bodies by checking the soil erosion in the forest catchments through soil and water conservation measures
- v. To augment fodder requirements of the villages. Mostly it is grass resources, which are to be supplemented, wherever required, with palatable legumes and tree fodder.
- vi. To improve the productivity of water bodies for the benefit of wild life and villagers.
- vii. To provide a safe and proper habitat for wild animals and birds.

9.9 Analysis and Valuation of the Crop:

9.9.01 The analysis of forest crop is carried out after enumeration of the crop. The species and tree girth distribution from the enumeration data and density distribution from satellite imageries is used for the purpose.

9.9.02 Areas susceptible to high erosion and falling in the catchments of large water bodies are included in the Protection and Catchments Area Management Working Circle.

9.9.03 Compartments under non-forest use, forest nurseries or other special purposes such as Forest Research have not been included under any Working Circle.

9.9.04 Compartments having sufficient dense tree cover and mature trees fit for harvesting are allotted to the Selection-cum Improvement Working Circles (SCI). This working circle is expected to produce large timber and firewood.

9.9.05 Compartments having preponderance of pole crop, dense tree cover without enough mature trees and damaged crop, is designated as the Improvement Working Circles (IWC). These compartments are expected to produce poles, small timber and firewood. Only improvement felling, in favour of desirable species, is to be carried out to improve the crop so that it may become the future Selection Forests.



9.9.06 Areas having sparse tree crops, open areas without tree growth and isolated small forest patches are included in the Afforestation Working Circle (Aff. W.C.). In such areas the focus would be upon tending of existing NR and rootstock, in natural regeneration management, the seedlings of seed origin of desirable species will be given preference over the coppice. If NR is insufficient then it will be supplemented by seedling plantations, wherever necessary. Involvement of the local community is considered focal for management of such areas as well as afforestation of open areas and isolated patches.

9.9.07 The compartments and areas close to the habitations which are unsuitable for raising timber crops due to their refractory nature, heavy biotic pressure and grass birs have been proposed to be managed under Fuel-wood, Fodder and Pasture Working Circle to cater the needs of local people. The Pasture forests areas of Bhandara, Pauni, Adyal, Jamkandri and Sakoli ranges have also been brought under this working circle as they are highly degraded and are unlikely to produce commercial timber. The plantations in these areas in the past have not been successful. However, by allowing regulated grazing in these areas, the grazing pressure on the remaining better quality forests of these ranges may be reduced.

9.10 Functional Classification of Forests:

9.10.01 The broad principles of classification of forests on functional basis have been guided by the Govt. Resolution No. MRF-1365/132211-Y, dated December, 6, 1968 issued by the Government of Maharashtra. The following functional classes have been recognised by the state:-

- a. Protection Forests:** It include forests on steep slopes (25° and above), along river banks and the forests that have become depleted through maltreatment and further exploitation of which will accentuate soil erosion and adversely affect the productivity of agricultural lands in the region. The management should aim at conserving these forests, through soil and moisture conservation measures, so that they may exert beneficial influence on the soil, water regime and the physical and climatic factors of the locality.
- b. Tree Forests:** These forests are situated in remote tracts that are mainly capable of growing large sized timber and other products of commercial value.
- c. Minor Forests:** It includes forests that are interspersed with cultivated lands and are capable of producing small timber and fuel wood and providing grazing which are indispensable needs of adjoining agricultural population.



d. Pasture Lands: These are openly stocked forests or scrub lands that have ceased to yield even the small timber but are conveniently situated for providing grazing to the cattle used for agricultural works.

e. Miscellaneous Forests:

- **Grass Reserves:** These are small blocks of forests situated amidst cultivated tracts carrying scrubby growth and capable of producing good fodder grasses.
- **Remaining Areas** needed for other purposes.

9.10.02 The functional classification of the forest has been made by taking into consideration the above aspects besides the growing stock and condition of site. The various types of forests will be treated as follows:

- A. Protection Forests:** This type of Forests includes the forest found on Steep slopes (More than 25°), areas along the water courses and in the Catchments of big water bodies. It generally includes good quality forests. They will be managed to protect the area from soil erosion and to minimise the siltation of water bodies. Soil and Moisture Conservation measures will be taken to protect the erosion prone lands and to improve the under ground water table. The commercial felling will not be the priority in these areas. Only dead trees will be harvested in such areas. Over congested young crops will be thinned and open areas will be regenerated, both by natural as well as artificial means. Strict control over grazing and protection from fire will be proposed. The areas directly draining into any water body are kept under **Protection and Catchment Area Management Circle**.
- B. Tree Forest:** This type of forest includes the better quality forests, especially the site quality III and IVA areas, capable of producing medium to large-sized timber, which are comparatively away from local habitations. They have been worked under Conversion and CWR system in the past except areas under Protected Forests. They will be managed to produce medium to large sized timber. Steep slopes will be excluded from harvesting operations, but will be covered for soil and moisture conservation works. The natural regeneration will be tended and areas having inadequate natural regeneration will be planted with suitable valuable species. The percentage of Teak in the existing crop is not very high, tending to small pure patches at places. Therefore, plantation of Teak and other valuable miscellaneous species shall be designed in such a way that the proportion of Teak should not be more than 50 % in the resulting



crop. These areas have been proposed to be worked under **SCI Working Circle**.

- C. Minor Forest:** These areas will be managed to meet the local need of small timber, poles and fuel wood. The growing stock is mainly of site quality IVA and IVB with few patches of quality III. The density varies from 0.4 to 0.6 and natural regeneration is deficient in open areas. These forests have been worked under CWR system under the previous plans. These forests will be managed under Improvement system by carrying out improvement felling only. Large scale soil and moisture conservation works are proposed to be taken in open and eroded areas. Natural Regeneration and rootstock will be tended and supplemented with Artificial Regeneration of suitable species. The forests will be managed under **Improvement Working Circle**, where only improvement fellings are recommended so that this crop may become selection forests in future.
- D. Pasture Land:** This area includes forests which are adjoining to villages with heavy biotic interference. They are not capable of producing even small timber and fire wood to any appreciable quantity. These areas will primarily be managed to provide fodder by introducing fodder trees species and superior grasses. Rotational grazing will be prescribed. Soil and moistures conservation works will be taken along with planting and sowing of fodder grass and trees to meet poles, fuel wood and assured fodder supply to the local people in case of fire or drought. These areas are proposed to be managed under **Fuel-wood, Fodder and Pasture Working Circle**.
- E. Jhudpi Jungle (Miscellaneous Forests) :** These includes the small scattered patches which are handed over by Revenue Department which are unsuitable for any type of working described earlier and areas earmarked for other purposes. These small patches of the Jhudpi Jungle will be treated as a reserved forest as the proposal has already been sent to the Government. These Jhudpi jungles are also kept reserved as a land bank for any future compensatory land against any project.

Some patches of RF and PF are allotted for different purposes and hence these lands are managed to meet those requirements. Mostly these areas are included in the Afforestation Working Circle and are supposed to be treated with the help of the villagers under JFM.



9.11. Treatments Prescribed:

- i. Management treatments will depend upon requirements of environmental stability, protection of topography, biodiversity conservation, characteristics of growing stock in the forest and the objectives of management.
- ii. Existing protection forests will be preserved. Soil and moisture conservation works should improve the moisture content and prevent soil erosion and siltation of the water bodies.
- iii. Suitable tending and soil working operations will be carried out to stimulate the growth of the naturally regenerated seedlings and rootstock.
- iv. Timber, if silviculturally available, will be extracted from the dense tree forests capable of producing medium to large-sized timber and poles on sustained basis.
- v. Open forest areas and traditional pastures will be managed with active participation of tribal and village communities for improving the productivity of the land to meet the local domestic needs of fodder and fire wood.
- vi. Uncontrolled grazing, fire, poaching, illicit cutting and uncontrolled encroachment, the major threats for sustainable growth for forest, shall be curbed.

The General Approach of the Treatments:

- i. The entire forests on steep and precipitous slopes will be protected from harvesting. 20 meter wide strips on either sides of streams and watercourses will also be protected from harvesting in the similar manner.
- ii. Forest areas susceptible to erosion and falling in catchments areas of medium and large irrigation projects and reservoirs shall be protected and given separate treatment having focus on soil and water conservation, afforestation eco-restoration and eco-tourism.
- iii. Recommended soil and moisture conservation works should restore ecological balance and ensure biodiversity conservation.
- iv. Special habitat management for wildlife conservation will receive high priority. Riparian zones and mesic sites, important for



wildlife management, will receive added protection and treatment. Adequate buffer will be provided to such sites while preparing treatment maps for coupe extraction. Snag, den trees and down logs shall be sufficiently protected, to meet the habitat requirement of birds and small animals. Wildlife requirements shall be the most important consideration for water body management in forest areas.

- v. The forests of Bhandara Dn. is extremely important from wildlife corridor management point of view as it lies between six important wildlife protected areas viz. Tadoba, Nawegon, Nagzira, Kanha, Pench (MS) and Pench(MP), of which four are Tiger project areas. It is therefore important that these forests should be managed in such a way that the corridors are not disturbed instead in future it should improve and the animals can migrate safely from one PA to another.
- vi. Compilation of a comprehensive database of floral and faunal resources as well as ecologically sensitive sites in the division is proposed.
- vii. Preference will be accorded to natural regeneration and rootstock management. Natural regeneration and promising coppice growth will receive suitable tending and soil working to stimulate growth and development. Areas having good natural regeneration of valuable species shall be protected from fire and grazing. Artificial regeneration will be used as supplementary activity, at places, where natural regeneration is inadequate or is not likely to succeed.
- viii. Management of forests close to villages will be given priority for meeting demands of local people for small timber, poles, firewood, fodder, non-wood forest produce, etc. Local people will be actively involved in forest management, forest protection, plantations and development of natural resources in the village. Management of forests close to villages shall primarily be done through JFM committees.
- ix. Non-Timber Forest Produce (NTFP) has great potential for sustainable economic development of local communities with conservation of forest resources. Sustainable NTFP production will be given high priority in the forest management.
- x. Sustainable use of forest resources will remain the guiding principle for managing the demands of forest produce and



services. Various government and non-government agencies will be engaged in identification and promotion of ecologically sound and economically feasible alternatives like wood saving technology, stall-feeding, population control of cattle and livestock improvement.

- xi. Involving local people in managing forests and generating awareness in rural and tribal areas is considered indispensable for the forest conservation.
- xii. Reducing biotic pressure on forests, particularly, illicit felling, unsustainable grazing, fire and encroachment near villages will be considered on priority basis.
- xiii. Forests capable of producing medium to large sized timber will be harvested under the Selection-Cum-Improvement management system. For production of small timber, poles and fuel wood to meet the local and the Nistar requirements, Improvement System is proposed to continue in areas of poor quality and stunted growth.
- xiv. Boundary demarcation will be carried out in time-bound manner for ensuring territorial integrity of forests. The Revenue and Forest Departments shall ensure maintaining forest boundaries, updating land records and reconciling revenue records in accordance to forest notifications.
- xv. Old notifications with estimated area of forest or with some errors will be taken up for correction. Proper survey and area measurement should be done on a time bound basis where the 'Blocks of Forests' have been notified Reserved Forests or Protected Forests.
- xvi. Action will be taken to convert all the Jhudpi jungles adjoining the Reserved Forests and large patches, away from villages into Reserved Forests.

9.12 Working Circles and Their Distribution: For the scientific management of forests, a compartment has been used as a unit for distribution. The allocation of compartments is based on preponderance of suitability to specific working circle. In all 5 (five) area-specific and 4(four) overlapping, working circles are prescribed. (Abstract of allotment of compartment to various Working Circles and Felling series is given in **Appendix -XXXI**).



Table No.9.1 Distribution of Forest Areas in Various Working Circles:

Working W.C.	Reserved Forests	Protected Forests	Unclass Forests	Gose Protected Forests	Acquired Private Forests	Jh. Jungle	Un Cl. Forests	Total Area (ha)	%
SCI	20120.802	5622.049	0	0	0	0	0	25742.851	27.74
IWC	20652.348	3431.106	0	0	0	0	0	24083.454	25.95
AFF WC	4101.577	6961.887	475.635	4778.701	0	10022	0	26339.860	28.39
FF & P WC	976.873	5300.595	0	0	0	0	0	6277.468	6.77
Pr & CA Mt.WC	8861.631	1473.793	0	0	0	0	0	10335.424	11.14
Total Area	54713.231	22789.43	475.635	4778.701	0	10022	0	92779.057	100
OL WC									
Wildlife(OL) WC								Entire Area	
Bamboo(OL) WC								22626.218	
Old Teak Plantation (OL) WC								5272.7	
NTFP (OL) WC								Entire Area	

9.12.01 Distribution of Area to Various Working Circles: The reallocation of forest areas under various working circles of the current working plan has been given in Table No. 9.1. The areas have been allotted after analysing the enumeration data.

- SCI WC:** The SCI Working Circle of this plan has mainly been constituted out of the SCI working circle area of the previous plan. Some areas of IWC, FFP and Misc. WCs, found suitable for SCI have also been allotted to this Working Circle. The compartments, which have not been worked under last plan, are included under SCI working circles in the current plan, having dense forest of mature and over mature crop capable of producing timber and poles, is available for harvesting
- IWC:** Most of the IWC areas of the previous plan and some compartments SCI, Misc. and FF&P Working Circles, found suitable for IWC, have been allotted to this Working Circle. Most of these areas belonged to the old CWR WC, which have been worked in previous plan and, have been put under Improvement working circle, because the young to middle aged crop in the area needs to reach at maturity for future productive selection forests.
- FF & P WC:** Old pasture, grass birs, and areas of Protected Forests adjoining to villages have been included in the Fuel-wood, Fodder & Pasture Working circle.



- iv. **AFF. WC:** Areas having sparse crops and open areas are included in Afforestation Working Circle. Tending operations of root stock and afforestation work have been proposed in such areas.
- v. **P&CAM WC:** Areas susceptible to high erosion occurring in the catchment of large water bodies have been included in the Protection and Catchment Area Management Working Circle. Mostly soil conservation works have been prescribed in this working circle. No felling is to be carried out in the areas directly draining into the water bodies.

Table No.9.2 Showing areas Allotted to Different Working Circles viz a viz the Previous Plan.

Dr Nand Kishore's Plan		Present Plan Working Circles (area in ha)	Area Transferred to Gondia Dn.	Area Transferred to Bhandara Dn.
Working Circle	Area (ha)	Area(Ha.)	Area(Ha.)	Area(Ha.)
SCI WC	43744.455	25742.851	5721.732	419.660
IWC	40005.318	24083.454	6893.719	1589.420
Protection & Catchment area WC		10335.424		
FFP WC	11610.239	6277.468	2533.374	
Miscellaneous WC	30161.547		4541.348	
Afforestation WC		26339.860		3647.006
Old Teak Pln.(OL)WC		5272.7		
NWFP (OL)WC		Entire Area		
BAMBOO (OL) WC	5564.474	22626.218		
TUSSAR CULT (OL)WC	175.59	-----		
WILDLIFE (OL) WC	125521.599	Entire Area		
TOTAL	125521.599	92779.057**	19690.173	5656.086

9.12.02 The SCI working circle areas are largely concentrated in Jamkandri, Sakoli, Nakadongri and Paoni ranges while the Improvement Working Circle areas are distributed in Tumsar, Adyal and Pauni ranges. Protection and Catchments Area Management Working Circle areas are distributed among almost all the ranges except Lakhandur, Sakoli and Lakhni Ranges. FFP working Circle are distributed among almost all the ranges except Jamkandri, Lakhandur and Lendejhari. Where as AFF working circle areas are distributed in all the ranges as most of the lands are from Jhudpi jungle.

Tables Showing the Proposed Range-Wise Distribution of Areas of Different Working Circles for the Current Plan.



Table No. 9.3 Table Showing Distribution of Area under Selection Cum Improvement Working Circle.

SCI						
Ranges	RF		PF		Comptts. Total	Total Area in ha.
	No. of Comptts.	Area in ha.	No. of Comptts.	Area in ha.		
Bhandara	4	649.601	8	981.429	12	1631.03
Jamkandri	11	5512.724	1	37.717	12	5550.441
Lakhandur	1	419.660	0	0	1	419.660
Lendezari	9	4200.631	2	142.676	11	4343.307
Nakadongri	7	3256.719	4	518.993	11	3775.712
Paoni	1	269.698	10	754.144	11	1023.842
Sakoli	8	2883.448	7	791.404	15	3674.852
Tumsar	6	2397.152	3	364.364	9	2761.516
Adyal	1	413.386	1	458.258	2	871.644
Lakhani	2	117.783	8	1573.064	10	1690.847
Grand Total	50	20120.802	44	5622.049	94	25742.851

Table No. 9.4 Table Showing Distribution of Area under Improvement Working Circle.

IWC						
Range	RF		PF		Comptts. Total	Total Area in ha.
	Comptts.	Area in ha.	Comptts.	Area in ha.		
Bhandara	3	1165.605	4	558.114	7	1723.719
Jamkandri	4	1466.937	0	0	4	1466.937
Lakhandur	4	1589.42	0	0	4	1589.42
Lendezari	4	1879.361	1	77.623	5	1956.984
Nakadongri	5	1056.126	2	263.842	7	1319.968
Paoni	19	8527.648	4	315.055	23	8842.703
Sakoli	3	107.569	3	571.431	6	679
Tumsar	7	2872.863	5	689.673	12	3562.536
Adyal	3	1485.734	3	459.331	6	1945.065
Lakhani	5	501.085	5	496.037	10	997.122
Grand Total	57	20652.348	27	3431.106	84	24083.454



Table No.9.5 Table Showing Distribution of Area under Afforestation Working Circle.

AWC								
Range	RF		PF		Gose PF	Jh.J	U.Cl. Forest	Total Area un ha.
	Comptts.	Area in ha.	Comptts.	Area in ha.				
Bhandara	2	462.361	17	2139.878	676.23	1201.9	0	4480.369
Tumsar	1	67.32	4	546.334	225.77	1264.36	0	2103.784
Jam Kandri	0	0	1	172.792	225.000	825.74	0	1223.532
Sakoli	2	421.505	5	1113.181	415.184	2113.71	0	4063.58
Pauni	4	1229.28	5	92.283	191.000	353.43	0	1865.993
Adyal	4	541.585	15	1426.431	275.00	1425.83	0	3668.846
Lakhani	1	4.399	3	128.879	507.000	1512.03	0	2152.308
Nakadongri	3	963.157	7	1255.615	0	376.79	0	2595.562
Lendejhari	1	411.97	2	86.494	0.000	59.89	0	558.354
Lakhandur	0	0	0	0	2263.517	888.38	475.635	3627.532
Grand Total	18	4101.577	59	6961.887	4778.701	10022.1	475.635	26339.9

Table No. 9.6 Table Showing Distribution of Area under Fuel Wood, Fodder & Pasture Working Circle.

FFP						
Range	RF		PF		Comptts. Total	Total Area in ha.
	Comptts.	Area in ha.	Comptts.	Area in ha.		
Bhandara	3	150.336	7	815.111	10	965.447
Jamkandri	0	0	0	0	0	0
Lakhandur	0	0	0	0	0	0
Lendezari	0	0	0	0	0	0
Nakadongri	3	147.926	3	516.335	6	664.261
Paoni	4	196.388	9	665.378	13	861.766
Sakoli	0	0	6	833.115	6	833.115
Tumsar	0	0	3	236.769	3	236.769
Adyal	3	482.223	2	116.772	5	598.995
Lakhani	0	0	18	2117.115	18	2117.115
Grand Total	13	976.873	48	5300.595	61	6277.468



Table No 9.7 Table Showing Distribution of Area under Protection and Catchment Area Management Working Circle.

Range	RF		PF		Comptt. Total	Area Total in ha.
	Comptts.	Area in ha.	Comptts.	Area in ha.		
Bhandara	1	452.438	1	95.615	2	548.053
Jamkandri	2	1401.022	0	0	2	1401.022
Lakhandur	0	0	0	0	0	0
Lendezari	6	2720.532	0	0	6	2720.532
Nakadongri	3	925.416	0	0	3	925.416
Paoni	5	2346.484	11	1335.719	16	3682.203
Sakoli	0	0	0	0	0	0
Tumsar	4	699.275	0	0	4	699.275
Adyal	1	316.464	1	42.459	2	358.923
Lakhani	0	0	0	0	0	0
Grand Total	22	8861.631	13	1473.793	35	10335.424

9.13 Blocks and Compartments:

9.13.01 Reserved Forests of this division have been distributed in 160 compartments and 48 forest blocks. All the compartments of Reserved Forests have been retained their original numbers.

9.13.02 Protected Forests (PF) covering 191 villages have been organised in 191 compartments, in such a way that each forest patch has a distinct compartment number irrespective of its size. The distinct patches within these compartment numbers are assigned with distinct sub compartment numbers. The notified area of such villages is considered for the purpose of area accounting.

9.13.03 The Bhandara Division has 475.635 hectares of unclassified forests. Compartments have not been formed in these areas.

9.13.04 The Revenue Authorities have handed over 100.22 km² of Jhudpi Jungle in 324 villages to the Bhandara Division in the year 1990. **(Appendix - XI)** Compartments have not been formed in such areas.



Table 9.8 Table Showing Distribution of Forest Compartments under various Working Circles.

Working Circle	Reserved Forests (Comptt)	Protected Forests (Comptt)	Gose P.F. (Village)	Jhudpi Jungle (Villages)	Un -Class Forest Land Village	Total Number Comptt / Village
Selection-cum-Improvement (SCI)	50	44	0	0	0	94
Improvement (IWC)	57	27	0	0	0	84
Afforestation (Aff.W.C.)	18	59	84	324	1	77/409
Fuel Wood Fodder & Pasture (F.F.P.W.C.)	13	48	0	0	0	61
Proctection & Catchment Area Mangmt. (Pr.C.A.M.W.C.)	22	13	0	0	0	35
Total	160	191	84	324	1	351/409

9.14 Period of the Plan: The schedules of various operations have been provided for 20 years. This plan, however, is proposed to be implemented for a period of 10 (Ten) years from the year of approval. However, the mid-term review may be carried out if the circumstances demand and if concerned Chief Conservator of Forests (Territorial) comes forward with a proposal for review.

9.14.01 Additional Principal Chief Conservator of Forests (Production & Management), Maharashtra State, Nagpur may issue necessary supplementary instructions on the aspects not covered in the plan.



Chapter X

SELECTION-CUM IMPROVEMENT WORKING CIRCLE

10.1 General Constitution of the Working Circle: The areas capable of producing large timber, poles and firewood with less biotic pressure are allotted to this working circle. The aim is to gradually convert the areas into High Forests by encouraging natural regeneration supplemented by artificial regeneration. It includes areas which support straight bole and sound trees of both seedling and coppice origin. It includes 25742.851 ha of total areas comprising of 20120.802 ha of Reserved Forests and 5622.049 ha of Protected Forests. It constitutes an area of 27.74 % of the total forest area of the division.

10.1.01 Based on the results of the enumeration data and satellite imageries and existing stock map details, the following criteria is proposed for allocation of compartments to the SCI areas:

- Compartments suitable for producing timber of medium and large size and not critically important for the protection of the topography.
- Compartments having dense Teak forest of IVA quality having patches of quality III and IVB inextricably mixed in the crop.
- Bulk of old CWR Working Circle areas (Included in the SCI of the previous Plan) having stunted but straight and sound Teak crop of site quality IV capable of producing timber and poles.
- Some areas of Improvement Working Circle, Pasture Working Circle and Miscellaneous WC of the previous plan, supporting dense and sound crop, found fit for SCI WC. (**Appendix - XXXIII**).

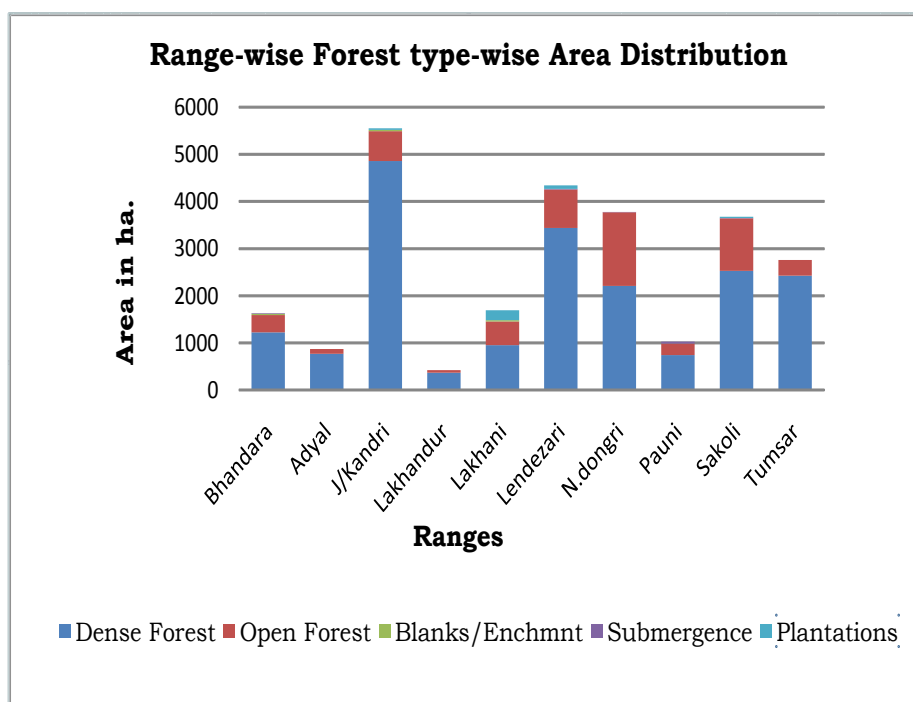


10.1.02 Area statement is given in the Table 10.1

Table No.10.1 Range Wise Compartments and Area Allocation to Selection cum Improvement Working Circle (in ha.)

Based on Enumeration and Existing Stock Map.

Range	No. of Comptt.	Dense Forest	Open Forest	Blanks & Encroachment	Grass Land	Submergence	Plantations	Total Area in Ha.
1	2	3	4	5	6	7	8	9
Bhandara	12	1223.05	363.887	28.716	0	15.377	0.00	1631.03
Adyal	2	768.547	103.097	0	0	0	0	871.644
J/Kandri	12	4859.177	632.197	27.067	0	0	32.00	5550.441
Lakhandur	1	369.798	49.862	0	0	0	0	419.66
Lakhani	10	954.355	500.114	26.378	0	0	210.00	1690.847
Lendezari	11	3441.083	814.104	0	0	10.12	78.00	4343.307
N.dongri	11	2208.804	1562.908	0	0	4.00	0	3775.712
Pauni	11	742.024	240.962	0	0	40.856	0	1023.842
Sakoli	15	2527.745	1115.507	0	0	7.6	24.00	3674.852
Tumsar	9	2423.294	338.222	0	0	0	0	2761.516
Total	94	19517.88	5720.86	82.161	0	77.953	344.00	25742.851
Percentage		75.82	22.22	0.32		0.30	1.34	100.00



10.2 General Character of the Vegetation: As per the enumeration results, composition and structure of forest crop in SCI area is given in the

Table No. 10.2 Species and Girth wise Distribution (Per Ha.) in SCI Area

(Source: Enumeration Data)

Total Area 25742.851

Area Enumerated = 261.ha.

Specie	16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-up	Total	Basal Area
Ain	27.37	16.52	9.02	5.77	4.79	2.70	1.38	0.69	0.61	68.86	1.52
Aonla	1.42	1.25	0.96	0.70	0.39	0.11	0.02	0.01	0.00	4.84	0.10
Behada	0.50	0.26	0.20	0.18	0.31	0.15	0.10	0.04	0.17	1.91	0.09
Bel	0.93	0.53	0.55	0.38	0.33	0.18	0.06	0.02	0.02	3.00	0.08
Bhirra	17.29	7.74	3.93	2.38	1.55	0.76	0.37	0.14	0.10	34.26	0.55
Biba	0.55	0.51	0.25	0.08	0.02	0.06	0.01	0.00	0.00	1.47	0.02
Bija	1.36	0.79	1.08	1.00	1.06	0.91	0.60	0.35	0.31	7.45	0.36
Bor/Ber	0.03	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00
Char	10.05	5.08	2.82	1.13	0.74	0.24	0.12	0.03	0.02	20.24	0.28
Chichawa	0.26	0.31	0.33	0.37	0.17	0.17	0.12	0.05	0.05	1.84	0.08
Dhaman	0.55	0.49	0.36	0.11	0.07	0.01	0.00	0.00	0.00	1.60	0.03
Dhawada	18.48	9.80	6.03	3.58	2.42	1.28	0.78	0.35	0.28	43.02	0.86
Garadi	47.77	26.20	11.35	4.38	1.65	0.46	0.24	0.04	0.01	92.10	1.07
Haldu	0.37	0.26	0.25	0.09	0.10	0.10	0.05	0.08	0.08	1.39	0.06
Hirda	0.08	0.08	0.02	0.01	0.00	0.01	0.00	0.01	0.00	0.21	0.00
Kalam	0.57	0.27	0.31	0.28	0.22	0.16	0.07	0.06	0.06	2.00	0.07
Kasai	0.83	0.55	0.50	0.28	0.18	0.09	0.04	0.01	0.01	2.49	0.05
Khair	2.79	2.33	1.45	0.57	0.27	0.05	0.01	0.00	0.00	7.48	0.11
Kulu	0.02	0.07	0.02	0.03	0.01	0.01	0.00	0.00	0.00	0.16	0.00
Lendia	22.14	8.42	3.45	1.70	0.90	0.36	0.11	0.05	0.02	37.16	0.43
Moha	4.34	1.72	1.09	0.97	1.12	0.81	0.96	0.67	1.68	13.35	0.68
Mokha	0.12	0.07	0.07	0.05	0.06	0.02	0.01	0.00	0.01	0.41	0.01
Mowai	2.13	2.01	2.21	2.29	2.13	1.58	1.04	0.35	0.40	14.14	0.62
Palas	5.84	4.43	2.65	1.28	0.60	0.24	0.10	0.06	0.07	15.25	0.26
Rohan	5.41	3.21	2.36	1.76	1.25	0.97	0.48	0.17	0.11	15.73	0.41
Salai	0.17	0.13	0.21	0.26	0.34	0.38	0.22	0.15	0.14	2.00	0.13
Semal	0.04	0.04	0.08	0.09	0.12	0.12	0.07	0.04	0.09	0.70	0.05
Shisham	0.06	0.10	0.17	0.04	0.02	0.00	0.00	0.00	0.00	0.40	0.01
Shiwan	0.08	0.02	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.15	0.00
Surya	1.29	1.08	1.02	0.63	0.22	0.11	0.03	0.01	0.01	4.40	0.09
Teak	15.14	8.26	4.39	2.13	1.28	0.74	0.43	0.24	0.13	32.74	0.56
Tendu	10.34	3.54	1.30	0.93	0.59	0.34	0.15	0.10	0.10	17.39	0.25
Tiwas	0.07	0.13	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.32	0.01
Other	34.09	17.13	6.90	2.47	1.70	1.12	0.75	0.37	0.64	65.17	0.99
Total	232.48	123.34	65.42	36.02	24.65	14.27	8.31	4.12	5.13	513.73	9.84

The forests are mixed in nature and contain trees of all age classes. The crop consists mainly of miscellaneous species. In some compartments Teak trees are also present, but they are confined to the well drained areas,



mainly along the major nalas and area consisting of good loamy soil. The major miscellaneous species are Saja, Bija, Kalam, Haldu, Tiwas, Dhaoda, Garadi, Mowai, Rohan, Bhirra, Surya, Lendia, Chichwa, Parad etc. In the fruit bearing species, Tendu, Moha, Char, Aonla, Bel, Harra and Beheda are the main species. Natural Bamboos are very less, but in many compartments Bamboo plantations have come up very well. Kuda, Garadi, Decamali are the main species in the understory. The crop is young to middle aged with occasional mature trees, in the major portion. The density of the crop is 0.4 to 0.8. The quality of the crop is III to IVA with some open patches of IVB mixed with above qualities. Natural regeneration of almost all species is present. But the establishment of natural regeneration varies from place to place. In the area subjected to annual fires and heavy grazing, the establishment is less. But the overall position of the natural regeneration is satisfactory. The advantage of this regeneration will be taken to regenerate the area.



SCI Forest during Summer



Natural Regeneration in SCI Coupes is good

Though the forest consists mainly of miscellaneous species, it is capable of growing Teak, therefore, to increase the value of the crop, Teak will be introduced by planting. The slopes are mostly well stocked. In the area where Dhaoda is abundant, Garadi is less and vice versa. Typical examples are Jamkandri and Tumsar ranges. While in the former Dhaoda is present in major portion, in the later Garadi is present. Haldu and Shisham are rare and are confined to a few compartments. The coppice reproduction of all miscellaneous species is poor except Garadi and Lendia. Regeneration of Dhaoda in the forests of Sodhipur is very good, but due to lack of silvicultural operations the desired results are not achieved.

10.3 Blocks and Compartments: Details of block and compartment wise area distribution is given in the **Appendix- XXXIII**. Range-wise area distribution under SCI Working Circle is given in the following table:



Table No. 10.3 Table Showing Range Wise Area Distribution Under SCI Working Circle.

Ranges	RF		PF		Comptts. (Total No.)	Total Area in ha.
	No. of Comptts.	Area in ha.	No. of Comptts.	Area in ha.		
Bhandara	4	649.601	8	981.429	12	1631.03
Jamkandri	11	5512.724	1	37.717	12	5550.441
Lakhandur	1	419.660	0	0	1	419.660
Lendejhari	9	4200.631	2	142.676	11	4343.307
Nakadongri	7	3256.719	4	518.993	11	3775.712
Paoni	1	269.698	10	754.144	11	1023.842
Sakoli	8	2883.448	7	791.404	15	3674.852
Tumsar	6	2397.152	3	364.364	9	2761.516
Adyal	1	413.386	1	458.258	2	871.644
Lakhani	2	117.783	8	1573.064	10	1690.847
Total	50	20120.802	44	5622.049	94	25742.851

10.4 Special Objectives of Management:

The special objects of management of the forest areas under the **SCI Working Circle** are as follows:

- To gradually convert stunted Teak and other valuable coppice crop with reduced coppicing vigor into 'High Forest' by suitable silvicultural techniques and tending existing natural regeneration of seed origin.
- To obtain sustained supply of medium to large-sized timber and poles.
- To maintain mixed forest composition and High Forest character of the forest crop and improve density of stocking by tending existing natural regeneration and supplementing it with artificial regeneration of suitable valuable species.
- To improve the proportion of valuable miscellaneous tree species in the crop by suitable tending operations and providing growing space for naturally regenerated seedlings of such species.
- To improve the productivity of Bamboo by giving proper treatment to the existing clumps and by planting Bamboo species only where it is going to grow well without suppressing other valuable species.
- To provide a safe habitat to the wild animals and birds in the forest of the division and also provide a safe corridor to the wild animals of the adjoining Wildlife Protected Areas.
- To conserve the local bio-diversity



10.5 Analysis and Valuation of the Crop:

10.5.01 Stock Mapping: The conventional stock mapping has also been carried out, besides the extensive enumeration exercise and crown density mapping through image processing and analysis of the satellite imageries.

10.5.02 Age and Density: The crop is mostly middle aged to mature having density varying from 0.4 to 0.8. The dense forest areas form about 3/4th of the crop in SCI areas.

10.5.03 Site Quality: Site quality governs the harvestable girth. It can be determined by average height of about 100 matured dominant Teak trees or its associates in the forest patches of consistent characteristics. However, site quality does not change much in time span of 20 years and hence the information from the previous plan has been used to delineate and digitise the various site quality classes.

Table No 10.4 Site Quality-wise Area distribution in SCI W.C.

(Area in ha.)

Site Quality	Ranges										Total
	Bhandara	Adyal	J/Kandri	Lakhandur	Lakhani	L.jhari	N.dongri	Pawani	Sakoli	Tumsar	
1	2	3	4	5	6	7	8	9	10	11	12
TIH	0	0	0	0	46.538	10.522	0	0	0	0	57.06
TIVA	0	0	0	0	0	0	0	0	0	0	0
TIVB	158.031	0	286.516	0	0	0	365.365	0	0	0	809.912
MIII	0	0	583.689	0	552.518	77.113	638.874	0	140.268	665.131	2657.593
MIVA	240.249	21.913	1863.849	33.000	355.294	2118.23	1034.012	327.552	691.8	817.331	7503.23
MIVB	634.57	304.467	1865.08	301.200	240.67	1049.375	1149.044	368.647	1633.992	655.903	8202.948
Total .	1032.85	326.38	4599.134	334.200	1195.02	3255.24	3187.295	696.199	2466.06	2138.365	19230.743
U_S	100.12	474.478	751.695	85.46	259.449	820.481	244.665	265.34	1001.95	317.218	4320.856
Plantation	42.500	0	52.000	0	210	97.700	0	0	24.000	0	426.200
Grass Land	0	0	0	0	0	0	0	0	0	0	0
Sub-Merge	135.578	18.615	70.367	0	0	90.685	4	4.856	37.857	228.102	590.06
Encroachment	28.716		27.067	0	0	0	176.597	0	0	0	232.38
Blank	291.266	52.171	50.178	0	26.378	79.201	163.155	57.447	144.985	77.831	942.612
Total	1631.03	871.644	5550.441	419.660	1690.847	4343.307	3775.712	1023.842	3674.852	2761.516	25742.851

10.5.04 Enumeration: Enumeration was carried out in 725 plots over an area of 25742.86 ha. Inventory works included complete enumeration of species and girth distribution of all trees, regeneration and recording of site quality and density. This data was used for girth class wise and basal area distribution of different species, which was further used for area allocation to various working circles. Analysis of the data collected from these sample plots is given in **Appendix - XXX**.



10.5.05 Regeneration: Data on regeneration status was collected along with enumeration of the crop. The seedlings were enumerated in the following three categories, as given in the Table 10.5. The data is analysed and used to devise prescriptions for regeneration of forest areas by both natural as well as artificial means. The focus is on tending of existing natural regeneration. The seedlings of seed origin are preferred over the regeneration through root stock. Plantation is proposed only as a supplementary activity limited to the extent to fill the deficiency in natural regeneration, on the degraded and blank areas (excluding natural blanks).

Table No. 10.5 Table Showing Status of Natural Regeneration in the SCI WC.

Range	Seedling (R1)	Sapling (R2)	Sapling (R3)	Total
	Up to 1 meter	1.0-3.0 meter	> 3 meter	
Adyal	1292.33	420.00	230.33	1942.67
Bhandara	1673.09	713.91	93.91	2480.91
Jamkandri	1879.92	909.50	291.50	3080.92
Pauni	2005.29	359.43	80.64	2445.36
Lakhani	2730.63	471.63	62.63	3264.88
Sakoli	1621.53	777.07	266.80	2665.40
Lendezari	1975.18	543.27	229.36	2747.82
Tumsar	1522.09	598.55	250.09	2370.73
Nakadongari	1283.44	654.67	377.00	2315.11
Lakhandur	0.00	0.00	0.00	0.00
Total	15983.50	5448.01	1882.26	23313.78
Average	1598.35	544.80	188.23	2331.38

10.6 Silvicultural System:

- SCI System prescribes removal of mature trees above the harvestable girth to create openings in the tree canopy, thereby, facilitates tree growth in the lower girth classes. It supports establishment of natural regeneration of Teak and other valuable light demander species. This system has advantages over, the clear felling and coppice systems, in its ability to address the issues related to the biodiversity conservation and maintenance of site conditions and Mixed and High Forest nature of the forest crops.
- Except Teak, forests of Bhandara Division support very few valuable species of good coppicing nature. Moreover, a significant part of these forests have been worked under Coppice Systems for 4 successive rotations leading to reduction in their coppicing vigour. In view of these reasons, coppice systems are not considered suitable for the future management of the forests of Bhandara Division.



- iii. In view to above, and to maintain the mixed composition and High Forest character of the forest crop and to achieve the objective of management, these forests are proposed to work under SCI working circle. Local demands of small wood can also be met from SCI coupes.
- iv. Forest areas containing dense pole crops will be thinned along with coupe working. Growth of naturally regenerated pole crop will be encouraged by the tending, cleaning operations and improvement felling as well as protection from fire and grazing.
- v. The natural regeneration will be given proper scientific treatments to regenerate the area.
- vi. The areas poor in natural regeneration will be artificially regenerated by Teak, miscellaneous species and Bamboo. Plantations will not be taken up in SCI areas unless a minimum 5 hectares of degraded area, having crown density less than 0.4, is available in an annual coupe.
- vii. There is a separate working Circle for the management of the Old Teak Plantations and thinnings are prescribed under this Working Circle. Thinning will be carried out in case of any old Teak plantation is left in the Old Teak Plantation Working Circle or any Miscellaneous Plantation suitable for thinning, along with the SCI coupe working.

10.7 Harvestable Girth: Harvestable girth for various important species, in SCI working circle, has been determined at maximum volume production as per the CAI & MAI curves in stem analysis exercises, carried out by the C.F Working Plan Nagpur during 2007. The details are given in the Table 10.6.

Table No. 10.6 Table showing the Harvestable Girth for Various Species in the Division:

Group	Species	Harvestable Girth
Group 1	Teak	135 cm. for quality III (If found)
		120 cm. for quality IV
Group 2	Ain, Bija, Haldu and Kalam.	135 cm for quality III(if found)
		120 cm.for site quality IV
Group 3	Dhaoda, Tiwas, Surya, Shisham, Rohan, Bhirra, Kasai, Mokha, Palas, Dhaman, Bhilawa, Chichwa, etc.	90 cm. for site quality IV
Group 4	Garadi, Lendia	45 cm for site quality IV
Group 5	Species protected from felling (Semal, Kullu, Beheda, Karai, etc. and all fruit trees)	No felling

10.8 Choice of Species:

10.8.01 Since Teak is the most valuable species and comes above all the miscellaneous timber species; it will be given top priority, wherever present.



The miscellaneous species to be favoured in the existing crop, in order of their priorities, are Bija, Saja, Shisham, Tinsa, Kalam, Haldu, Kasai, Dhaoda, Bhirra, Rohan, Lendia, Garadi and Mowai. However, in inferior areas with degraded soil, Rohan, Bhirra, Khair, Garadi and Lendia will be preferred. In the artificial regeneration, **Teak will be planted only in open areas with well drained soil**, and Khair and Rohan will be planted in inferior areas. Bamboo will be planted in all suitable soils but due precaution should be taken so that it should not suppress other valuable species. Besides this, edible fruit and flower yielding plants will be reserved from felling and will also be planted along with the timber species. In the plantation some shade bearing fruit trees like Ficus spp, Ber etc will also be planted for the benefit of wildlife. Some important MFP yielding species, like Kullu, Char, Mahua etc or as desired by the villagers, may also be planted to benefit the local population.

10.9 Felling Cycle: Felling cycle has been fixed at 20 years.

Felling Series and Annual Coupes: The entire area of this working circle has been divided into 14 Felling Series with an average area of 1839 ha. and each felling series is further divided into 20 coupes with an average area of 92 ha. **(Details in Appendix – XXXIV.)**

10.10 Yield Calculation: The yield is regulated by area.

10.10.01 The annual yield will be regulated by area by making coupes equi-productive in each felling series, as far as possible. Coupes of around 92 ha. each, will be laid down.

10.10.02 From the enumeration data of SCI WC of this working plan, the average number of stems per ha are calculated. For the purpose of yield, data of each species mentioned above is used. The data is as under:-

Table No.10.7 Table Showing Abstract of Enumeration Data.

Girth Class (cm)	Group-I Teak	Group-II Ain, Bija, Haldu, Kalam	Group-III Dhaoda, Khair, Bhirra, Chichwa, Salai, Mowai, Rohan, Shivan, Shisham, Tiwas, Surya etc.	Group-IV Lendia, Garadi	Total
15 - 30	15.14	29.570	55.300	69.900	169.91
31 - 45	8.26	17.840	32.370	34.620	93.09
46 - 60	4.39	10.670	21.350	14.800	51.21
61 - 75	2.13	7.140	13.680	6.080	29.03
76 - 90	1.28	6.170	9.280	2.560	19.29
91 - 105	0.74	3.880	5.670	0.820	11.11
106 - 120	0.43	2.100	3.200	0.350	6.08
121 - 135	0.24	1.190	1.300	0.090	2.82
136 & above	0.13	1.050	1.170	0.030	2.38
Total	32.74	79.610	143.320	129.250	384.92



10.10.03. Survival Percentage: The percentage of trees, that will be reaching the harvestable girth has, been calculated on the basis of number of trees that should have been in each girth class, if the present stock was evenly balanced. The expected number of trees in different girth classes in an evenly balanced growing stock is what is obtained from the law of **F.De Liocourt**.

10.10.04 F. De Liocourt's Law: This formula was used for the yield calculation in the previous working plan hence it has been adopted in this working plan too. The theory states that in a fully stocked selection forest i.e. the normal growing stock of the uneven aged forests, the number of stems falls off from one diameter class to the next higher diameter class in a geometrical progression with a constant ratio. This means that the percentage reduction in the stem number from one diameter class to the next is constant. Although the numerical value of the ratio varies from one forest to another, the general form of the distribution follows an exponential curve of decrease in number of trees as diameter increase is a fundamental characteristic of the uneven aged condition which provides the basis for the concept of uneven aged normally.

Thus, according to the law of **F.De Liocourt**, the number of trees in successive diameter or Girth classes represents a geometrical series of the form.

$$a, ar^{-1}, ar^{-2}, ar^{-3}$$

Where 'a' represents the number of trees in the lower diameter/girth class, ar^{-1} the number in the next higher diameter/girth class, ar^{-2} the number in the next higher diameter/girth class and so on and 'r' represents the common ratio of the geometrical progression. If the value of 'r' and the number of stems in any class are known, the whole series can be worked out and this would give the proportionate distribution of stems of an evenly balanced composition in an ideal selection forest.

The numerical values of 'r', which is the ratio of the geometric series, can easily be calculated if the stand table of such an ideal forest is available. By dividing the number of tree in a given diameter class by the number of trees in the next higher diameter class will give the value of 'r', which will be constant throughout all diameter/girth classes if the distribution is balanced. But in actual, such balanced distribution does not exist due to a number of reasons. In order to visualise an ideal distribution for a given actual distribution, the above law is applied. For a given stand table the value of 'r' and 'a' are obtained as follows:



A) Calculation of 'r'

'r' can be calculated by 3 methods. They are as follows:

a) The average (arithmetic mean) of the successive ratios. If a_1, a_2, \dots, a_9 are number of stems in 9 girth classes, then

$$r = \frac{1}{8} = \frac{a_1}{a_2} = \frac{a_2}{a_3} = \dots = \frac{a_8}{a_9}$$

b) Since $\frac{a_1}{a_2} = \frac{a_2}{a_3} = \dots = \frac{a_8}{a_9}$

and so $\frac{a_1 + a_2 + \dots + a_8}{a_2 + a_3 + \dots + a_9} = r$

c) Since $\frac{a_1}{a_2} = \frac{a_2}{a_3} = \dots = \frac{a_8}{a_9} = r$

and therefore $\frac{a_1}{a_2} = \frac{a_2}{a_3} = \frac{a_8}{a_9} = r$, or $r = \frac{a_1}{a_3} \cdot \frac{1}{8}$

The value of 'r' can be calculated from any of the three methods, mentioned above, but (a) and (b) involves all terms of the series to find out the average value, whereas the in last one only two terms are required, and so these two (a & b) are more appropriate.

Between (a) and (b), (a) includes ratio of higher girth classes, which contains fewer trees and so the chance of error is more and the estimate of 'r' may have more standard error, and therefore method (b) appears to be most appropriate one and the same is being applied in the subsequent calculation.

B) Calculation of the First Term of Geometrical Progression:

The sum of n terms of a G.P. is given as

$$S = a + ar^{-1} + ar^{-2} + ar^{-3} \dots + ar^{-(n-1)}$$

Where 'a' is the number of stems in the lower girth class.

Multiplying both sides by 'r' and subtracting it from the former, we get the following :

$$a = s (r^{n-1}) (r - 1) / (r^{n-1})$$

Here 'S' is the some of stems of all girth/dia classes which is known and 'r' has been calculated as above. Therefore, the value of 'a' can be



calculated. From these 'a' and 'r' the whole series of an ideal distribution for a given stem distribution can be found out. The same principle is applied hereafter to construct the table for different harvestable girth.

10.10.05 Yield Calculation for Group-I Species (Teak)

Table No. 10.8 Table Showing Average Annual Recruitment for Teak.
Harvestable girth 120 cms.

Girth Class (cm)	Stem per ha	Stem/ha as per De Liocourt's Law	% of survival	Stem/ha reaching harvestable siz (2 x 4/100)	Years required to pass over next girth class	Average annual recruitment 5/6
1	2	3	4	5	6	7
15 - 30	15.14	15.100	1.39	0.21	10	0.021 R1
31 - 45	8.26	8.160	2.57	0.21	10	0.021 R2
46 - 60	4.39	4.410	4.76	0.21	12	0.018 R3
61 - 75	2.13	2.380	8.82	0.19	13	0.015 R4
76 - 90	1.28	1.290	16.28	0.21	14	0.015 R5
91 - 105	0.74	0.700	30.00	0.22	15	0.015 R6
106 - 120	0.43	0.380	55.26	0.24	18	0.013 R7
121 - 135	0.24	0.210	100.00	0.24		
136 & above	0.13	0.110	100.00	0.13		
Total	32.74					

In the above table by **De Liocourt's formula**

$$\begin{aligned}
 \text{i) } r &= \frac{a_1 + a_2 + \dots + a_8}{a_2 + a_3 + \dots + a_9} \\
 &= \frac{15.14 + 8.26 + \dots + 0.13}{8.26 + 4.39 + \dots + 0.24} \\
 &= \frac{32.61}{17.6} = 1.85
 \end{aligned}$$

$$\begin{aligned}
 \text{and } S &= a_1 + a_2 + \dots + a_9 \\
 &= 15.14 + 8.26 + \dots + 0.13 \\
 &= 32.74
 \end{aligned}$$

$$\begin{aligned}
 \text{ii) } a &= s (r^{n-1}) (r - 1) / (r^n - 1) \\
 &= 32.74 (136.89)(0.85) / (253.25-1) \\
 &= 32.74 \times 116.36 / 252.25 \\
 &= 15.10 = \text{Recruitment in successive three felling series}
 \end{aligned}$$



Felling Cycle Total Recruitment

1) $18R_7 + 2R_6 = 0.234 + 0.03 = 0.264$

2) $13R_6 + 7R_5 = 0.195 + 0.105 = 0.300$

3) $7R_5 + 13R_4 = 0.105 + 0.195 = 0.300$

Realisable recruitment in successive three felling cycles

a) First Felling Cycle

$$\begin{aligned} \text{i) } R_{r_1} &= \frac{1}{2} \{0.264 - 18 (0.264 / 20 - 0.013) \} \\ &= \frac{1}{2} \{0.264 - 18 (0.0132 - 0.013) \} \\ &= \frac{1}{2} (0.264 - 0.0036) \\ &= 0.1302 \end{aligned}$$

ii) Available recruitment R_{a_1}

$$\begin{aligned} R_{a_1} &= 0.264 - 0.1302 \\ &= 0.134 \end{aligned}$$

b) Second Felling Cycle

$$\begin{aligned} \text{i) } R_{r_2} &= \frac{1}{2} \{0.300 - 13(0.300 / 20 - 0.015) \} \\ &= \frac{1}{2} \{0.300 - 13(0.015 - 0.015) \} \\ &= \frac{1}{2} (0.300 + 0) = 0.150 \end{aligned}$$

ii) Available recruitment R_{a_2}

$$R_{a_2} = 0.300 - 0.150 = 0.150$$

c) Third Felling Cycle

$$\begin{aligned} \text{i) } R_{r_3} &= \frac{1}{2} \{0.300 - 7 (0.300 / 20 - 0.015) \} \\ &= \frac{1}{2} \{0.300 - 7(0.015 - 0.015) \} \\ &= \frac{1}{2} (0.300 + 0.00) \\ &= \frac{1}{2} (0.300) = 0.150 \end{aligned}$$

ii) Available recruitment R_{a_2}

$$R_{a_3} = 0.300 - 0.150 = 0.150$$

Table No. 10.9 Table Showing the Net Realisable Recruitment

Felling cycle	Total Recruitment	i) Realisable Accumulation	ii) Net Realisable Recruitment	Annual average realisable	Annual average vol. in m ³ .
1	0.264	0.130	0.130	0.0065	0.0042
		0.134			
2	0.300	0.150	0.284	0.0142	0.00966
		0.150			
3	0.300	0.150	0.300	0.0150	0.0102
		0.150			



Yield in First Three Felling Cycles:

The existing number of stems per ha above 120 cm girth is 0.370 which will be liquidated in first three cycles. The annual liquidation will be 0.0061 stems/ha or 0.00422 m³/ha. Thus the annual average yield in the first, second and third cycle will be 0.0086 m³, 0.0139 m³ and 0.0144 m³ per ha respectively. The total area of the Working Circle is 25742.851 ha. and the submergence area is 677.777 ha., as there will be no yield from the submergence area. Hence for yield calculation the 25742.851 – 677.777 = 25065.074 ha area should be used. Reserving 50% as the future safeguard, the utilizable yield in three cycles will be 0.0043 m³, 0.0067 m³ and 0.0072 m³ respectively, and the estimated annual yield for the whole working cycle for three cycles will be 107.780 m³, 167.936 m³, 180.468 m³ respectively.

10.10.06 Yield Calculation for Group-II Species (Ain, Bija, Haldu, Kalam)

Table No. 10.10 Table Showing Annual Average Recruitment

Harvestable girth 120cms.

Girth Class (cm)	Stem per ha.	Stem/ha as per DeLicourt's Law	% of survival	Stem/ha reaching harvestable size (2 x4/ 100)	Years required to pass over next girth	Average annual recruitment
15 - 30	29.570	29.410	4.25	1.257	9	0.1397 R1
31 - 45	17.840	18.730	6.67	1.900	10	0.119 R2
46 - 60	10.670	11.930	10.48	1.118	10	0.1118 R3
61 - 75	7.140	7.600	16.45	1.175	11	0.1068 R4
76 - 90	6.170	4.840	25.83	1.594	12	0.1328 R5
91 - 105	3.880	3.080	32.89	1.276	13	0.0982 R6
106 - 120	2.100	1.960	63.78	1.400	14	0.1 R7
121 - 135	1.190	1.250	100.00	1.190		
136 & above	1.050	0.800	100.00	1.050		
Total	79.61	79.600				

Stock in hand 2.33

In the above table by **De Liocourt's** formula

$$\begin{aligned}
 \text{i) } r &= \frac{a_1 + a_2 + \dots + a_8}{a_2 + a_3 + \dots + a_9} \\
 &= \frac{29.57 + 17.84 + \dots + 1.19}{17.84 + 10.67 + \dots + 1.05} \\
 &= \frac{78.56}{50.04} = 1.57
 \end{aligned}$$

$$\begin{aligned}
 \text{and } S &= a_1 + a_2 + \dots + a_9 \\
 &= 29.57 + 17.84 + \dots + 1.05 = 79.61
 \end{aligned}$$



$$\begin{aligned}
 \text{ii) } a &= s (r^{n-1}) (r - 1) / (r^n - 1) \\
 &= 79.61 (36.92) (0.57) / (57.96 - 1) \\
 &= 79.61 \times 21.04 / 56.96 \\
 &= 29.41
 \end{aligned}$$

Recruitment in successive three felling series

Felling cycle	Total recruitment
1) 14R7 + 6R6	= 1.4 + 0.5892 = 1.9892
2) 7R6 + 12R5 + R4	= 0.6874 + 1.5936 + 0.1068 = 2.3878
3) 10R4 + 10R3	= 1.068 + 0.1118 = 2.186

Realisable recruitment in successive three felling cycles.

a) First Felling Cycle

$$\begin{aligned}
 \text{i) } R_{r_1} &= \frac{1}{2} \{1.9892 - 14 (1.9892 / 20 - 0.1)\} \\
 &= \frac{1}{2} \{1.9892 - 14 (0.09946 - 0.1)\} \\
 &= \frac{1}{2} (1.9892 + 0.00756) \\
 &= 0.9984
 \end{aligned}$$

ii) Available recruitment Ra_1

$$\begin{aligned}
 Ra_1 &= 1.9892 - 0.9984 \\
 &= 0.9908
 \end{aligned}$$

b) Second Felling Cycle

$$\begin{aligned}
 \text{i) } R_{r_2} &= \frac{1}{2} \{2.3878 - 7 (2.3878 / 20 - 0.0982)\} \\
 &= \frac{1}{2} \{2.3878 - 7 (0.1194 - 0.0982)\} \\
 &= \frac{1}{2} (2.3878 - 0.1484) \\
 &= 1.1197
 \end{aligned}$$

ii) Available recruitment Ra_2

$$\begin{aligned}
 Ra_2 &= 2.3878 - 1.1197 \\
 &= 1.2681
 \end{aligned}$$

c) Third Felling Cycle

$$\begin{aligned}
 \text{i) } R_{r_3} &= \frac{1}{2} \{2.186 - 10 (2.186 / 20 - 0.1328)\} \\
 &= \frac{1}{2} \{2.186 - 10 (0.1093 - 0.1328)\} \\
 &= \frac{1}{2} (2.186 + 0.235) = 1.211
 \end{aligned}$$

ii) Available recruitment Ra_3

$$\begin{aligned}
 Ra_3 &= 2.186 - 1.211 \\
 &= 0.975
 \end{aligned}$$



Table No. 10.11 Net Realisable Recruitment:

Total Recruitment	i) Realisable Accumulation	ii) Net Realisable Recruitment	Annual average realisable	Annual average volume in m ³ .
1.9892	0.9984	0.9984	0.0500	0.0375
	0.9908			
2.3878	1.1197	2.1105	0.1055	0.0791
	1.2681			
2.186	1.211	2.4791	0.1240	0.0930
	0.975			

Yield in First Three Felling Cycles:

The existing number of stems per ha above 120 cm girth is 2.24 which will be liquidated in first three cycles. The annual liquidation will be 0.037 stems/ha or 0.028 m³/ha. Thus the annual average yield in the first, second and third cycle will be 0.0655 m³, 0.1017m³ and 0.121 m³per ha respectively. The total area of the Working Circle is 25742.851 ha. and the submergence area is 677.777 ha., as their will be no yield from the submergence area. Hence for yield calculation the 25742.851 – 677.777 = 25065.074 ha area should be used.

Reserving 50% as the future safeguard, the utilizable yield in three cycle will be 0.033 m³, 0.054 m³ and 0.061 m³ respectively, and the estimated annual yield for the whole working cycle three cycles will be 827.145 m³, 1353.51 m³, 1528.965 m³ respectively.

10.10.07 Yield Calculation for Group-III Species (Dhaoda, Khair, Rohan, Shiwan, Shisham, Salai, Mowai, Surya)

Harvestable girth 90 cms.

Table No. 10.12 Table Showing Annual Average Recruitment;

Girth Class (cm)	Stem per ha.	Stem/ha as per DeLicourt's Law	% of survival	Stem/ha reaching harvestable size (2 x4/100)	Years required to pass over next girth class	Average annual recruitment
1	2	3	4	5	6	7
15 - 30	55.300	55.050	9.25	5.12	9	0.569R1
31 - 45	32.370	34.190	14.89	4.82	10	0.482 R2
46 - 60	21.350	21.240	23.96	5.12	11	0.465 R3
61 - 75	13.680	13.190	38.59	5.28	12	0.440 R4
76 - 90	9.280	8.190	62.15	5.77	18	0.321 R5
91 - 105	5.670	5.090	100.00	5.67		
106 - 120	3.200	3.160	100.00	3.2		
121 - 135	1.300	1.960	100.00	1.3		
136 & above	1.170	1.220	100.00	1.17		
Total	143.32	143.290				

Stock in hand 11.34



In the above table by De Liocourt's formula

$$\begin{aligned}
 \text{i) } r &= \frac{a_1 + a_2 + \dots + a_8}{a_2 + a_3 + \dots + a_9} \\
 &= \frac{55.30 + 32.37 + \dots + 1.30}{32.37 + 21.35 + \dots + 1.17} \\
 &= \frac{142.15}{88.02} = 1.61
 \end{aligned}$$

$$\begin{aligned}
 \text{and } S &= a_1 + a_2 + \dots + a_9 \\
 &= 55.30 + 32.37 + \dots + 1.17 \\
 &= 143.32
 \end{aligned}$$

$$\begin{aligned}
 \text{ii) } a &= s (r^{n-1}) (r - 1) / (r^n - 1) \\
 &= 143.32 (45.14) (0.61) / (72.68 - 1) \\
 &= 143.32 \times 27.53 / 71.68 = 55.05
 \end{aligned}$$

Recruitment in successive three felling series

Felling Cycle	Total Recruitment
1) 18R5 + 2R4	= 5.778 + 0.88 = 6.658
2) 10R4 + 10R3	= 4.40 + 4.65 = 9.05
3) R3 + 10R2 + 9R1	= 0.465 + 4.82 + 5.121 = 10.406

Realisable recruitment in successive three felling cycles.

a) First Felling Cycle

$$\begin{aligned}
 \text{i) } R_{r1} &= \frac{1}{2} \{6.658 - 18 (6.658 / 20 - 0.321)\} \\
 &= \frac{1}{2} \{6.658 - 18 (0.3329 - 0.321)\} \\
 &= \frac{1}{2} (6.658 - 0.2142) \\
 &= 3.2219
 \end{aligned}$$

ii) Available recruitment Ra_1

$$\begin{aligned}
 Ra_1 &= 6.658 - 3.2219 \\
 &= 3.4361
 \end{aligned}$$



b) Second Felling Cycle

$$\begin{aligned}
 \text{i) } R r_2 &= \frac{1}{2} \{9.05 - 10 (9.05 / 20 - 0.440)\} \\
 &= \frac{1}{2} (9.05 - 10 (0.453 - 0.440)) \\
 &= \frac{1}{2} (9.05 - 0.13) = 4.46
 \end{aligned}$$

ii) Available recruitment Ra_2

$$\begin{aligned}
 Ra_2 &= 9.05 - 4.46 \\
 &= 4.59
 \end{aligned}$$

c) Third Felling Cycle

$$\begin{aligned}
 \text{i) } R r_3 &= \frac{1}{2} \{10.406 - 10 (10.406 / 20 - 0.465)\} \\
 &= \frac{1}{2} \{10.406 - 10 (0.520 - 0.465)\} \\
 &= \frac{1}{2} (10.406 - 0.55) \\
 &= 4.928
 \end{aligned}$$

ii) Available recruitment Ra_3

$$Ra_3 = 10.406 - 4.928 = 5.478$$

Table No.10.13 Table Showing Net Realisable Recruitment:

Felling cycle	Total Recruitment	i) Realisable ii) Accumulation	Net Realisable Recruitment	Annual average realisable	Annual average volume in m ³ .
1	6.658	3.222	3.222	0.1611	0.0644
		3.436			
2	9.05	4.460	7.896	0.3948	0.1579
		4.590			
3	10.406	4.928	9.518	0.4759	0.1904

Yield in First three Felling Cycles:

The existing number of stems per ha above 90 cm girth is 11.34 which will be liquidated in first three cycles. The annual liquidation will be 0.189 stems/ha or 0.0756 m³/ha. Thus the annual average yield in the first, second and third cycle will be 0.140 m³, 0.234 m³ and 0.266 m³ per ha respectively. The total area of the Working Circle is 25742.851 ha. and the submergence area is 677.777 ha., as there will be no yield from the submergence area. Hence for yield calculation the 25742.851 – 677.777 = 25065.074 ha area should be used.

Reserving 50% as the future safeguard, the utilizable yield in three cycle will be 0.070 m³, 0.117 m³ and 0.133 m³ respectively, and the estimated annual yield for the whole working cycle three cycles will be 1754.55 m³, 2932.605 m³, 3333.645 m³ respectively.



10.10.08 Yield Calculation for Group-IV Species (Lendia, Garadi)

Harvestable girth 45 cms.

Table No. 10.14 Table Showing Annual Average

Girth Class (cm)	Stem per ha.	Stem/ha as per De Liocourt's Law	% of survival	Stem/ha reaching harvestable size (2 x4/100)	Years required to pass over next girth class	Average annual recruitment
15 - 30	69.900	70.025	21.04	14.707	14	1.0505 R1
31 - 45	34.620	32.122	45.87	15.880	19	0.8358 R2
46 - 60	14.800	14.735	100.00	14.080		
61 - 75	6.080	6.759	100.00	6.080		
76 - 90	2.560	3.101	100.00	2.560		
91 - 105	0.820	1.422	100.00	0.820		
106 - 120	0.350	0.652	100.00	0.350		
121 - 135	0.090	0.299	100.00	0.090		
136 & above	0.030	0.137	100.00	0.030		
Total	129.25	129.252				

Stock in hand 24.73

In the above table by **De Liocourt's** formula

$$\begin{aligned}
 \text{i) } r &= \frac{a_1 + a_2 + \dots + a_8}{a_2 + a_3 + \dots + a_9} \\
 &= \frac{69.90 + 34.62 + \dots + 0.09}{34.62 + 14.80 + \dots + 0.03} \\
 &= \frac{129.22}{59.35} = 2.18
 \end{aligned}$$

$$\begin{aligned}
 \text{And } S &= a_1 + a_2 + \dots + a_9 \\
 &= 69.90 + 34.62 + \dots + 0.03 \\
 &= 129.25
 \end{aligned}$$

$$\begin{aligned}
 \text{ii) } a &= s (r^{n-1}) (r - 1) / (r^n - 1) \\
 &= 129.25 (510.10) (2.18-1) / (1112.009 - 1) \\
 &= 129.25 \times 601.918 / 1111.009 \\
 &= 70.025
 \end{aligned}$$

Recruitment in successive three felling series

Felling cycle Total recruitment

$$1) 19R2 + R1 = 15.8802 + 1.505 = 16.9307$$

$$2) 13R1 + 7R2 = 13.6565 + 5.8506 = 19.5071$$



$$3) 12R_2 + 8R_1 = 10.296 + 8.404 = 18.4336$$

Realisable recruitment in the successive three felling cycles.

a) First Felling Cycle

$$\begin{aligned} i) R_{r1} &= \frac{1}{2} \{16.9307 - 19 (16.9307 / 20 - 0.8358)\} \\ &= \frac{1}{2} \{16.9307 - 19 (0.8465 - 0.8358)\} \\ &= \frac{1}{2} \{16.9307 - 0.2040\} \\ &= 8.3634 \end{aligned}$$

ii) Available recruitment R_{a1}

$$\begin{aligned} R_{a1} &= 16.9304 - 8.3634 \\ &= 8.5673 \end{aligned}$$

b) Second Felling Cycle

$$\begin{aligned} i) R_{r2} &= \frac{1}{2} \{19.5071 - 13 (19.5071 / 20 - 1.0505)\} \\ &= \frac{1}{2} \{19.5071 - 13 (0.9754 - 1.0505)\} \\ &= \frac{1}{2} (19.5071 + 0.9763) \\ &= 10.2417 \end{aligned}$$

ii) Available recruitment R_{a2}

$$\begin{aligned} R_{a2} &= 19.5071 - 10.2417 \\ &= 9.2654 \end{aligned}$$

c) Third Felling Cycle

$$\begin{aligned} i) R_{r3} &= \frac{1}{2} \{18.4336 - 12 (18.4336 / 20 - 0.8358)\} \\ &= \frac{1}{2} \{18.4336 - 12 (0.9217 - 0.8358)\} \\ &= \frac{1}{2} (18.4336 - 1.306) = 8.7015 \end{aligned}$$

ii) Available recruitment R_{a3}

$$\begin{aligned} R_{a3} &= 18.4336 - 8.7015 \\ &= 9.7321 \end{aligned}$$

Table No. 10.15 Table Showing Net Realisable Recruitment:

Felling cycle	Total Recruitment	i) Realisable Accumulation	ii) Net Realisable Recruitment	Annual average realisable	Annual average volume in m ³ .
1	16.9307	8.3634	8.3634	0.4317	0.0270
		8.5673			
2	19.5071	10.2417	18.809	0.940	0.0589
		9.2654			
3	18.4336	8.7015	17.9669	1.113	0.0697
		9.7321			



Yield in First Three Felling Cycles:

The existing number of stems per ha above 45 cm girth is 24.73 which will be liquidated in first three cycles. The annual liquidation will be 0.412 stems/ha or 0.026 m³/ha. Thus the annual average yield in the first, second and third cycle will be 0.053 m³, 0.085 m³ and 0.096 m³ per ha respectively.

The total area of the Working Circle is 25742.851 ha. and the submergence area is 677.777 ha., as there will be no yield from the submergence area. Hence for yield calculation the 25742.851 – 677.777 = 25065.074 ha area should be used.

Reserving 50% as the future safeguard, the utilizable yield in three cycle will be 0.027 m³, 0.043m³ and 0.048 m³ respectively, and the estimated annual yield for the whole working cycle three cycles will be 676.755 m³, 1077.795 m³, 1203.12 m³ respectively.

The total yield for all four harvesting girth classes will be as under:

Table No.10.16 Table Showing Total Annual Yield for Three Felling Cycles

Felling cycle	Per ha annual yield in cum					Annual average estimated yield for SCI wc in m ³
	Harvestable Girth					
	120 cm (Teak)	120 cm (misc)	90 cm	45 cm	Total	
1	0.0043	0.033	0.070	0.027	0.1343	3366.23
2	0.0067	0.054	0.117	0.043	0.2207	5531.846
3	0.0072	0.061	0.133	0.048	0.2492	6246.198

The above table shows that the yield will be increasing progressively in successive felling cycles provided the crop is protected effectively from various damages.

10.11 Agency of Harvesting: Demarcation of coupes and marking of trees for felling will be carried out departmentally to meet the silvicultural and technical requirements. Felling of trees, logging and haulage of the felled material, in most of the coupes will be carried out by FLCS and in some coupes it will be done by the Forest department, as per the directives issued by the Govt. Silvicultural operations like cut-back operation, cleaning, thinning etc. and other regeneration activities after main felling of the coupes will be carried out under strict supervision of the Forest Department.

The Forest department will examine the legal provisions in the “**The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act.2006**”, before allotting the coupes to the existing Forest Labour Co-operative Societies. The opinion of the villages should be considered as per the provisions of the Act. JFM committees should also be taken into confidence to encourage the participatory system of forest management.



10.12 Coupe Demarcation, Preparation of Treatment Maps and Marking Techniques:

10.12.01 Demarcation: The coupe demarcation, preparation of treatment maps and marking will be carried out as per the prescriptions mentioned in the chapter of Miscellaneous Regulations.

The main annual coupes shall be demarcated one year in advance along with coupes due for Cleaning and Thinning. The coupe shall be divided into four sections i.e. A, B, C and D, to effectively control the various coupe operations. A particular section will be demarcated only if the area is more than 5 ha.

10.12.02 Preparation of Treatment Maps: Treatment maps shall be prepared by the RFO and verified by the ACF. All the treatment type areas shall be shown distinctively on the map, including the areas suitable for planting, areas having adequate promising natural regeneration and areas prone to soil erosion.

The Treatments Proposed for Various Areas:

A-Type Areas: Protection Areas

- An area having more than 25° slopes and more than a quarter hectare in extent must be shown on the map as the **A1-type i.e. steep slope**. Smaller areas of steep slope, even if not marked on the map, will also receive the prescribed treatment.
- 20 meter wide buffer along streams will be measured from the bank or the high flood mark. Similar buffer of the **A2-type** areas will be marked along all water bodies and Nallas.
- The **A3-type** areas are excessively erosion prone and include seasonally flooded areas.

Treatments Recommended for A-Type Areas:

- i) Soil and Moisture Conservation:** Gully plugging and other soil and moisture conservation works, as described in the chapter of Miscellaneous Regulations shall be taken in the A3-type areas. Such works may be taken up in the A2-type areas, if not detrimental to the riparian ecosystem.
- ii) Bush Sowing:** Bush sowing of *Khair*, *Neem*, *Maharukh*, *Sandal*, *Babul* and other local seeds is prescribed. Any one species should not constitute more than one-fourth of the disseminated seeds.
- iii) Stake Planting:** In the areas around water bodies and along watercourses(A2-type) , stakes of *Ficus* spp., *Pangara*, *Salai* or other suitable species will be planted at six-meter interval, and tussocks of *Khas* grass will be planted on suitable sites, as per Misc. Regulations.
- iv) Plantation:** Plantation of suitable spp. may be taken, if necessary and an area not less than 5 ha. is available.



- iv) Harvesting Prohibited:** Harvesting of standing trees (dead or alive) is strictly prohibited in the A-type areas. The marketable down logs of valuable species such as *Teak*, *Shisham*, *Bija*, *Haldu* and *Tiwas* may be extracted.

B-Type Areas: Under-stocked & Blank Areas: Under stocked areas can be categorised into 2 types:

- **B1-type:** Open forests (density < 0.4) with Natural Regeneration (600 or more saplings per hectare)
- **B2-type:** Open forests (density < 0.4) without Natural Regeneration (saplings less than 600).

Treatments Recommended for B-Type Areas: Preference will be given to natural regeneration and proper treatment will be given to the crop considering the existence of seedlings or rootstock in the areas.

Tending of Natural Regeneration of valuable species in the B- type will be carried out as follows:

A. Natural Regeneration Management in B1-type Areas: Following treatments are prescribed for B1-type areas:

i. Tending of Natural Regeneration (of seed origin): All seedlings and saplings (of seed origin) of valuable species, more than 60 cm. in height, will be nursed as future crop. Spacing operations, if required, will be carried out to leave nearly 400 saplings per hectare at an average of 5 metre spacing. Spacing out operation will be in favour of valuable species and species rarely found in the area. The natural regeneration shall be assisted and encouraged by soil working and mulching around them, in the following manner.

- a) First Year Operations:** Weeds in one-meter diameter around saplings of valuable species should be cleared during the first week of July. Uprooted weed, grasses and leaf-litter should be mixed in the upper layer of soil as the organic mulch and facilitate loosening and aeration of the soil by worms and insects. One soil working should be carried out in October.
- b) Second year operations:** The soil working in October will be repeated in the following year. However, one scrap weeding of one-meter diameter should be carried out in the first week of August around the shoots of seedling coppice within the rootstock management area.
- c) Third year operations:** Singling of coppice shoots, management of damaged and malformed saplings, climber cutting and shrub clearance should be repeated as third year operations.

ii. Singling of Coppice Shoots: One healthy and promising coppice shoot will be retained on the stumps and the rest will be removed. Such coppice shoots should also be close enough to the ground so



that it will not topple after gaining volume and weight and would be able to subsequently develop root system of its own. However, coppice shoots interfering with promising saplings of seed origin or coppice of valuable species shall be removed.

- iii. **Coppice Management of Damaged and Malformed Saplings:** The saplings and poles of up to 45 cm GBH having one third of the stem damaged and malformed shall be coppiced by cutting flush to the ground. Such coppicing, however, should not expose the ground, causing erosion and leading to soil loss. Poles having at least 2.50 meter of clean bole will not be treated as malformed.

B. Artificial Regeneration (Plantations) in B2-Type Areas: Plantations will not be taken up in SCI areas unless a minimum of 5 hectares of open area, having crown density less than 0.4, is available in an annual coupe. Such suitable sites of the B-type areas may be brought under the plantations. The choice of species will be decided as per the site. Teak and valuable miscellaneous spp. should be given preference in the plantation. Bamboo may be planted depending upon the site. Stump planting of Teak should be taken only in well drained areas with crown density less than 0.2. All planting operations and subsequent operations should follow the guidelines for planting operations described in the chapter of Miscellaneous Regulations.

C. Soil and Moisture Conservation Works: Required soil and moisture conservation works will be carried out as mentioned in the miscellaneous regulations. CCT should only be taken if it is necessary and the estimates are approved by the CCF, Nagpur.

C-Type Areas: Congested Pole Crop: It includes groups of naturally grown poles, having 15 to 45 cm GBH.

Treatments Recommended:

Thinning: Thinning of congested pole crops will be carried out to maintain an average spacing of one-third of the crop height in such patches. The post-thinning crop should have basal area and number as close as possible to the relevant stand or yield table for that site quality. Detailed guidelines for thinning have been included in Chapter of Miscellaneous Regulations. Poles of vigorously growing non-Teak species should be preferred for retention if Teak is more than 50 percent of the crop in stocking.

D-Type Areas: Well-Stocked Areas:

Treatments Recommended in D Type Areas

- a. Main felling is concentrated in the areas having density 0.4 or over and showing adequate regeneration of 400 or above established seedlings.
- b. Plantation is not proposed in this area.



The following operations are recommended:

- i. **Enumeration in Annual Coupes:** Species and girth-class of all trees above harvestable girth class and approach class are prescribed to be recorded in 15 cm. girth class for enumeration. The enumeration will be carried out in a 100 m. X 100 m. grid with a base line.
- ii. **Harvesting:** 50% of available matured trees above harvestable girth are prescribed for harvesting. However hollow Teak trees above 75cm girth are prescribed to be harvested. The harvesting will start from higher girth class to lower girth class. Hollow trees will be harvested first on priority and then other sound Teak trees, subject to their silvicultural availability. The opening created by harvesting are to be regenerated naturally. Well-formed and vigorous seed origin trees will be preferred for retention. To avoid the over felling of valuable species, like Teak, Bija etc., removal of trees will be proportionate to the number of trees of that species found in the coupe.
- iii. **B-Grade Thinning:** If the congestion is expected to persist in some patches after the harvesting, the B-grade thinning in the same girth class will be carried out in such patches. *B-grade or moderate thinning is defined as removal of dead, dying, diseased, suppressed, defective dominated stems and whips in this order.* Removal of inferior individuals will start from suppressed class and then to some of the dominated class of the crop. Advanced growth having too many branches not desirable to be pruned or lopped, may also be removed.
- iv. **Tending of Natural Regeneration:** Singling and spacing out will be carried out among saplings of Teak and other valuable species listed in the section for the rootstock management. Spacing operations should leave nearly 400 saplings per hectare. The natural regeneration present should be encouraged by soil working and mulching around them in accordance with the guidelines for the rootstock management described in this chapter.

10.12.03 Marking Techniques: Marking will be done along with the work of coupe demarcation, one year in advance of the main felling.

Marking technique and prescriptions described in the chapter of the Miscellaneous Regulations shall be followed, with required modifications described in the following paragraphs.

- i. Marking shall be carried out under the close supervision of the RFO and under guidance of ACF concerned. DCF shall himself inspect the coupes to ensure proper marking and to guard against excessive marking, if any.
- ii. The following rules shall be observed strictly for marking in various treatments type areas.



A- Type Areas (Protection Areas): No tree shall be marked for felling.

B-Type Areas (Under Stocked Areas):

1. All dead and malformed trees, retaining 2 dead trees/ha., as snags and dens for nesting and resting of wildlife, shall be marked.
2. All live high stumps shall be marked.
3. All multiple coppice poles; retaining only one, the most promising / stool, shall be marked.
4. **All NTFP trees, fruit bearing trees and trees useful for wild life are to be reserved.**

C-Type Areas (Groups of Young Poles):

1. The congested pole crop shall be marked for thinning to maintain a spacing equal to 1/3rd. of the crop height and/or to bring down stem number as per the yield table.
2. All high stumps, dead and malformed poles shall be marked for harvesting.
3. Unwanted undergrowth interfering or likely to interfere, the seed based NR of Teak and other valuable species, shall be removed.
4. **All NTFP trees, fruit bearing trees and trees useful for wild life are to be reserved.**

D-Type Areas (Well-stocked Areas):

1. All Teak (group I), Ain, Bija, Haldu & Kalam (group II) and the group III & IV (listed species), trees above the harvestable girth and approach class are prescribed to be enumerated in 15 cm girth-classes, before marking.
2. All hollow Teak trees above 75 cm girth are to be marked for felling. Felling marking is prescribed to proceed from highest girth-class to lower girth-classes; and no trees, except hollow trees, shall be marked for felling unless silviculturally available. Trees of seed origin shall be preferred for retention.
3. All edible fruit bearing species, such as, *Mahua*, *Char*, *Tendu*, *Aonla*, *Sitaphal*, *Chinch*, *Bel*, *Hirida*, *Beheda* etc, NTFP species such as *Kullu*, *Semal*, etc. and all trees useful for wild life , shall be reserved against felling.
4. All dead and malformed trees, retaining 2 dead trees per hectare, shall be marked for felling. To avoid excessive felling it is prescribed that malformed trees having straight clear bole exceeding 2.5 metre height from ground level shall not be marked for felling.
5. All live high stumps and all but one vigorously growing coppice pole per stool shall be marked for felling.



6. The marking of Bija, Shisham, Haldu and Tiwas will be done only in the areas where adequate established natural regeneration of these species is found.

Malformed Trees: *A tree is malformed when it is defective or abnormal either in crown or bole, which include conditions like, slag headness, crookedness, gnarls, twist or constriction by climbers beyond recoupment etc.*

Tending of Natural Regeneration: *Taking care of the Natural Regeneration, both of seed origin as well as coppice, and nursing them to future healthy matured crop. This operation includes: CBO, Singling of coppice on the stump, spacing out of young saplings, de-budding & branch cutting of saplings, cleaning & soil working for natural seedlings of desired species. It does not include the silvicultural thinning of old plantations.*

10.13 Soil and Moisture Conservation: The soil and moisture conservation works will be taken up along with marking operation and completed before on set of monsoon in the next financial year. The soil and moisture conservation works will include gully plugging and nala bunding etc. These works will be taken up after preparation of a detailed treatment map of the area and model of soil and moisture conservation measures duly sanctioned by the competent authority. **As breaking of soil is not advisable in the forest, Continuous Contour Trenches/Staggered Contour Trenches should be taken only if it is necessary. The estimates of these trenches should be examined and approved by the Chief Conservator of forests, Territorial, Nagpur.**

10.14 Methods of Regeneration:

- Natural Regeneration, including rootstock management, is prescribed to be given preference over plantations. The areas with promising seedling of seed origin and rootstock patches shall be identified and marked on the treatment map. The treatment, as prescribed above, shall be given to such areas. Tending operations as prescribed for natural regeneration in the B-type areas will be taken up with the coupe operations.
- Plantations shall be taken only in the B-type and A-type areas, (except natural blanks) having inadequate NR in a patch of a minimum of 5 ha area. For plantations, Plantation Guidelines shall be followed.
- Bamboo plantations shall be taken in suitable areas in such a way that it does not suppress the valuable light demanding species like Teak.
- Stump planting of Teak should only be taken in the areas with well drained soil and crown density less than 0.2. The remaining plantation area will be brought under the mixed species plantations using suitable species like Shiwan, Shisham, Bija, Khair, Mahrukh,



Kinhi, Semal, Sisso, Babul and fruit trees (Ficus spp. Ber etc for wildlife).

10.15 Subsidiary Silvicultural Operations:

- **Cutback Operations:** Cutback operations shall be carried out, in the next year of coupe working in the annual coupes. **(Appendix- XXXIV.)** All the left over marked trees during the main coupe operations shall be removed. Such trees, if less than 2 percent of original marking, can be felled after inspection of the Range Forest Officer. Deputy Conservator of Forests may sanction felling up to 5 percent of the original marking, and a higher proportion would require prior permission of the Chief Conservator of Forests (Territorial), Nagpur. All trees damaged during the main coupe felling shall be marked for removal as well as multiple coppice shoots and poles shall be reduced to one per stool. All newly risen coppice shoots shall be removed to encourage establishment of seedling regeneration.
- **Cleaning** - Cleaning in the 6th year from the main felling will be done. All areas of the natural regeneration, tending, rootstock management and plantations shall be recorded in the divisional notebook and shall be cleaned. Unwanted undergrowth interfering or likely to interfere with the growth of NR of Teak and other valuable species shall be cut. Climber cutting, shrub clearance, dressing of high stumps, extraction of marketable down logs should be carried out in the entire coupe. Coppicing of damaged and malformed saplings and singling of coppice shoots shall be carried out. All newly risen Teak coppice shoots shall be removed. Established seedling regeneration of Teak and other miscellaneous species shall be spaced out suitably. Spacing of dense growth will follow the stand table of the concerned species. In absence of the stand table, thumb-rule of keeping the spacing at one-third of the average height will be followed.
- **Thinning** - Thinning is prescribed in the 11th. year of main felling. It will be carried out in patches of dense pole crop by maintaining average spacing of one-third of the crop height. The post-thinning crop should have basal area and number as close to the relevant stand or yield table for that site quality. Poles of vigorously growing non-Teak species should be preferred for retention so long as not less than 50 percent of the crop is dominated by Teak.

10.16 Other Regulations: Protection from fire and grazing is essential for the success of natural and artificial regeneration. All annual coupes shall remain closed to grazing; and shall be provided strict fire protection, till completion of the 6th year coupe cleaning operations.



Chapter XI

IMPROVEMENT WORKING CIRCLE

11.1 General Constitution of the Working Circle : Forest areas capable of producing medium to large-sized timber, poles and fuel wood but not considered fit for harvesting due to preponderance of young crop has been included in this working circle. The Improvement Working Circle (IWC) covers an area of 24083.454 hectares, comprising 20652.348 ha of Reserved Forests and 3431.106 ha of Protected Forests. It constitutes 25.95 % of the total forest area of the division.

Based on the results of Enumeration data, satellite imageries and existing stock map details, following criteria is proposed for allocation of compartments to the I.W.C. area.

- Areas with young crop and damaged crop, requiring spacing out (thinning) and improvement felling to develop it as future SCI crop.
- Majority of old IWC Working Circle (CWR Working Circle areas of old working plans) in the previous plan with young and pole crops, are included.
- Some Compartments of SCI, FFP and Miscellaneous WC of the previous plan, have been found suitable for IWC, have been included in this Working Circle .(**Details in Appendix- XXXVI.**)



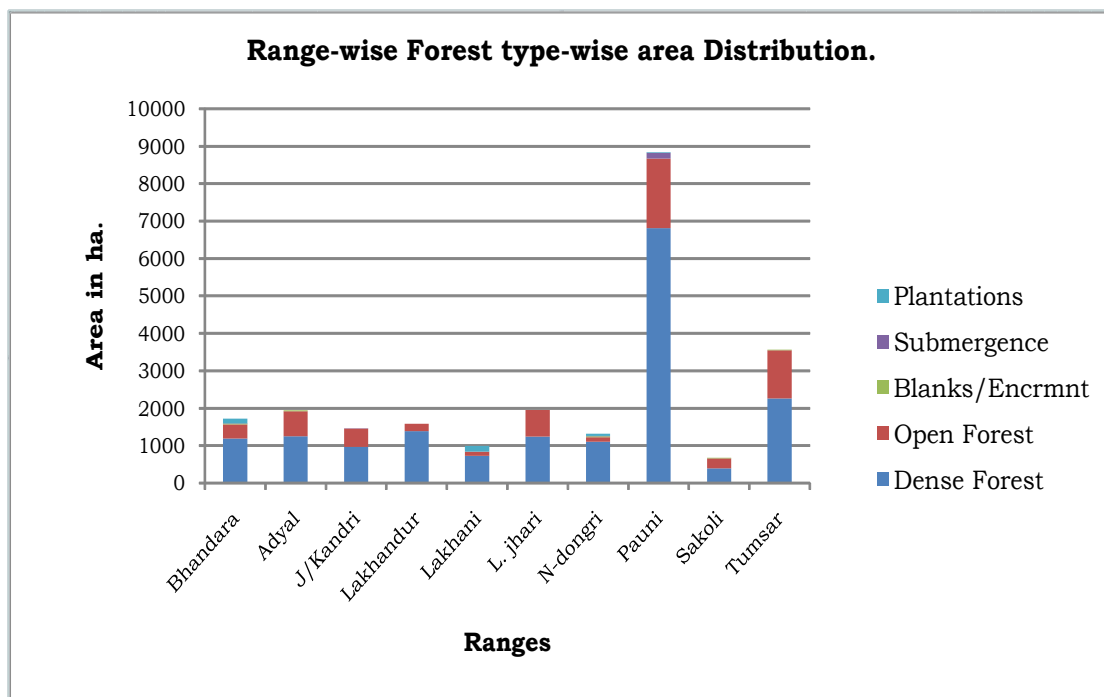
Representative IWC areas



The distribution of areas by Ranges is given in the table below:

Table No. 11.1 Range wise Compartments and Area Allocation to Improvement Working Circle:

Range wise Comptt. and Area allocation to I.W.C Working Circle (in ha.)								
Range	Compt. included	Dense Forest	Open Forest	Blank/Encroachment	Grass Land	Submergence	Plantation	Total Area in ha.
Bhandara	7	1188.573	383.792	18.522	0	2.832	130.00	1723.719
Adyal	6	1252.71	668.074	24.281	0	0	0	1945.065
J/Kandri	4	965.305	495.158	0	0	6.474	0	1466.937
Lakhandur	4	1388.526	200.894	0	0	0	0	1589.420
Lakhani	10	729.046	113.076	0	0	0	155	997.122
L. jhari	5	1244.287	712.697	0	0	0	0	1956.984
N-dongri	7	1101.446	120.052	30.67	0	7.80	60.00	1319.968
Pauni	23	6812.537	1857.752	0	0	156.414	16	8842.703
Sakoli	6	396.999	262.529	19.472	0	0	0	679.000
Tumsar	12	2259.737	1283.912	18.887	0	0	0	3562.536
Total	84	17339.2	6097.94	111.832	0	173.52	361	24083.454
Percentage		72.00	25.32	0.46		0.72	1.50	100.00



11.2 General Character of the Vegetation: The forests allotted to this working circle vary considerably in composition, density and growth. For the purpose of description of the crop composition, the crop in the Working Circle can be divided in to two parts viz (i) all IWC area of the previous Plan (ii)

Areas from other WC of the previous plan fulfils the criteria to be included in the IWC.

On the basis of enumeration results, the species composition and their girth distribution in forest areas under this working circle, is given below

Table No. 11.2 Species and Girth- wise Distribution in IWC Area (Source: Enumeration Data)

Total Area = 20928.458 ha.			Area Enumerated = 172.80 ha.						Area Enumerated =0.83%		
Specie	16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-up	Total	Basal Area
Ain	24.59	13.66	6.71	3.18	2.06	0.93	0.35	0.12	0.10	51.71	0.78
Aonla	1.56	0.72	0.50	0.26	0.10	0.01	0.01	0.00	0.00	3.17	0.04
Behada	0.37	0.27	0.20	0.19	0.09	0.04	0.02	0.01	0.02	1.22	0.03
Bel	0.95	0.64	0.48	0.26	0.15	0.04	0.03	0.01	0.02	2.56	0.05
Bhirra	10.96	5.00	3.09	1.61	0.99	0.34	0.20	0.04	0.04	22.28	0.35
Biba	0.46	0.21	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.75	0.01
Bija	1.76	1.05	0.87	0.87	0.61	0.53	0.27	0.09	0.08	6.14	0.20
Bor/Ber	0.08	0.06	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.19	0.00
Char	6.54	3.53	1.46	0.55	0.29	0.08	0.02	0.01	0.00	12.47	0.15
Chichawa	0.58	0.66	0.56	0.37	0.30	0.20	0.08	0.02	0.03	2.79	0.08
Dhaman	0.27	0.29	0.09	0.02	0.01	0.00	0.00	0.00	0.00	0.68	0.01
Dhawada	18.80	8.65	4.37	2.48	1.55	0.57	0.20	0.06	0.04	36.72	0.53
Garadi	48.95	19.81	5.41	1.13	0.30	0.03	0.01	0.00	0.00	75.63	0.62
Haldu	0.11	0.13	0.10	0.02	0.01	0.00	0.02	0.01	0.01	0.41	0.01
Hirda	0.25	0.07	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.37	0.00
Kalam	0.33	0.30	0.33	0.29	0.31	0.22	0.13	0.04	0.04	1.98	0.08
Kasai	0.51	0.38	0.19	0.12	0.08	0.02	0.00	0.01	0.00	1.32	0.02
Khair	3.18	1.98	1.04	0.35	0.14	0.03	0.00	0.00	0.00	6.71	0.08
Kulu	0.10	0.08	0.05	0.03	0.00	0.00	0.00	0.00	0.01	0.28	0.01
Lendia	17.62	5.25	1.56	0.64	0.29	0.13	0.02	0.04	0.00	25.54	0.23
Moha	4.86	2.49	1.99	1.25	0.81	0.56	0.35	0.33	0.70	13.34	0.42
Mokha	0.02	0.03	0.02	0.04	0.01	0.00	0.00	0.00	0.00	0.13	0.00
Mowai	2.00	1.92	1.57	1.20	0.79	0.45	0.19	0.07	0.06	8.25	0.23
Palas	4.30	2.53	1.74	0.87	0.26	0.16	0.03	0.04	0.00	9.93	0.15
Rohan	4.83	2.58	2.26	1.39	1.04	0.47	0.22	0.07	0.06	12.91	0.29
Salai	0.16	0.17	0.08	0.08	0.09	0.05	0.08	0.03	0.03	0.75	0.03
Semal	0.24	0.17	0.24	0.16	0.13	0.09	0.06	0.01	0.02	1.11	0.04
Shisham	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
Shiwan	0.24	0.03	0.04	0.02	0.01	0.01	0.00	0.00	0.00	0.36	0.00
Surya	1.34	0.48	0.26	0.14	0.09	0.01	0.00	0.01	0.00	2.33	0.03
Teak	14.92	8.93	3.91	0.96	0.56	0.22	0.07	0.01	0.01	29.59	0.35
Tendu	5.93	1.46	0.79	0.45	0.32	0.18	0.06	0.06	0.03	9.28	0.13
Tiwas	0.22	0.16	0.11	0.05	0.03	0.00	0.00	0.00	0.00	0.56	0.01
Other	20.58	7.76	3.11	1.30	0.68	0.35	0.22	0.09	0.14	34.25	0.42
Total	197.59	91.45	43.24	20.34	12.13	5.75	2.65	1.14	1.44	375.74	5.36

(i) SCI Working Circle of Previous plan (Converted areas of old plan): The areas of clear felling and planted with Teak, were included in this Working Circle of old plans. Bamboo plantations, in some coupes, were also included.



These crops are now 25 to 35 years old. The survival of Teak and Bamboo varies from coupe to coupe and is not more than 70% in any of the coupes. In areas where the Bamboo plantations are good, other light demander spp. like Teak, are suppressed and such areas appear to be Bamboo forest. In these areas, the growth of Teak and natural regeneration of other species has also been suppressed by Bamboo. The crop has become malformed due to frequent annual fires. In the areas where survival of Teak is good, the growth varies from quality IVA to IVB. In some of these areas other species have also come up through natural regeneration and the crop has become congested. The miscellaneous species found are Bija, Saja, Bhirra, Dhaoda, Surya, Kalam, Garadi and Lendia. Among the fruit trees char, Aonla, Moha and Bel have come up. The undergrowth consists of Kuda and Decamali. The area has been subjected to repeated fires and have become undersotcked and the growth of planted as well as naturally regenerated seedlings have become stunted and crooked. In the areas, near villages, where grazing pressure is high, the ground flora and regenerations, including plantations, are destroyed and the soil has become compact. The crop is also damaged due to pressure of firewood. Soil erosion has started at many places.

(ii) Area of IWC of the Previous WP: In this area the quality of the crop varies from IVA to IVB. The age of the crop in general is young to middle aged. In some patches, specially the unconverted area of PBI, the crop contains matured trees also. The density of the crop in the well stocked areas varies from 0.4 to 0.6. The under-stocked patches are from blank upto 0.4 density. Forests adjoining to villages are subjected to constant hacking for fuel-wood, specially in PFs. All the growths in such areas have become bushy, including the superior miscellaneous species, except in some protected forest where hardy species like Teak is abundantly present. The miscellaneous species are Saja, Dhaoda, Garadi, Bhirra, Rohan, Bija, Lendia, Kalam, Khair and Haldu. The understorey consists of Garadi, Kuda and Dicamali. The fruit species are Aonla, Char, Moha, Sitaphal, Bel, Tendu etc. In the well stocked areas very less grass comes up. In under-stocked areas Kusal, Ghonad, Marvel, Paunia and Mushan grasses come up. The natural regeneration of almost all species is seen. But due to heavy grazing pressure, annual fires and desiccation it does not get established. Garadi and Lendia are very good coppicers, but their coppice shoots are cut annually for fencing material and fuel wood. In some compartments Bamboo have been planted, which are successful in many areas, but need cleaning operations.

iii. Areas from Miscellaneous and FFP Working Circle of the Previous Plan : Some areas of Misc. WC and FFP WC of the previous plan have also been included in this working circle as they were found suitable to be included in the IWC.



11.3 Blocks and Compartments:

Table No.11.3 Area allotted to Improvement Working Circle:

IWC						
Range	RF		PF		Comptts. Total	Total Area in ha.
	Comptts.	Area in ha.	Comptts.	Area in ha.		
Bhandara	3	1165.605	4	558.114	7	1723.719
Jamkandri	4	1466.937	0	0	4	1466.937
Lakhandur	4	1589.42	0	0	4	1589.42
Lendezari	4	1879.361	1	77.623	5	1956.984
Nakadongri	5	1056.126	2	263.842	7	1319.968
Paoni	19	8527.648	4	315.055	23	8842.703
Sakoli	3	107.569	3	571.431	6	679
Tumsar	7	2872.863	5	689.673	12	3562.536
Adyal	3	1485.734	3	459.331	6	1945.065
Lakhani	5	501.085	5	496.037	10	997.122
Grand Total	57	20652.348	27	3431.106	84	24083.454

Details of the allotment of compartments to Improvement Working Circle have been given in **Appendix- XXXVI**.

11.4. Special Objectives of Management:

The special objectives of management for this working circle are:

- To improve the quality and productivity of the existing crops by improvement felling, tending operations in favour of valuable species and supplementary plantations, all these measures are aimed at nursing back these forests to normalcy.
- To check soil erosion and conserve soil moisture, essential for creating conditions conducive for rejuvenation and growth of natural regeneration and rootstock.
- To meet the bona fide needs of the local people by carrying out the hygienic tending and thinning operations, expected to provide small timber, poles and firewood.
- To conserve the biological diversity of the area.

11.5 Analysis and Valuation of the Crop:

11.5.01 Stock Mapping: The conventional stock mapping has been carried out by the field staff of this division. SOFR unit of Chandrapur also helped in this worked. An extensive enumeration exercise and crown density mapping through image analysis of satellite imageries has been done.

11.5.02 Age and Density: The crop is mostly young to middle aged with scattered matured trees having density of around 0.4 , but in some patches with dense pole crop the density is up to 0.6 or even more,



11.5.03 Site Quality: Site quality governs the harvestable girth.

Table No.11.4 Site Quality wise Area distribution in I.W.C. (area in ha.)

Site Quality	Bhandara	Adyal	J/Kandri	Lakhandur	Lakhani	Lendejhari	Nakadongri	Pauni	Sakoli	Tumsar	Total
THI	0	0	0	0	0	0	0	0	0	0	0
TIVA	0	0	0	0	0	0	0	151.411	0	0	151.411
TIVB	103.939	15.71	0	0	0	0	0	230.351	0	0	350.002
MIII	68.796	26.81	374.41	0	342.462	324.9	149.712	730.615	0	462.351	2480.04
MIVA	385.938	764.7	663.74	891.885	236.129	508.7	157.683	628.507	136.211	928.522	4906.751
MIVB	629.91	545.5	377.81	496.641	146.317	167.6	473.651	3484.505	268.357	1268.863	8751.053
Total .	1188.58	1353	1415.9	1388.526	724.908	1001	781.046	5225.389	404.568	2659.74	16142.62
U S	380.782	566.1	44.515	200.894	87.214	905.4	190.21	3253.321	254.96	883.913	6767.232
Plantation	133.00	0	0	0	185.00		227.00	16.00	0.00	0	561
Grass Land	0	0	0	0	0	0	0	0	0	0	0
Sub-Merge	2.832	0	6.474	0	0	50.43	31.93	306.906	0.00	0	398.577
Encroachment	18.522	0	0	0	0	0	30.67	0	19.472	2.7	71.364
Blank	0	26.28	0	0	0	0	59.11	41.087	0	16.187	142.665
Total	1723.72	1945	1466.9	1589.420	997.122	1957	1319.97	8842.703	679.000	3562.54	24083.45

Harvesting is not the main objective but the harvestable girth will be used for patches where the density of matured trees is good. However, site quality does not change much in time span of 20 years and hence the information from the previous plan has been used to delineate and digitise the various site quality classes.

11.5.04 Enumeration: Enumeration was carried out in 480 plots in over an area of 20928.458 ha. Inventory work included complete enumeration of species and girth distribution of all trees, regeneration, and recording of the site quality and density. Analysis of the data collected from these sample plots is given in **Appendix- XXX**. This data was used for the relative distribution of species, girthwise, basal area wise, which ultimately is used for allocation of working circles.

11.5.05 Regeneration: Average numbers of seedlings and saplings per hectare in the IWC areas are found out from regeneration survey carried out along with the enumeration of the crop.



Table No. 11.5 Regeneration Recorded in the Improvement Working Circle:

Seedling & Sapling per hectare in the IWC.				
Range	Seedling (R1)	Sapling (R2)	Sapling (R3)	Total
	Up to 1 meter	1.0-3.0 meter	> 3 meter	
Adyal	1354.29	506.00	221.14	2081.43
Bhandara	1677.86	621.29	148.00	2447.14
Jamkandri	2207.00	366.00	24.00	2597.00
Pauni	1166.00	483.69	142.15	1791.85
Lakhani	963.00	282.67	5.67	1251.33
Sakoli	1408.33	830.00	269.33	2507.67
Lendezari	1544.75	231.75	132.25	1908.75
Tumsar	1890.40	777.10	181.60	2849.10
Nakadongari	1244.00	985.67	330.00	2559.67
Lakhandur	0.00	0.00	0.00	0.00
Total	13455.63	5084.16	1454.15	19993.93
Average	1495.07	564.91	161.57	2221.55

11.6 Silvicultural System: The good quality dense forests having young to middle aged crop are aimed at to mature as future productive selection forests, if hygienic operations of improvement felling are carried out and adequate growing space is provided to the trees of valuable species, like *Teak*, *Bija*, *Chichwa*, *Haldu*, *Kasai*, *Kullu*, *Mokha*, *Semal*, *Shisham*, *Shiwan*, *Tiwas*, *Beheda* etc. The species whose population in the 'stand' dynamics is less than 1% shall be retained till they reach the rotation age. Supplementary plantations of suitable species in open forests and forest blanks would result in improvement of stocking. The best suited system of treatment is improvement felling supplemented by tending of naturally regenerated crop and rootstock. The future crop has been visualized to have mixed composition of valuable species like *Teak*, and other superior miscellaneous species.

11.7 Harvestable Girth: This working circle aims at improvement of the crop, and therefore, harvesting is not visualised in the area. However, for the purpose of managing a few dense patches of over-matured trees the harvestable girth adopted for the SCI areas will be applied for this working circle. However, in this working circle no commercial felling except for improvement felling, shall be carried out. This will also lead to opening of canopy to some extent resulting in regeneration of light demander species.

11.8 Choice of Species: The species in the existing growth to be favoured, in order of their priorities i.e. *Teak*, *Bija*, *Shisham*, *Haldu*, *Saja*, *Tiwas*, *Garadi*, *Lendia*, *Dhaoda*, *Kalam*, *Rohan* and *Bhirra*. In the understorey *Kuda* and *Dikamali* will be preferred as they are very good fuelwood. Edible fruit and flower yielding trees in general, are to be reserved every where. Same sequence of priority will be maintained in the tending of natural regeneration.



In the artificial regeneration, besides planting of above species Khair, Kinhi, Babul, Neem and Shiwan will be planted. Though Kinhi, Neem and Babul are not forestry species, they are suitable for planting in the forest as these species are now increasingly being used by the villagers. Some shade and fruit bearing trees like ficus spp. etc. will also be planted for the benefit of wildlife.

11.9 Felling Cycle: The felling cycle is fixed at 20 (twenty) years.

11.10 Formation of Felling Series and Annual Coupes :

The entire area of this working circle is divided into 11 Felling Series with average area of treatment series of 2189.40 ha. The area of each Felling series is further divided into 20 (twenty) coupes with an average area of about 109.4 ha. **(Appendix – XXXVIII.)**

11.11 Regulation of Yield: The felling is not adapted for yield. The silvicultural tending operations will be done.

11.12 Agency for Harvesting: Demarcation of coupes and marking of trees for felling will be carried out departmentally to meet the silvicultural and technical requirements. Felling of trees, logging and haulage of the felled material may be allotted to the FLCSSs, or JFMCs of the villages or as decided by the competent authority under the provisions of “**the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of rights on Forest Land), Act 2006**”, provided the coupe has sufficient material to be extracted. Strict supervision of the forest deptt. should be kept on the working of the harvesting agencies, so that all the prescriptions are implemented properly. Some coupes will be worked departmentally, as per the directives issued by the govt. Silvicultural operations like cut-back operation, cleaning, thinning etc. and other regeneration activities after main felling of the coupes will be done departmentally.

11.13 Coupe Demarcation, Preparation of Treatment Maps and Marking Rules:

- I. Demarcation:** The demarcation of annual coupes shall be carried out one year in advance of main working along with the coupes due for cleaning and thinning, as per the prescriptions given in the Chapter of Miscellaneous Regulations.
- II. Preparation of Treatment Map:** Treatment Maps shall be prepared by the RFO and verified by the ACF. All the treatment type areas i.e. A-Type, B-Type, C-Type and D-Type areas and their sub-classes shall be shown distinctively on the map. The shall include the areas suitable for planting and areas having adequate promising NR and rootstock.
- III. Treatments Prescribed:** The treatment proposed for various treatment type areas marked on treatment map shall be, as follows:



A-Type Areas (Protection Areas):

They will include:

- A1-** Type areas, which have slope more than 25°.
- A2-** Type areas i.e. 20 m wide strip on both sides of streams.
- A3-** Type areas, areas susceptible to excessive erosion.

Following Treatments are recommended:

1. Soil and moisture conservation works/measures, as prescribed in the Chapter of Miscellaneous Regulations.
2. Suitable species should be planted if the area is more than 5ha and poor and in natural regeneration.
3. No harvesting is prescribed in these areas, except down logs of valuable spp..

B-Type Areas (Under-Stocked Areas): Open and degraded areas with density less than 0.4 are included.

B1-Type areas are with sufficient Natural Regeneration (400 or more seedlings/ha.)

B2-Type Areas are with insufficient Natural Regeneration (<400 Seedlings/ha.)

Following Treatments are Recommended:

1. Soil and moisture conservation works/measures will be carried out in B-Type areas, as prescribed in the Chapter of Miscellaneous Regulations.
2. In the B1-Type areas, tending of Natural Regeneration will be carried out in favour of valuable and desirable species. The seedlings of seed origin shall be given preference over coppice.
3. B2-Type areas shall be regenerated with the help of Artificial Regeneration and in the process, Teak, suitable miscellaneous (including NTFP and Ficus) species and Bamboo shall be planted in conformity with the Ecological Index and the Plantation Guidelines given in the Miscellaneous Regulation.

C-Type Areas (Congested Pole Crop): Areas with sufficient pole crop of valuable species which can be retained as future crop are included in this type of areas.

Following Treatments are Recommended:

1. No planting shall be done in these areas.
2. Thinning shall be carried out in young pole crop with thumb rule of 1/3rd spacing out of the crop height.
3. The field staff should be trained and encouraged to use the local yield table for the purpose of thinning and to bring the numbers



and spacing, matching with the yield table, as prescribed under the Thinning Guidelines.

D-Type Areas: Well-stocked Areas: Areas having density of 0.4 or over, showing adequate regeneration, 400 or above established seedlings, are considered as well stocked areas and have been included in D-Type area.

Following Treatments are Recommended:

- 1. Enumeration in Annual Coupes:** Trees suitable for removal will be enumerated and listed.
- 2. Marking for Harvesting:** Trees for improvement felling in favour of valuable species and over matured trees in few dense patches (above harvestable girth as prescribed in SCI WC) are marked for felling. Well-formed and vigorous trees of valuable timber and NTFP species will be preferred for retention.
- 3. Tending of Natural Regeneration:** Singling and spacing out will be carried out in favour of saplings of Teak and other valuable species. Spacing operations should leave nearly 400 saplings per hectare. The natural regeneration shall be encouraged by soil working and mulching around them in accordance with the guidelines for the Natural Regeneration management given in the Miscellaneous Rules.
- 4. Cutback Operations:** The cutback operations shall be carried out in the year following harvesting of mature trees, if any, trees damaged during harvesting and all live stumps shall be removed by cutting it to the ground.
- 5. No Commercial Felling:** However, in this working circle no commercial felling except for improvement felling shall be carried out.
- 6. No Plantation is recommended.**

IV. Marking Rules: Marking technique and prescriptions described in the Chapter of the Miscellaneous Regulations shall be followed.

Marking shall be carried out under the close supervision of the RFO and under guidance of ACF concerned. DCF shall himself inspect majority of coupes to ensure proper marking and to guard against wrong marking, if any.

The following rules are proposed to be observed strictly for marking in various treatments type areas;

A-Type Areas: Protection Areas: No tree shall be marked for felling.

B-Type Areas: Under Stocked Areas:

1. All dead and malformed, over mature trees, retaining 2 dead trees / ha, as snags and dens, for nesting and resting of wildlife.



2. All live high stumps shall be marked.
3. All multiple coppice poles; retaining only one, the most promising / stool, shall be marked.

C-Type Areas: Groups of Young Pole Crop:

1. The congested pole crop shall be marked for thinning to maintain a spacing equal to 1/3rd of the crop height and/or to bring down stem number as per the yield table.
2. Unwanted undergrowth interfering or likely to interfere the seed based NR of Teak and other valuable species shall be removed.

D- Type Areas: Well-stocked Areas:

1. All over-matured *Teak, Ain, Bija and Dhaoda* trees if any, are to be enumerated in 15 cm girth-classes, before marking.
2. All healthy edible fruit bearing species, such as, *Moha, Char, Tendu, Aonla, Sitaphal, Chinch, Bel, Hirda, Beheda* and NTFP yielding species like, *Kullu, Semal etc* **shall be reserved.**
3. All dead and malformed trees, retaining 2 dead trees per hectare and all live high stumps shall be marked for felling.
4. Mature trees that have developed hollowness and show visual sign of decay will be marked for felling if, silviculturally, available.
5. All, but one, vigorously, growing coppice pole per stool shall be marked for felling.
6. However, in this working circle no commercial felling except for improvement felling, shall be carried out.

11.14 Soil and Moisture Conservation Works: Soon after the receipt of approved treatment map, soil and moisture conservation works will also be taken along with marking and will be completed before the onset of monsoon in the next year. Standard Models of Soil and Moisture Conservation works, other than CCT/SCT, will be carried out after it is sanctioned by the competent authority only. CCT/SCT should only be taken, if necessary, and the estimate should be examined and sanctioned by the CCF, Nagpur. The details of these works are given in the miscellaneous regulation.

11.15 Methods of Regeneration: All open and blank areas (except natural blanks) will be regenerated either by tending and nursing the existing Natural regeneration and if it is not possible, shall be regenerated artificially. In both the methods the treatment maps and execution on the ground will be based on 50 m. X 50m. grids with proper reference points.

11.15.01 Natural Regeneration:

- I. Natural Regeneration shall be given preference over the plantations. The existing NR, including rootstock, shall be tended as per the prescriptions



for NR management. Plantations shall be taken as a supplementary activity to NR in the under stocked areas.

II. Tending operations for natural regeneration in the D-type and in the B1-type shall be taken up along with the coupe operations.

i) Singling of Coppice Shoots: One healthy and promising coppice shoot will be retained on the stumps and the rest be removed. However, coppice shoots interfering with promising saplings of seed origin should be removed. Such coppice shoots should also be close enough to the ground so that it would not topple after gaining volume and weight and would be able to develop root system of its own subsequently.

ii) Coppice Management of Damaged and Malformed Saplings: The saplings and poles of up to 45 cm GBH having one third of the stem damaged and malformed shall be coppiced by cutting flush to the ground. Such coppicing, however, should not expose the ground and cause erosion and lead to soil loss. Poles having at least 2.50 meter of clean bole will not be treated as malformed.

iii) Tending of Natural Regeneration of Seed Origin: All seedlings and saplings of seed origin shall be given preference over the coppice. Saplings of valuable species, *more than 60 centimetres in height will be nursed as future crop.* Spacing operations, if required, will be carried out to leave nearly 400 saplings per hectare at an average of 5 metre spacing. The natural regeneration shall be assisted and encouraged by soil working and mulching around them, in the following manner.

- **First year operations:** Weeds in one-meter diameter around saplings of valuable species shall be cleared during the first week of July. Uprooted weed, grasses and leaf-litter shall be mixed in the upper layer of soil as the organic mulch and facilitate loosening and aeration of the soil by worms and insects. One soil working shall be carried out in October.
- **Second year operations:** The soil working in October will be repeated in the following year. However, one scrape weeding of one-meter diameter shall be carried out in the first week of August around the shoots of coppice seedlings.
- **Third year operations:** Singling of coppice shoots, management of damaged and malformed saplings, climber cutting and shrub clearance shall be done.

11.15.02 Artificial Regeneration: Plantations in the B2-type and A-type areas are prescribed as per the plantation guidelines given in the Miscellaneous Rules. Preference will be given to the local valuable species and as desired by the local people. Areas suitable for Bamboo will be brought under the Bamboo plantations but reasonable care should be taken while



taking Bamboo plantation, so that it should not suppress the young crop of valuable species like Teak and Bija. Stump planting of Teak shall only be considered in well drained areas with crown density less than 0.2. The remaining plantation area will be brought under the mixed species plantations, using suitable species like *Shiwan, Maharukh, Kinhi, Siras Semal, Sissoo, Babul and other NTFP species* at suitable sites. Some suitable species like Ficus, Ber, Babul etc. specie should also be planted to improve the habitat of wild animals and birds.

11.16 Subsidiary Silvicultural Operations:

A. Cutback Operation: The cutback operations will be carried out in the next year of coupe working (**Appendix - XXXVII**). All trees damaged during the harvesting of mature trees shall be removed. All left over multiple coppice shoots and poles shall be reduced to one per stool. All newly risen coppice shoots shall be removed to encourage establishment of seedling regeneration.

B. Cleaning in the Sixth Year: Cleaning shall be carried out in the sixth year of the coupe working. All areas of the natural regeneration tending, rootstock management and plantations shall be recorded in the divisional notebook and shall be cleaned. All inferior species including the unwanted undergrowth interfering or likely to interfere with the growth of NR of Teak and other valuable species shall be cut. Climber cutting, shrub clearance, dressing of high stumps, extraction of marketable down logs shall be carried out. Coppicing of damaged and malformed saplings and singling of coppice shoots shall be carried out. All newly risen Teak coppice shoots shall be removed. Established seedling regeneration of Teak and other miscellaneous species shall be spaced out suitably.

C. Thinning in 11th Year: Thinning is prescribed to be carried in the worked coupe in the 11th year of coupe working as per thinning guidelines. This will reduce the congestion in the young crop.

Poles of vigorously growing non-Teak species should be preferred for retention so long as not less than 50 percent of the crop is dominated by Teak.

11.17 Other Regulations: Protection from fire and grazing is essential for success of natural and artificial regeneration.

All annual coupes will be provided strict fire protection and will remain closed to grazing, till completion of the 6th year cleaning operations.



Chapter XII

AFFORESTATION WORKING CIRCLE

12.1 General Constitution of The Working Circle: The open forest areas having density less than 0.4 and with rootstock and shrubby growth as well as open forests without rootstock, where artificial regeneration appears necessary to restore productivity, are included in this working circle. Most of these areas are located in the immediate vicinity of the villages and are under very heavy pressure of grazing, which is the main reason for their deterioration.

The Afforestation Working Circle (AFF) forms about 28.36 % of the forest areas of the division. It includes 26339.860 ha. of the forest areas comprising of Reserved Forests to the extent of 4101.577 ha., Protected Forests 6961.887 ha., Gose PF 4778.701 Ha., Jhudpi Jungle 10022.06 ha and Unclassed Forest 475.635 ha. The Compartment and Village wise area allotted to various Ranges is shown in the following Table:

Table No. 12.1 Compartments Allotted to AFF Working Circle:
(Only RF & PF)

Range	No. of old Compts.+ Gosse PF	Dense Forest	Open* Forest	Blank/En crochme	Grass Land	Submergence	Plantation	Total Area in Ha.
Bhandara	19	777.761	3684.39	18.218	0	0	0	4480.369
Adyal	19	642.726	2871.12	0	0	0	155	3668.846
Lakhani	4	129.443	2022.865	0	0	0	0	2152.308
Lendezari	3	247.076	291.428	0	0	13.75	6.1	558.354
Nakhadongr	10	135.64	2363.332	78.71	0	17.88	0	2595.562
Pauni	9	1121.44	696.824	0	0	47.729	0	1865.993
Sakoli	7	1269.74	2672.603	3.237	0	0	118	4063.58
Tumsar	5	861.656	1227.75	0	0	14.378	0	2103.784
Jamkandri	1	496.507	708.407	2.428	0	16.19	0	1223.532
Lakhandur	0	0	3627.532	0	0	0	0	3627.532
Total	77	5681.99	20166.3	102.593	0	109.93	279.1	26339.9

* Open Forest includes Gosse PF and Jhudpi Jungle

Since this working circle has been newly created, 8 Comptts of RF (1817.634 ha.), 27 comptts of PF (5279.705 ha.) from IWC, 6 comptts of RF (783.508 ha.) and 2 comptts of PF (140.676 ha.) from SCI, 3 comptts of RF (1339.573 ha.) and 26 comptts of PF (946.188 ha.) of Miscellaneous WC have been included in this Working Circle. Besides this 1 comptt. of RF (160.862 ha) and 4 comptt. of PF (595.310 ha.) of FFP WC have also been included in this newly created working circle. The total of the above mentioned compartments of R.F & P.F is 77.



84 newly formed compartments, one compartment including all the survey numbers of one village, of Gosse P.F (4778.7 ha.) and one newly formed compartment of Un-classed Forest, in village Dighori, Lakhandur, (475.635 ha.) are also included in this working circle. The Jhudpi Jungle (10022.060 ha.) spread over 324 villages have been included in this working Circle. The areas of Jhudpi Jungle and Unclassed Forest have not been allotted to any felling series and coupe, as most of them are small scattered patched and not fit for regular coupe working. The area of Jhudpi Jungle have also been reserved against any future compensatory afforestation, hence it is prescribed that the plantation works will be carried out as per the requirement, preferably under JFM scheme.

The following criteria have been considered for allocation of compartments to the Afforestation Working Circle:

- Compartments having blank areas.
- Compartments having poor quality open forests (degraded forests), which need some tending operations to become productive.
- Compartments showing potential for natural regeneration indicated by the presence of good shrubby vegetation & rootstock.

12.2 General Character of the Vegetation:

- i. This working circle generally comprises of degraded open forest areas interspersed with forest blanks or brushwood. The blank areas have dominance of shrubby growth and inferior grasses. The common grasses include *Ghonad*, *Kusal*, *Bhurbhusi*, *Marvel* and *Sheda*. While *Ghot*, *Khair*, *Eruni*, *Bharati*, *Ber*, *Kuda*, *Dikamali*, etc. are the common thorny or brushwood species. *Tarota*, *Gokhru* and *Rantulsi* are the common weeds. Lantana has infested in many places. At places *Parthenium* has also been noticed. The allotted areas in general are highly degraded, under stocked and open with crop density usually less than 0.4, though patches of better stocked areas are also found, in some compartments. The PF areas allotted to this WC, especially, those near the habitations, are degraded to the extreme condition and lays bare without any significant tree crop.
- ii. The crop consists mainly of scattered trees or patches of open forests. The principal species is *Saja* and its common associates are *Dhaoda*, *Bhirra*, *Rohan*, *Tendu*, *Lendia*, *Salai*, *Mowai*, *Char*, and *Palas*, etc. *Arjun*, *Jamun* and *Ficus* are found along the streams (Table 12.2).
- iii. The site quality is IV. The canopy density of the vegetation varies from blank to 0.4. The crop is generally young with occasional middle aged or mature trees.



Table No.12.2 Species and Girthwise Distribution in AFF WC.*(Source : Enumeration Data)*

Species and Girth Distribution in AWC Area per ha. (Source - Enumeration data)											
Total Area = 11063.464 ha.						Area Enumerated = 172.80 ha.					
Specie	16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-up	Total	B.A
Ain	20.78	10.29	3.67	1.86	1.08	0.46	0.07	0.07	0.05	38.33	0.48
Aonla	1.32	0.32	0.23	0.04	0.01	0.03	0.00	0.00	0.00	1.95	0.02
Behada	0.42	0.17	0.02	0.06	0.02	0.02	0.02	0.00	0.03	0.77	0.02
Bel	0.26	0.14	0.09	0.06	0.05	0.01	0.00	0.00	0.00	0.62	0.01
Bhirra	8.26	2.44	0.89	0.29	0.22	0.16	0.03	0.00	0.01	12.31	0.12
Biba	0.76	0.17	0.15	0.04	0.00	0.01	0.00	0.00	0.00	1.13	0.01
Bija	1.71	0.88	0.50	0.81	0.76	0.23	0.05	0.01	0.07	5.03	0.14
Bor/Ber	0.07	0.09	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.25	0.00
Char	10.30	2.60	0.81	0.15	0.10	0.02	0.01	0.00	0.00	14.00	0.10
Chichawa	0.54	0.22	0.17	0.11	0.06	0.04	0.00	0.00	0.00	1.15	0.02
Dhaman	0.16	0.12	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.38	0.00
Dhawada	12.47	4.41	2.09	0.79	0.65	0.19	0.07	0.03	0.03	20.74	0.25
Garadi	16.54	4.86	1.30	0.41	0.08	0.01	0.00	0.00	0.00	23.20	0.18
Haldu	0.12	0.04	0.02	0.03	0.00	0.02	0.00	0.01	0.00	0.25	0.01
Hirda	0.15	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.18	0.00
Kalam	0.26	0.12	0.00	0.03	0.00	0.02	0.01	0.02	0.00	0.46	0.01
Kasai	0.95	0.55	0.25	0.12	0.02	0.01	0.00	0.00	0.00	1.89	0.02
Khair	3.04	1.09	0.50	0.18	0.04	0.03	0.01	0.00	0.00	4.89	0.05
Kulu	0.01	0.02	0.04	0.02	0.02	0.02	0.01	0.00	0.00	0.15	0.01
Lendia	16.31	3.29	0.98	0.34	0.08	0.01	0.02	0.00	0.00	21.05	0.15
Moha	4.52	1.35	0.76	0.39	0.24	0.05	0.04	0.07	0.12	7.54	0.12
Mokha	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
Mowai	2.00	1.90	0.94	0.58	0.35	0.19	0.10	0.04	0.01	6.10	0.12
Palas	5.88	5.32	2.05	0.92	0.22	0.12	0.02	0.01	0.03	14.57	0.19
Rohan	9.08	3.04	1.12	0.48	0.41	0.16	0.11	0.01	0.00	14.41	0.16
Salai	0.69	0.45	0.12	0.07	0.10	0.10	0.01	0.04	0.00	1.57	0.03
Semal	0.05	0.06	0.01	0.06	0.07	0.05	0.01	0.01	0.01	0.34	0.02
Shisham	0.17	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00
Shiwan	0.11	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.00
Surya	0.42	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.00
Teak	11.96	3.79	1.43	0.74	0.22	0.10	0.04	0.01	0.00	18.29	0.18
Tendu	7.78	1.01	0.39	0.24	0.16	0.07	0.02	0.03	0.01	9.70	0.08
Tiwas	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
Other	15.23	4.51	1.96	0.58	0.22	0.17	0.08	0.01	0.09	22.85	0.23
Total	152.35	53.57	20.68	9.44	5.21	2.32	0.76	0.39	0.48	245.21	2.74

- iv. Natural regeneration of common species is present but its extent is far from being adequate. Heavy grazing pressure has resulted in compaction of the soil with little sub-soil moisture. Young recruits of species like *Ain*, *Dhaoda*, *Bhirra* and *Teak*, etc. are found in many compartments but die-back without



getting established. Due to excessive grazing, fires and refractory nature of areas, establishment of NR is very poor.

Table No. 12.3 Position of Natural Regeneration in this AFF WC.

Seedling & Sapling per hectare in the AFF areas				
Range	Seedling (R1)	Sapling (R2)	Sapling (R3)	Total
	Up to 1 meter	1.0-3.0 meter	> 3 meter	
Adyal	1860.80	483.80	90.30	2434.90
Bhandara	1036.06	464.88	248.81	1749.75
Jamkandri	2098.00	209.00	24.00	2331.00
Pauni	664.00	715.75	203.25	1583.00
Lakhani	978.00	691.00	134.67	1803.67
Sakoli	919.86	1316.43	137.29	2373.57
Lendezari	1733.00	144.33	154.00	2031.33
Tumsar	1138.67	366.17	64.17	1569.00
Nakadongari	1901.20	276.80	36.60	2214.60
Lakhandur	0.00	0.00	0.00	0.00
Total	12329.59	4668.15	1093.08	18090.82
Average	1369.95	518.68	121.45	2010.09

12.3 Blocks and Compartments: Details of Blocks and compartments have been given in **Appendix - XXXIX**.

Table No.12.4 Showing the Range-wise Area Distribution to AFF. W.C:

Range	R.F		PF		Gose PF	Jh.Jungle	U.Cl.F	Total Area in ha.
	No.Of Compt	Area in ha.	No.of Compt.	Area in ha.	Area in ha.	Area in ha.	Area in ha.	
Bhandara	2	462.361	17	2139.878	676.23	1201.9	0	4480.369
Tumsar	1	67.32	4	546.334	225.77	1264.36	0	2103.784
Jam - Kandri	0	0	1	172.792	225.000	825.74	0	1223.532
Sakoli	2	421.505	5	1113.181	415.184	2113.71	0	4063.58
Paoni	4	1229.28	5	92.283	191.000	353.43	0	1865.993
Adyal	4	541.585	15	1426.431	275.00	1425.83	0	3668.846
Lakhani	1	4.399	3	128.879	507.000	1512.03	0	2152.308
Nakhadongri	3	963.157	7	1255.615	0	376.79	0	2595.562
Lendezari	1	411.97	2	86.494	0.000	59.89	0	558.354
Lakhandur	0	0	0	0	2263.517	888.38	475.635	3627.532
Grand Total	18	4101.58	59	6961.89	4778.7	10022.06	475.635	26339.86

12.4. Objectives of Management: The special objectives of management of this working circle are, as follows:

- To restore the vegetative cover of the degraded and open areas. To increase their productivity by site protection and tending of natural



regeneration and rootstock, supplementing it with plantations of desired species, wherever, necessary, preferable through JFM.

- To check the loss of top soil by adopting suitable soil and moisture conservation measures and to increase the water absorption capacity of the soil.
- To meet the local demands of fuel wood, small timber and poles through active involvement of Gram Panchayats and other village institutions.
- To improve the habitat of wild animals and birds.

12.5 Analysis and Valuation of the Crop:

Stock Mapping: The stock mapping has been done by the CF Working Plan Division Nagpur and the results are given in **Appendix LIV**.

- **Age and Density:** The crop of forest areas under this working circle is mostly young to middle aged with occasional mature trees having density below 0.4.
- **Site Quality:** Site quality governs the harvestable girth. The information from the previous plan has been used to delineate and digitise the various site quality classes. Site quality wise area distribution is given in table below:

Table No.12.5 Range-wise and Site Quality-wise Area Distribution in AFF. W.C. (area in ha.)

Site Quality	Bhandara	Adyal	J/Kandri	Lakhani	Lakhandur	Lendezari	N.dongri	Pauni	Sakoli	Tumsar	Total
TIII	0	0	0	0	0	0	0	0	0	0	0
TIVA	0	0	0	0	0	0	0	0	0	0	0
TIVB	0	0	0	0	0	0	0	0	0	0	0
MIII	0	0	52.02	0	0	0	398.958	0	16.194	119.53	586.704
MIVA	313.729	419.223	41.21	0	0	58.637	248.736	10.029	624.229	114.77	1830.563
MIVB	484.318	198.463	0	30.129	0	28.664	485.048	434.616	629.317	132.391	2422.946
Total .	798.047	617.686	93.232	30.129	0	87.301	1132.742	444.645	1269.74	366.691	4840.213
U.S	1785.974	1195.33	60.942	103.149	0	391.313	989.44	861.277	143.709	232.585	5763.719
Plantation	0	155	0	0	0	6.1	0	0	118.00	0	279.1
Grass Land	0	0	0	0	0	0	0	0	0	0	0
Sub-Merge	0	0	16.19	0	0	13.75	17.88	0	0.00	14.378	62.198
En.ment	18.218	0	0	0	0	0	78.71	15.641	3.237	0	115.806
Blank	0	0	2	0	0	0	0	0	0	0	2.428
Gose PF	676.23	275.00	225.00	507.00	2263.517	0	0	191.000	415.184	225.77	4778.701
ZJ	1201.9	1425.83	825.74	1512.03	888.38	59.89	376.79	353.43	2113.71	1264.36	10022.06
UnClass Forest	0	0	0	0	475.635	0	0	0	0	0	475.635
Total	4480.369	3668.846	1223.532	2152.308	3627.532	558.354	2595.562	1865.993	4063.58	2103.784	26339.86





Representative area of Afforestation Working Circle.

- **Enumeration:** Most of the areas under this Working Circle belong to the PF, which are mainly degraded with little growth. Enumeration was carried out in 270 plots over an area of 97.20 ha. It includes complete enumeration of species and girth distribution of all trees, regeneration and recording of site quality and density. Analysis of the data collected from these sample plots is given in Appendix – **XXX**.

12.6 Silvicultural System:

- i. The area will be regenerated with Teak, Miscellaneous tree species and Bamboos. No harvesting is required in this working circle. Only improvement felling and tending of existing natural regeneration, i.e. the saplings, coppice shoots and poles, will be carried out and if the NR is absent it will be supplemented by plantations, would be the main activities in this working circle.
- ii. Large areas of this working circle have inadequate sub-soil moisture, highly compact soil structure and heavy biotic pressure. These are the main limiting factors for the establishment of seedlings in this area. Top soil has been washed away and as a result vast areas do not have even adequate soil-depth to support tree crop. As a consequence, a large chunk of these areas lay bare without any significant vegetation. Hence, intensive soil and moisture conservation measures and tending of existing rootstock have been proposed to be given priority over plantation.
- iii. In addition, concept of '*Ecological Index*' has been proposed for deciding the number of seedlings to be planted per hectare, over the traditional method of planting based only on *soil-depth zonation approach*. Ecological Index of a site gives an idea as to number of plants which

could be sustained per hectare on a particular site depending upon the various locality factors of the area. It is based upon the climatic and edaphic conditions prevailing in the area and is determined by the formula, as follows:

$$\text{Ecological Index} = \frac{P \times D}{Tr \times EPT}$$

Where

P = Annual precipitation in mm.

D = Number of rainy days in a year.

Tr = Range of maximum temperature averages.

EPT = Potential Evapo-transpiration in mm.

- iv. There is no need for planting more seedlings per ha than those could be sustained on a particular site. The emphasis is to grow the optimum number of seedlings per ha, which should grow into a healthy future stock with little mortality. Ecological Index for these areas is calculated on the basis of data of *Bhandara* to determine the number seedlings to be planted per hectare in these areas. **The ecological index for Bhandara division is 13.15. Therefore, 2500 seedlings per hectare shall be planted in these areas.** A sample calculation of the Ecological Index has been shown in **Appendix - XLIX.**

12.7 Choice of Species:

- i. Valuable local species suitable for the site and favoured by the local village communities will be preferred in plantations. *Teak, Shisham, Khair, Shiwan, Sissoo, Siras, Kullu, Karanj, Chichwa, Aonla, Chinch, Neem, Babul, Sitaphal, Jamun, Karnaj, etc.* shall be considered. Seedlings of NTFP including, edible fruit-yielding forest species and medicinal plants may constitute up to 10 percent of the plantation. For the benefit of wildlife, *Ficus* species (2 seedlings per ha) shall also be used in plantations. An officer not below the rank of Assistant Conservator of Forests in consultation with the Dy.C.F., will approve the final choice of species. The broad information of different species growing in different Types of soil conditions is given in **Appendix - XLIX.**
- ii. Mixed species plantations should include up to 50 % of Teak and fairly good proportion of timber, fodder, firewood fruits and MFP yielding species as mentioned in the above para.
- iii. Bamboo plantation should also be taken on suitable land but with a precaution that it should not suppress other valuable species. In



case of bamboo plantation in Teak or misc. plantations, it should be taken in the sixth year of the previous plantations (Teak or Mixed).

- iv. Nurseries of Root Trainer/Poly pots should be raised in the previous financial year just after monsoon.
- v. Seedlings of species like Neem, Jamun, etc. should be raised on the mother beds during the rainy season and subsequently transferred to poly-pots.
- vi. Seedlings of slow growing species like Bija, Haldu, Mahua, Hirda etc should be planted after two monsoons.
- vii. Bamboo seeds should also be sown on the mother beds. The rhizomes should be transplanted on the same bed for at least twice then after one year they should be transplanted to poly pots of suitable size. Seed sowing directly in the pots should be avoided as it may lead to a clump with more than one species.
- viii. Seeds of all planting stock must be from a known healthy source and it should be recorded in the seed register of the nursery as well as the concerned plantation registers.

12.8 Treatment Cycle, Series and Annual Coupes:

- i. **Treatment Cycle:** The treatment cycle for this working circle has been fixed at 20 (twenty) years.
- ii. **Treatment Series and Annual Coupes:** These treatment series and annual coupes comprises only of RF and PF, it does not include the area of Jhudpi jungle and Unclassed Forests, handed over to the Forest Deptt. The small and scattered areas of Jhudpi Jungle and Unclassed Forest are included in the Afforestation Working Circle but they are not part of any felling series or regular coupes. It will be afforested as per the requirement, either under Compensatory afforestation or JFM. The areas of RF and PF have been allotted to 10 Treatment Series with an average area of 1584.216 ha. Each Treatment Series has been further divided into 20 (twenty) annual coupes with an average area of 79.210 ha. Details are provided in **Appendix-XL and XLI.**
- iii. **Regulation of Yield:** No yield is prescribed for this working circle. The treatment will be regulated by area. The Dy.C.F. should instruct the Forest Guards to make entry of all the produce, like grass etc, into the plantation registers.

12.9 Demarcation, Treatment Maps and Prescriptions:

12.9.01. The demarcation of coupe will be carried out, along with other coupes, as per the prescriptions mentioned in the chapter of Miscellaneous Regulations.



12.9.02. Treatment Map: Delineation of areas falling under various treatment Types will be mentioned in the treatment maps under the following general guidelines:

- An area having more than 25° slopes and more than a quarter hectare in extent must be shown on the map as the **A1-Type: steep slope**. Smaller areas of steep slope, even if not marked on the map, will also receive the prescribed treatment.
- 20 meter wide buffer along streams will be measured from the bank or the high flood mark. Similar buffer of the **A2-Type** areas will be marked along water bodies and tanks.
- The **A3-Type (excessive erosion prone)** includes seasonally flooded areas.
- In **B-Type** areas the crop is degraded and open. Natural regeneration would be considered adequate if at least 400 good established saplings per hectare are present. The same criterion will be applied for the rootstock **B1-Type** will include the areas with sufficient Natural Regeneration, where as **B2-Type** will include degraded lands without sufficient Natural Regeneration.
- The **C-Type areas** would include groups of naturally grown poles of 15 to 45 cm GBH and old plantations.
- The **D-Type areas have** dense vegetation and need proper treatment if found.

12.9.03 Preparation of Treatment Maps: The Range Forest Officer shall prepare the Treatment Map of the coupe after a thorough inspection of the area, showing the various Treatment Type areas. The Assistant Conservator of Forests will check the treatment map and will make corrections in the map, if necessary. The Deputy Conservator of Forests will approve the treatment maps after careful examination.

The treatment maps will bear date of inspection by the Range Forest Officer and the Assistant Conservator of Forests under their official seals and signatures.

12.9.04 Treatments Prescribed: The treatment prescribed for various treatment-Type areas are as follows:

A- Type Areas: Protection Areas:

- i) **Soil and Moisture Conservation:** Gully plugging and other soil and moisture conservation works, as described in the chapter of Miscellaneous Regulations shall be taken in the **A1** and **A3-Type** areas. Such works may be taken up in the **A2-Type** areas, if not detrimental to the riparian ecosystem.

- ii) **Regeneration:** Bush sowing of *Khair*, *Neem*, *Maharukh*, *Sandal*, *Babul* and other local seeds is prescribed to be carried out. Any one species should not constitute more than one fourth of the disseminated seeds. A proper coupe wise record should be maintained for the bush sowing operation.

In the **A2** and **A3-Type** areas, stakes of *Ficus* spp., Pangara, Salai or other suitable species will be planted at six-meter interval, and tussocks of *Khas grass* will be planted on suitable sites.

If necessary plantation of desired spp shall be taken on suitable areas.

- iii) **Harvesting Prohibited:** Harvesting of standing trees (dead or alive) is strictly prohibited. The marketable down-logs of valuable species such as Teak, Shisham, Bija, Saja, Haldu and Tiwas may be extracted.

B- Type Areas: Under-stock Areas: These areas are categorised into 2 types:

B1-Type: Land with sufficient Natural Regeneration

B2-Type: Land without sufficient Natural Regeneration

1) Treatments for B1-Type Area: Natural Regeneration Management:
Guidelines for the Natural Regeneration Management:

- i. **Tending of Natural Regeneration (of seed origin):** All seedlings and saplings (of seed origin) of valuable species, more than 60 centimetre in height, will be nursed as future crop. Spacing operations in favour of valuable species, if required, will be carried out to leave nearly 400 saplings per hectare at an average of 5 metre spacing. The natural regeneration shall be assisted and encouraged by soil working and mulching around them, in the following manner.
- ii. **Singling of Coppice Shoots:** One healthy and promising coppice shoot will be retained on the stumps and the rest be removed. However, coppice shoots interfering with promising saplings of seed origin shall be removed. Such coppice shoots should also be close enough to the ground so that it would not topple after gaining volume and weight and would be able to, subsequently, develop root system of its own.
- iii. **Coppice Management of Damaged and Malformed Saplings:** The saplings and poles up to 45 cm GBH having one third of the stem damaged and malformed shall be coppiced by cutting flush to the ground. Such coppicing, however, should not expose the ground, causing erosion and leading to soil loss. Poles having at least 2.50 meter of clean bole will not be treated as malformed.



iv. Subsequent year Operations for B1- type Land: Seedlings of Seed Origin will be given preference.

- a. First year Operations:** Weeds in one-meter diameter around saplings of valuable species shall be cleared during the first week of July. Uprooted weed, grasses and leaf-litter shall be mixed in the upper layer of soil as the organic mulch to facilitate loosening and aeration of the soil by worms and insects. One soil working will be carried out in October.
- b. Second year Operations:** The soil working in October will be repeated in the following year. However, one scrape weeding of one-meter diameter will be carried out in the first week of August around the seedlings.
- c. Third year Operations:** Singling of coppice shoots, climber cutting and shrub clearance shall be repeated in third year.

2) Treatments for B2-Type Area: Artificial Regeneration (Plantations): Suitable sites of the B2-Type areas shall be brought under Artificial Regeneration. Teak stumps and saplings of suitable miscellaneous species shall be planted as per site suitability. **Stump planting of Teak shall be considered only in areas with well drained soil with crown density less than 0.2.** All planting operations shall follow the guidelines described in the chapter of Miscellaneous Regulations.

Local species of Bamboo shall be planted only when the Teak or Miscellaneous species get established and there is no risk of getting suppressed by bamboo clumps.

C & D- Type Areas: Pole Crop and Matured Crop:

1. **Thinning:** Thinning of young and pole crop will be carried out maintaining average spacing of one-third of the crop height in such patches. Thinning is to be carried out as per guidelines prescribed in the miscellaneous regulations.
2. No planting shall be done in these areas.
3. Over matured, malformed and dead trees to be removed
4. **Tending of Natural Regeneration:** Singling and spacing out will be carried out among saplings of Teak and other valuable species. Spacing operations should leave nearly 400 saplings per hectare. The natural regeneration shall be encouraged by soil working and mulching around them as per the guidelines of Misc. Regulations.



12.10 Methods of Regeneration:

12.10.01 Natural Regeneration: Natural Regeneration shall be given preference over plantation. The existing NR and rootstock shall be tended as per the prescriptions on Natural Regeneration Management. Plantations shall be taken as a supplementary activity to NR in the under stocked areas.

Tending operations for Natural Regeneration in the D-Type and rootstock management in the B1-Type shall be taken up along with the coupe operations.

All the operations required for the Natural Regeneration shall be carried out in accordance with the prescribed guidelines in the Miscellaneous Regulations.

12.10.02 Artificial Regeneration: Plantations shall be taken only in the B2-Type and A-Type areas of the Afforestation Working Circle having inadequate Natural Regeneration. Plantations are proposed to be undertaken in accordance with the Ecological Index of the site and Plantation Guidelines described in the Chapter of Miscellaneous Regulations. Plantation register is to be maintained as per **Appendix-LXXXVIII**. Bamboo plantations should also be given priority and areas suitable for bamboo will be brought under the Bamboo plantation. **Necessary precautions should be taken so that no other plantation or young crop of valuable species is suppressed by the planted Bamboo.**

Stump planting of Teak shall be considered in areas with crown density less than 0.2 and found suitable for Teak planting. The remaining plantation area will be brought under the mixed species plantations using suitable species.

Though most of the sites in Bhandara Division are fit for One Stage Plantation, two stage plantations may be considered on some highly degraded and refractory sites.

A. Two-Stage Plantation in Afforestation Areas: On refractory sites of B2-Type areas, the two-stage plantation activity, as described under Plantation Guidelines, is proposed. Two stage plantation, that is, the restorative phase followed by planting phase.

- **Restorative Phase:** Restorative phase is proposed to include the soil and moisture conservation works and fencing in the year of coupe operations. Seed sowing of Neem, Chandan, Maharukh and Babul will be done in bushes. Planting of Agave on TCM and *Khus* on earthen soil conservation structures will be carried out in the following year. The restorative phase will be judged in the fourth year of the coupe working. Effectiveness of fencing and success of the soil and moisture conservation measures will mark the completion of the restorative phase. All the areas covered under restorative phase shall not be



allowed to be switched over in the fourth year to the planting phase. The areas having inadequate regeneration (less than 600 seedlings per hectare) from rootstock and seed sowing will be switched over to planting phase. It shall be applicable only after its evaluation. The areas failing these tests shall not be covered under plantation programme.

- **Planting Phase:** Areas having adequate regeneration from rootstock and seed sowing will be tended as described for the rootstock management. PPO/PYO (pre-planting operations) shall be taken up in the fourth year of coupe working, while the seedling planting and other FYO (first year operations) activities shall be carried out in the following year, that is, the fifth year of coupe working. Other plantation works will follow in the sequence.

B. One Stage Plantation Activity: One stage plantation activity shall be taken up on non-refractory sites of B2-Type areas as per the plantation guidelines prescribed under miscellaneous regulation.

12.10.03 Role Of JFM Committees : Involvement of the Joint Forest Management Committees, Village Forest Protection Committees, Village Panchayats or other active Village Organisations would be an integral component of all the plantation activities. These committees should be encouraged and motivated for the protection of the Plantations.

12.11 Closure to Grazing and Fire Protection:

Protection from fire and grazing is essential for the success of any natural and artificial regeneration.

Plantations will be provided fire protection and complete closure to grazing for 5 years or more as per the provisions in BFM Vol.II depending upon the growth and establishment of seedlings so that when the areas are open for grazing; the established seedlings are beyond the reach of cattle from browsing. The DCF will examine the area closed for grazing at the end of 5th year operation and decide whether the coupe requires further closure depending upon growth of seedlings and recommend to CCF(T) for its further closure for a specific period, so that the seedlings get established.



Chapter XIII

PROTECTION & CATCHMENTS AREA MANAGEMENT WORKING CIRCLE

13.1. General Constitution of the Working Circle: Bhandara district is known for its major and minor water tanks. The catchment areas of most of these water bodies lie in the forest. To protect these water bodies, their catchments need to be protected with good quality vegetation on it. The majority of the areas, included in this WC, have a submergence of more than 10 ha. and catchments of more than 200 ha. It includes various irrigation projects of Bhandara Division, besides some small water bodies inside the forest have also been included in this Working Circle. It extends over to 10335.424 ha. of forest areas, comprising 8861.631 ha. of the Reserved Forests and 1473.793 ha of the Protected Forests. Out of this, 1163.655 ha. of forest land is submerged under different irrigation projects, 101.10 ha the area is under plantation. The rest of the area, 8943.698, ha. is covered with dense forest and forms 11.13 % of the total Forest area of the division.

Since this new Working Circle is introduced in this Plan, areas from different working circles of the previous plan have been diverted to this working circle. The details are as follow:

- 7 compartments of Reserved Forest & Protected Forest (5 comppts of RF 2552.740 ha. & 2 comptt. P.F. 144.692ha.) of previous SCI Working Circle.
- 7 Compartments of Reserved Forest & Protected Forest (6 comppts. of RF 2649.430 & 1 comptt. of P.F. 42.459 ha.) of previous IWC.
- 8 Compartments of RF & PF (7 comppts. of RF 3659.46 ha. & 1 comptt. of PF 63.742 ha.) of the previous Miscellaneous Working Circle.
- 9 Comptt. of PF (1222.900ha.) of the previous Fuel, Fodder & Pasture Working Circle.

13.1.01 Protection and soil conservation treatments in these forests is necessary for site protection, preservation of the steep and precipitous slopes and reduction of silt load to the major dams or water bodies.





RAWANVADI TANK – One of the hundreds of Water Tanks in the district.

Table No.13.1 Range wise Compartments & Area Allocation to Protection & Catchment Area Management Working Circle:

Range	Comptts. included	Dense Forests	Open Forests	Blank Area	Encroachment	Grass Land	Submergence	Plantation	Total Area in Ha.
Bhandara	2	186.623	229.93	0	0	0	89.00	42.50	548.053
Adyal	2	156	183.923	0	0	0	19	0	358.923
J/Kandri	2	872.12	384.902	0	0	0	144	0.00	1401.022
Lendejhari	6	2211.487	0	0	0	0	502.945	6.10	2720.532
Nakadongri	3	647.738	20.854	0	0	0	256.824	0.00	925.416
Pauni	16	3142.184	237.042	70.869	0	0	137.108	95	3682.203
Sakoli	0	0	0	0	0	0	0	0	0
Tumsar	4	591.779	35.058	0	0	0	72.438	0	699.275
Total	35	7807.93	1091.709	0	0	0	1221.315	143.6	10335.424

13.1.02 Following criteria have been adopted for the allocation of forest areas or compartments to this working circle:

- The compartments having more than half of its areas on the steep slope or in the stream buffer.
- The compartments which are close to and fall under the catchments of the major dams and directly draining into these water bodies.



13.2 General Characters of the Vegetation:

The forests composition varies from few Teak patches to the mixed crop having high proportion of miscellaneous crop. Saja is the predominant species. The common associates of Saja are Bija, Dhaoda, Bhirra, Garadi, Khair, Lendia, Mowai, Salai, Palas etc. Majority of the area supports stunted

Table No.13.2 Species-wise and Girth Class-wise Distribution in the P&CAM Working Circle:

Specie	16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-up	Total	Basal Area
Ain	10.49	7.03	5.31	3.11	2.63	0.66	0.41	0.17	0.04	29.86	0.62
Aonla	1.29	1.26	0.68	0.34	0.17	0.12	0.02	0.01	0.00	3.88	0.07
Behada	0.06	0.03	0.02	0.01	0.01	0.04	0.02	0.01	0.00	0.22	0.01
Bel	0.52	0.42	0.52	0.17	0.05	0.03	0.01	0.01	0.00	1.73	0.03
Bhirra	10.95	6.22	2.72	1.44	0.90	0.54	0.27	0.06	0.09	23.18	0.37
Biba	0.25	0.37	0.17	0.07	0.02	0.00	0.01	0.01	0.00	0.89	0.01
Bija	1.27	0.83	0.63	0.44	0.54	0.40	0.23	0.09	0.03	4.48	0.15
Bor/Ber	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00
Char	4.18	2.63	1.04	0.37	0.42	0.06	0.03	0.01	0.00	8.73	0.12
Chichawa	0.45	0.40	0.33	0.20	0.19	0.22	0.05	0.03	0.01	1.90	0.06
Dhaman	0.90	1.40	0.61	0.17	0.04	0.01	0.00	0.00	0.00	3.12	0.04
Dhawada	14.84	8.60	3.27	1.60	1.05	0.55	0.17	0.13	0.04	30.25	0.43
Garadi	35.28	16.96	6.35	1.74	0.37	0.08	0.02	0.01	0.00	60.79	0.58
Haldu	0.25	0.14	0.08	0.02	0.05	0.03	0.04	0.01	0.01	0.62	0.02
Hirda	0.02	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.08	0.00
Kalam	0.24	0.14	0.10	0.10	0.02	0.05	0.05	0.00	0.01	0.71	0.02
Kasai	0.37	0.70	0.43	0.25	0.11	0.05	0.02	0.01	0.00	1.94	0.04
Khair	0.02	0.07	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.13	0.00
Kulu	0.02	0.07	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.13	0.00
Lendia	15.52	6.34	2.11	0.80	0.36	0.15	0.04	0.04	0.00	25.36	0.26
Moha	2.09	2.05	1.06	0.66	0.60	0.37	0.32	0.14	0.14	7.41	0.21
Mowai	1.90	2.95	3.17	2.34	1.38	0.73	0.37	0.15	0.19	13.20	0.42
Palas	2.33	1.65	1.59	0.65	0.47	0.23	0.09	0.05	0.01	7.07	0.15
Rohan	3.09	2.04	1.58	1.00	0.60	0.32	0.16	0.03	0.02	8.85	0.19
Salai	0.05	0.15	0.14	0.17	0.20	0.25	0.14	0.10	0.31	1.50	0.12
Semal	0.03	0.03	0.04	0.07	0.05	0.01	0.02	0.01	0.04	0.31	0.02
Shisham	0.01	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.04	0.00
Shiwan	0.07	0.04	0.05	0.02	0.01	0.00	0.00	0.00	0.01	0.21	0.00
Surya	0.95	0.57	0.16	0.04	0.02	0.01	0.00	0.00	0.00	1.76	0.02
Teak	7.33	4.44	2.37	1.11	0.94	0.37	0.06	0.01	0.07	16.72	0.27
Tendu	5.13	1.60	0.97	0.87	0.51	0.30	0.13	0.04	0.04	9.58	0.17
Tiwas	0.07	0.11	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.21	0.00
Other	24.70	11.79	3.97	1.60	0.84	0.58	0.41	0.17	0.30	44.36	0.59
Total	144.73	81.11	39.56	19.41	12.58	6.19	3.08	1.30	1.36	309.31	5.01

tree crop. Planted Bamboos have come up well at many places. The species and girth class wise enumeration data is given in the Table 13.2.

13.2.01 The site quality of the crop varies from IVA to IVB. The quality is generally IVB in the upper slopes and IVA in the lower slopes. At few places, quality III is found on the planes, along streams and valleys. The density of crop generally varies from 0.4 to 0.7.

13.2.02 On the basis of enumeration results the species composition and their girth distribution in the forest areas under this working circle is given in the Table 13.2.

13.2.03 Natural Regeneration of common species is present, but their establishment vary with damages from grazing and fire. The coppice regenerations of some species are found in the catchments areas, however, at places, its growth is malformed and stunted due to excessive grazing pressure, repeated hacking by the local people and regular fire. Areas adjoining to villages are comparatively degraded. Bhirra, Lendia, Palas, Ain, Khair and at places Teak etc. are found on these areas.

Table No.13.3 Range wise Average Regeneration Recorded in the Protection & Catchments Area Management Working Circle.

(Number of seedlings/saplings per hectare)

Seedlings & Saplings per hectare in the Pro. & Catchmt. Area Management W.C.				
Range	Seedling (R1)	Sapling (R2)	Sapling (R3)	Total
	Up to 1 meter	1.0-3.0 meter	> 3 meter	
Adyal	0.00	0.00	0.00	0.00
Bhandara	0.00	0.00	0.00	0.00
Jamkandri	2203.67	622.33	52.00	2878.00
Pauni	1212.42	587.58	190.08	1990.08
Lakhani	0.00	0.00	0.00	0.00
Sakoli	0.00	0.00	0.00	0.00
Lendezari	2720.33	553.83	240.67	3514.83
Tumsar	848.00	619.00	198.00	1665.00
Nakadongari	705.00	487.50	323.50	1516.00
Lakhandur	0.00	0.00	0.00	0.00
Total	7689.42	2870.25	1004.25	11563.92
Average	1537.88	574.05	200.85	2312.78

13.2.04 Soil erosion is noticed all over the forest areas of the division. The top layer of soil which stores organic matter, and nutrients, on which plants feed, is lost in this process. It decreases the soil fertility, lowers the sub- soil water level and water holding capacity of the soil.



Sheet erosion in plains and gully erosion on slopes is moderate in most of the areas of the forest. But it is increasing at an alarming rate in forest all over the division. The erosion increased due to excess harvesting of coupes without soil conservation works in the next year of felling, excessive grazing and repeated fires.

13.2.05 The details of the compartments included in this Working Circle has been provided in the **Appendix - XLII**.

13.3 Special Objectives of Management: The irrigation dams and other water bodies are the life line of the agriculture based Bhandara district. They play a crucial role in the development and well being of the people of this tract. To check the soil erosion (siltation) and to arrest the water run off, by maintaining very good and healthy vegetation and by taking proper soil and water conservation measures in the catchments. This would help increase the longevity of these water bodies.

The special objectives of management of P&CAM Working Circle are:

- To protect the fragile forest sites and to reduce the silt load on the water bodies, by preventing the siltation of the dams and water bodies by checking the soil erosion in the catchment areas falling in the forests, by maintaining good vegetation and by taking soil and water conservation measures.
- To preserve and increase the vegetal cover and to help enhance the quantity and quality of water of this tract.
- To develop and optimise the natural biodiversity, wildlife and aesthetic value of these areas. This is aimed to cater the nature and wildlife conservation and education through **Eco-Tourism**.

13.4 Analysis and Valuation of the Crop:

13.4.01 Stock Mapping: The stock mapping has been done by Working Plan Division Nagpur with the help of staff of Bhandara Forest Division. Entire area under this WC has been stock-mapped; the result of stock mapping will be given in Appendix in volume II of Draft Plan Report and crown density mapping through image analysis of satellite imageries.

13.4.02 Age and Density: The crop is mostly middle aged with scattered patches of mature and young crop. The density of the crop varies from 0.4 to 0.7 with some share of open and degraded patches. The dense areas make a significant part of the crop.

13.04.03 Site Quality: The site quality of the crop varies from IVA to IVB at few patches and some area of quality III is found on the plains. The information from the previous plan has been used to delineate and digitise



the various site quality classes. Area details of its distribution is given in the table below:

Table No.13.4. Site Quality Wise Area Distribution: (area in ha.)

Site Quality	Bhanda ra	Ady al	J/Kandr i	Lakha ndur	Lakh ani	Lendezari	Nakhado ngri	Pauani	Sakol i	Tums ar	Total
TIII	0	0	0	0	0		0	0	0	0	0
TIVA	0	0	0	0	0	12.14	0	0	0	0	12.14
TIVB	0	0	0	0	0	22.11	0	89.759	0	0	111.872
MIII	0	0	0	0	0	275.954	284.29	471.464	0	147	1178.674
MIVA	358.1	169	293.478	0	0	1193.324	223.6	381.32	0	192.2	2810.508
MIVB	94.38	190	528.072	0	0	255.838	56.83	1750.57	0	200	3076.067
Total .	452.4	359	821.55	0	0	1759.37	564.72	2693	0	539	7189.261
U_S	70	0	385.13	0	0	452.118	84.076	686.111	0	87.69	1765.124
Plantation	0	0	0	0	0	6.1	0	95	0	0	101.1
Grass Land	0	0	0	0	0		0	0	0	0	0
Sub-Merge	0	0	194.34	0	0	502.945	276.624	137.108	0	72.44	1183.455
Encroachm ent	0	0	0	0	0		0	0	0	0	0
Blank	25.62	0	0	0	0		0	70.87	0	0	96.484
Total	548.1	359	1401	0	0	2720.53	925.42	3682	0	699	10335.424

13.4.04 Enumeration: Enumeration has been carried out in 211 plots over an area 75.96 ha. Inventory works include complete enumeration of species and girth distribution of all trees, regeneration and recording of site quality and density.

13.5 Method of Treatments: To check the soil erosion, to improve the stocking in the under stocked area and to improve the habitat for wildlife, the following measures are proposed:

- Silvicultural system is proposed on the pattern of **Ridge to Valley Watershed Management System**. In the eroded areas, areas prone to erosion, gullies and small nalas, appropriate soil and moisture conservation works, along with afforestation, should be taken to prevent further soil erosion, siltation of reservoirs and to enhance the vegetation cover and ground water table. Areas of each catchment should be treated as a unit.
- No harvesting is proposed in the areas. Wind fallen trees of valuable species only should be extracted.
- These areas are proposed to receive strict protection from grazing and fire and unwanted human interference.

As a matter of fact vegetative cover provides best protection to the soil and for these dibbling of seeds of suitable species in under stocked and blank areas will be done on planned basis and result of such a works will be evaluated in the following years.

13.6 Formation of Working Series and Coupes:

- **Working Cycle:** Treatment cycle is fixed at 20 years.
- **Working Series and Annual Coupes:** The area of this working circle is comprised of catchments of 42 water bodies. The catchments divided into 5 treatment series with an average area of 2067 ha for each treatment series. Each series is further divided into 20 annual coupes with an average area of 103.00 ha. The statement showing the allotment of compartments to the working series and their sequence of working is given in **Appendix- XLIIIA**.

13.7 Methods of Execution of Treatments: Demarcation, Preparation of Treatment Maps and Treatments:

- The Range Forest Officer shall inspect the coupe thoroughly then after proper demarcation, prepare the *Treatment Map* of the coupe, showing the various *Treatment Type areas*, on the compartment maps. The Assistant Conservator of Forests will check the treatment map and will make corrections in the map, if necessary. The Deputy Conservator of Forests will approve the treatment maps after careful examination.
- The treatment map will bear date of inspection, signature and official seal of the Range Forest Officer and the Assistant Conservator of Forests.
- The Treatment map will show the following areas for appropriate treatment :

Treatments Prescribed: The treatments prescribed for various treatment-type areas shall be, as follows:

A- Type Areas:

- Harvesting of Trees:** No harvesting of trees is recommended in these areas except wind fallen trees of valuable species.
- Soil and Moisture Conservation:** Soil and moisture conservation works, as prescribed in the chapter of Miscellaneous Regulations shall be taken in A3 type areas
- Bush Sowing:** Bush sowing of *Khair, Neem, Maharukh, Sandal, Babool, Ber and other local seeds* is to be carried out in the areas. Any one species should not constitute more than 25% of the total species.



- iv. **Stake planting:** Stakes of *Ficus* spp., Pangara, Salai or other suitable species will be planted at six-meter interval in the areas with sufficient moisture for these stakes.
- v. **Plantations:** If a suitable area, not less than 5 ha., is available, plantations of suitable miscellaneous species and Bamboo as per Miscellaneous Regulations shall be carried out.

B- Type Areas: Under-stocked and Open Areas: Treatments Prescribed:

i. Tending of Natural Regeneration :

a. Regeneration of Seed Origin: Seedlings and Saplings: All seedlings and saplings of desirable species, more than 60 cm. in height, will be nursed as future crop. Spacing out operation will be carried out, to maintain 400 saplings per ha. at an average spacing of 5 mt. These saplings will be nursed carrying out soil working and mulching for the next three years as it is prescribed in the SCI Working Circle.

b. Tending of Root Stock: Operations like Singling of coppice shoots and Management of damaged and malformed saplings will be carried out as prescribed in the SCI Working Circle.

ii. No harvesting is recommended in these areas.

iii. Required Soil & Moisture Conservation Works, like nala bunding, gully plugging, grass plantation etc. will be carried out.

iv. Seed Sowing of species like Babul, Neem, Khair, Sandal etc. will be carried out in areas where density of forest is less than 4.

v. Plantation of suitable species will be carried out if an area, not less than 5 ha. of degraded or open forest (excluding natural blanks), is available.

C Type Areas: Young Pole Crops:

i. Thinning: In case the crop is very congested (including congested Bamboo clumps not covered under Bamboo OL W.C.) and adversely affecting the growth and health of the crop, the required thing will be carried out as per the thinning guidelines in the Miscellaneous Regulations.

ii. No Plantation in this area will be taken.

D Type Areas: Well Stocked Areas:

i. Harvesting: No harvesting, except of dead trees, will be done.

ii. Suitable soil and moisture conservation works, if required, will be taken in the erosion prone areas.

iii. No plantation is recommended.



13.8 Monitoring of the Catchment Areas: As the catchments are very important for the water bodies, the results of the treatments given to these areas need to be monitored. The D.C.F with the help of Irrigation department, will develop a monitoring system to assess the result of the implementation of the treatments prescribed in the plan. The main objective of the monitoring will be the quality of water and the quantity of silt in it, going to the water, bodies and the state of vegetation in this Working Circle. All these records will be provided to the Working Plan Officer as **this assessment will be useful for the future planning of these catchment areas.**

13.9 Other Regulations: Grazing Closure, Fire Protection and other Regulations:

- To protect the natural and artificial regeneration and to reduce the rate of soil erosion, leading to siltation of water bodies, protection from fire and grazing is essential. Grazing closure will be enforced in the entire areas.
- The entire area will be provided with Class-I fire line protection.



Chapter XIV

FUELWOOD FODDER AND PASTURE WORKING CIRCLE

14.1 General Constitution of the Working Circle: The areas included in this working circle are mainly those forest lands which are highly degraded and incapable of even producing small timber and fire wood. These areas are located in the immediate vicinity of the villages and have very heavy demand of grazing which is the main cause of their degradation. Some small patches of forests, which can not be taken up for regular forestry working and have been excluded from the previous working circles, have also been included here. These areas are spread-over in all the ranges. The total area included in this working circle is 6277.468 ha. comprising 976.873 ha. of Reserved Forests and 5300.595 ha. of Protected Forests . It is extending over an area of 6.76 % of the total forests area of the division. Rotational grazing along with the protection to the site and soil and moisture works are expected to improve the site. This working circle includes

- The areas incapable of producing large and small timber or fuel to an appreciable extent and the areas over which the grazing demand is heavy.
- Failed plantation and highly degraded forest areas, adjoining to villages, with heavy biotic pressure of grazing and fire wood.

14.1.01 Area allocation along with the extent of dense and open forests, grass lands and blanks has been tabulated below. Areas under this Working Circle shows that 3923.5 ha. of dense forest falls under this working circle. The reason for the increased density in these areas due to non implementation of the prescription for the grass development. Species like Palas and Saja have come up from the root stock but the growth is not sound in most of the cases.

14.2 General Character of Vegetation: On the basis of enumeration results the species composition and their girth distribution in forest area under this working circle is given below:



Table No. 14.1 Range wise Comptt. and Area Allocation to F.F.P Working Circle (in ha.) On basis of existing Stock Mapping:

Range	Compts. included	Dence Forest	Open Forest	Blank Area	Encroachm ent	Grass Land	Submergen ce	Plantation	Total Area in ha.
Bhandara	10	619.335	135.66	0	0	210.452	0	0.00	965.447
Adyal	5	348.993	29.918	0	0	0	70.084	150	598.995
J/Kandri	0	0	0	0	0	0	0	0	0.000
Lakhani	11	1163.219	269.14	0	78.492	500.697	15.567	90	2117.115
N.dongri	6	326.262	163.184	0	62.247	112.568	0	0.00	664.261
Pauni	13	822.217	39.549	0	0	0	0	0	861.766
Sakoli	6	543.003	140.082	0	0	150.03	0	0.00	833.115
Tumsar	3	100.486	30.794	0	0	105.489	0	0	236.769
Total	54	3923.515	808.327	0	140.739	1079.236	85.651	240.00	6277.468

14.2.01 The forests put under this working circle contain degraded soils and are with heavy biotic pressure. They are therefore open (density ranges upto 0.3) containing brushwood and bushes along with the grasses. Few malformed, stunted and hacked trees are found scattered throughout the area. Stocking of tree species is poor but a few small patches of tree growth are found.

14.2.02 Tree species found are *Teak, Palas, Lendia, Bhirra, Ain, Bor, Dhaoda, Mowai, Salai, Char, Moha, Sitaphal, Rohan*. Thorny and bushy species like *Bor, Khair, Bharati, Eruni, Ghot, Chilati, Phetra* are also common. Grass species are *Kusal, Bhurbhushi, Ghonad, Sheda, Marvel*.



PF 115 One of the FF&P Coupes.



Old Soil Conservation work in Comptt. 115

Table No.14.2 : Species and Girth Distribution in F.F.P. W.C Area per ha.

Area = 8279.215									Area Enumerated 0.60 %.		
Area Enumerated 49.32 Ha.											
Specie	16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-up	Total	Basal Area
Ain	27.56	9.89	3.45	1.46	1.13	0.45	0.18	0.01	0.11	44.24	0.49
Aonla	0.30	0.04	0.14	0.02	0.00	0.00	0.00	0.00	0.00	0.50	0.01
Behada	0.49	0.31	0.19	0.11	0.10	0.01	0.00	0.01	0.01	1.23	0.02
Bel	0.26	0.04	0.03	0.06	0.02	0.00	0.00	0.00	0.00	0.40	0.01
Bhirra	4.51	1.56	0.48	0.47	0.25	0.00	0.00	0.00	0.00	7.27	0.08
Biba	0.46	0.21	0.09	0.02	0.03	0.00	0.00	0.00	0.00	0.81	0.01
Bija	0.80	0.15	0.01	0.02	0.05	0.00	0.00	0.00	0.00	1.04	0.01
Bor/Ber	0.04	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.06	0.00
Char	11.26	4.44	1.54	0.68	0.30	0.26	0.02	0.03	0.00	18.54	0.20
Chichawa	0.27	0.13	0.10	0.08	0.11	0.01	0.00	0.00	0.00	0.70	0.01
Dhaman	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
Dhawada	14.99	3.49	1.35	0.67	0.38	0.20	0.02	0.00	0.00	21.10	0.20
Garadi	7.58	2.18	0.47	0.09	0.00	0.00	0.00	0.00	0.00	10.31	0.07
Haldu	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.03	0.00
Hirda	0.34	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.00
Kalam	0.03	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.06	0.00
Kasai	0.09	0.04	0.00	0.01	0.00	0.00	0.00	0.07	0.00	0.21	0.01
Khair	2.35	0.55	0.19	0.07	0.01	0.02	0.00	0.00	0.00	3.19	0.02
Kulu	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
Lendia	16.77	2.95	0.93	0.13	0.11	0.02	0.03	0.00	0.00	20.96	0.14
Moha	4.84	2.36	0.77	0.55	0.73	0.55	0.19	0.16	0.66	10.82	0.32
Mowai	1.20	0.69	0.31	0.36	0.15	0.14	0.10	0.02	0.04	3.01	0.07
Palas	10.79	4.80	1.69	0.60	0.32	0.01	0.07	0.00	0.02	18.31	0.19
Rohan	10.53	2.96	0.58	0.44	0.36	0.25	0.04	0.02	0.00	15.19	0.15
Salai	0.00	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.04	0.00
Semal	0.03	0.02	0.03	0.13	0.09	0.00	0.00	0.00	0.00	0.31	0.01
Shisham	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Shiwan	0.08	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00
Surya	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00
Teak	9.94	3.35	2.15	1.14	0.81	0.37	0.03	0.03	0.07	17.89	0.26
Tendu	9.76	2.11	0.66	0.22	0.14	0.08	0.07	0.00	0.00	13.04	0.11
Tiwas	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
Other	22.15	6.68	1.80	0.69	0.17	0.11	0.03	0.02	0.05	31.70	0.27
Total	157.51	49.16	17.01	8.02	5.28	2.50	0.80	0.37	0.99	241.64	2.67

Source: Enumeration Data

14.2.03 *Rantulsi* and *Tarota* as weeds have extensively invaded these forests. There are other herbs and shrubs also which are spreading fast as weeds in the areas which were used as pasture lands and grass land in the past. Lantana has also invaded in large areas and in some places it has virtually replaced all other bushes, grass and fodder plants. The palatability of the vegetation and availability of the grasses from such areas is drastically reduced, because of regular and repeated fires every year. The top soil is also washed away due to heavy grazing and annual fire. Some areas are highly



eroded. Some areas are encroached the extent of encroachment can be known only after proper demarcation.

14.3 Blocks and Compartments : Details are given in the **Appendix- XLIV**

Table No. 14.3 Range Wise Area Distribution:

Range	FFP					
	RF		PF		Comptt. Total	Area Total
	Comptt.	Area	Comptt.	Area		
Bhandara	3	150.336	7	815.111	10	965.447
Jamkandri	0	0	0	0	0	0
Lakhandur	0	0	0	0	0	0
Lendejhari	0	0	0	0	0	0
Nakadongri	3	147.926	3	516.335	6	664.261
Pauni	4	196.388	9	665.378	13	861.766
Sakoli	0	0	6	833.115	6	833.115
Tumsar	0	0	3	236.769	3	236.769
Adyal	3	482.223	2	116.772	5	598.995
Lakhani	0	0	18	2117.115	18	2117.115
Grand Total	13	976.873	48	5300.595	61	6277.468

14.4 Special Objectives of Management:

- The forests put under this working circle are primarily intended to augment fodder requirements of the villages. Mostly it is grass, which is to be supplemented, wherever required, with palatable legumes and tree fodder to improve the productivity of dairy industry of the district.
- To improve the productivity of grass and fodder by introducing suitable superior varieties of grasses as well as legumes and fodder tree species in selected areas.
- To meet fuel wood and small timber requirement of the local people who are dependant, to a large extent, on these forests, though these tracts are primarily meant to act as grazing grounds and grasslands.

14.5 Analysis and Valuation of the Crop:

14.5.01 Stock Mapping - The conventional stock mapping have been carried out by the Working Plan Division. Nagpur, besides extensive enumeration exercise and carried out by the SOFR unit of Amravati. The digital vegetation map has also been procured from the FSI Nagpur, have also been used.

i. Age and Density - Areas are mostly open and blank and density ranges between 0.0 to 0.3. At places the density as per enumeration seems to be high but it is due to the inclusion of species like Palas and hacked stumps of Saja etc.

ii. Site Quality: Site quality governs the harvestable girth. The information from the previous plan has been used to delineate and digitise the various site quality classes. This information may be useful if in future it is decided that the land should be brought under timber plantation.

Table No.14.4 Site Quality wise area Distribution in Fuel-wood Fodder and Pasture working circle (area in ha.)

Site Quality	Ranges										Total
	Bhandara	Adyal	J/Kandri	Lakhandur	Lakhani	Lendejhari	Nakhadongri	Pauni	Sakoli	Tumsar	
THH	0	0	0	0	0	0	0	0	0	0	0
TIVA	0	0	0	0	0	0	0	0	0	0	0
TIVB	0	0	0	0	0	0	0	0	0	0	0
MHH	39.783	0	0	0	380.211	0	64.749	0	0	0	484.743
MIVA	579.554	0	0	0	346.189	0	76.038	54.82	325.65	0	1382.248
MIVB		192.9	0	0	536.323	0	262.172	40.062	324.24	111.121	1466.812
Total .	619.337	192.9	0	0	1262.72	0	402.959	94.882	649.88	111.12	3333.803
U_S	235.658	146	0	0	269.236	0	100.487	727.34	33.108	30.599	1542.429
Plantation	0	150	0	0	90	0	0	0	0	0	240
Grass Land	110	0	0	0	400.697	0	98.568	0	150.12	95.049	854.889
Sub-Merge	0	110.09	0	0	15.567	0	0	0	0	0	125.661
Encroachment	0	0	0	0	78.892	0	62.247	0	0	0	141.139
Blank	0	0	0	0	0	0	0	39.547	0	0	39.547
Total	965.447	599	0	0	2117.12	0	664.261	861.766	833.12	236.77	6277.468

iii. Enumeration: Enumeration was carried out in 137 plots over an area 49.32 ha. Enumeration results show species and girth distribution and basal area as well as regeneration status in the area.

14.5.02 Analysis and Valuation of Fuel-wood Fodder and Pasture Resources: Present enumeration primarily evaluates tree crop and this has been given under Table 14.2 above. However, for the proper management of grass and fodder resources and for their further development, different valuation method is required to be used. It should include valuation of soil type suitable for grassland management and its moisture content. This will help in deciding the grass species most suitable for a site to give optimum production. Extent of grazing and other biotic pressures as well as their effect on grass composition and yield shall also be considered as factors for such valuation.

14.6 Silvicultural System: Despite large area under grass land (cut and carry-away from grasslands permanently closed to grazing), grass production is very low. Also these forestlands are burdened with huge grazing pressure and secondly, the demand for grass resources on cut and carry- away basis is very low. Official grass production figures show declining trend. It is due to



various reasons. One of these reasons may be that grass availability has gone down so much that it is not economically beneficial to harvest grass resources. Another reason is that fodder resources from agricultural sector are readily available at cheaper rates. But the main reason for the low demand of cut grass is the free grazing of the cattle in the forests. The local people are either ignorant about the benefits of stall fed cattle or they do not want to go for this. Therefore, a long term strategy and sustained efforts are required to bring back grasslands of the Bhandara Forest Division to the level of their optimum production. The annual revenue realised from the cut grass in the division is given in the table below.

Table No.14.5 out turn of Grass:

Financial Year	Grass (M.Tonne)	Amount (in Rs.)
1996-97	N.A.	5000
1998-98	N.A.	9000
1998-99	N.A.	6000
99-2000	N.A.	6100
2000-01	N.A.	5100
2001-02	N.A.	5500
2002-03	N.A.	6500
2003-04	N.A.	6000
2004-05	N.A.	5500
2005-06	N.A.	6100

Based on the grass and forest resources of the site as well as the objectives of the management, the silvicultural systems to be followed are as under:

- a. Eradication of harmful and obnoxious weeds
- b. Seed Sowing of high quality local grass spp. like Paunia, Sheda, Marvel etc. and good nutritious legumes like *Stylo hemata* should be carried out in these areas to improve the quantity as well as quality of the fodder
- c. Plantation of good fodder tree species like Anjan, Maharukh, Ber, Babul, Sissoo etc. for assured supply of fodder in case of draught or fire.
- d. Regulated and rotational grazing in pasture areas.
- e. Regulating seeding, grass cutting and complete closure to grazing in identified grass lands.



- f. Improvement felling in dense tree growth patches to improve the tree crop as well as cater the needs of local people for small timber and fuel wood.

14.7 Method of Treatments: The method of treatment to improve grasses shall be three pronged i.e.

- (a) Rotational grazing in pasture areas.
- (b) Augmenting natural grasses and eradication of obnoxious weeds in grasslands through closure to grazing and uprooting respectively.
- (c) Artificial Regeneration of high quality grasses and fodder trees.

(a) Rotational Grazing in Pasture Lands: Major area under this working circle belong to Bhandara, Pauni, Lakhani and Nakadongri ranges and they shall be regulated for controlled grazing as per prevailing grazing rules. Pasture lands have been divided in to Pasture Series and each series will have 4 coupes, namely A, B, C and D. Each coupe shall remain closed to grazing for three years. The coupe will be demarcated one year before the due date of closure and the period of the closure will be prominently displayed at the convenient places. In the closed coupe, works for facilitating improvement in grass and fodder productivity such as removal of weeds and woody growth will be taken up. All obnoxious weeds and thorny shrubs and bushes shall be uprooted. The non-palatable grasses, such as, Kusal, Bhurbhushi, etc. shall be eradicated in the pre-flowering state only. Soil and moisture conservation works may be taken up extensively to improve the site, such as CCTs, Nalla-bunding and gully-plugging etc. **The planted areas of the coupes will remain closed for five years but the grasses can be cut and carried away from the second year of planting.**

(b) Augmenting Natural Grasses in Grass Land: Areas containing palatable natural grasses shall be closed to grazing and work of removal of weeds to facilitate these grasses to come up naturally will be taken up. It has been seen that as a result of protection to grasslands, a lot of shrubs invade the area as weeds resulting in reduction in grass production. Hence, only the manually/ mechanically removal of such weeds is suggested. It will require complete and permanent closure from grazing but with a provision of drawing fodder resources from it on 'cut and carry-away' basis. They are to be cut only after grass seeding. Grasslands developed as grass birs (permanent grasslands) are therefore to be allowed for grass cutting on rotational basis, and 4 years after their establishment.

(c) Supplement through Artificial Regeneration: To improve the productivity of areas deficit in grass and fodder.



14.8 Treatment Cycle, Series and Annual Coupes:

Treatment cycle is fixed at 4 years.

Treatment Series and Annual coupe - The working circle has been divided into 6 Fodder Series with an average area of treatment series 1046.24 ha. Each Fodder Series has been further divided into four annual coupes with an average area of coupe 261.5 ha. Details are provided in **Appendix-XLVI**.

14.9 Demarcation and Treatment Prescriptions:

14.9.01 Demarcation: The coupe due for closure to grazing will be demarcated one year in advance, by cutting 3 metre wide lines and erecting pillars at suitable intervals. The pillars inside the compartment will be different than the boundary pillars to differentiate the compartment boundary and coupe boundary. To demarcate these coupes, permanently trench-cum-mound fencing will be dug with adequate passage at one place for the entry of cattle. If possible, barbed wire fencing may be used instead of TCM.

14.9.02 Treatments Prescribed: After demarcation, the area will be thoroughly inspected by the RFO and the treatment map will be prepared showing the following areas.

1) A-Type Area: Protection areas – slope more than 25 degrees, areas along the water courses and areas prone to soil erosion.

- i. Soil and Moisture Conservation works
- ii. Seed Sowing and Stake Planting of Fodder Tree spp.(like Babul, Khair etc.) and seed broadcasting of superior grasses in open areas is recommended.

2) B-Type Area: Degraded and open areas: Area suitable for the introduction of better fodder grasses, legume and fodder trees.

- i. Soil and moisture conservation works as per Miscellaneous Regulations.
- ii. Well scattered grass beds of the dimension 8 m. long, 1 m. wide and 15 cm. deep will be prepared @ 38 beds per ha.
- iii. 30cm X 30 cm pits for fodder tree plantation will be dug at a spacing of 15m x 15m.

3) C & D-Type Areas: If patch/patches of dense crop are found then

- All malformed, dead and damaged (including live high stumps) trees, to be removed.
- Spacing out will be done in case the crop is young.
- All fruit and NTFP trees to be retained.
- Fodder plantation will be carried out as in B-Type, if open space is available after felling.

Each year, areas suitable for fodder development, will be selected out of the coupes and developed for fodder either by removal of obnoxious weeds and unwanted grasses, where good quality grasses already exist or through plantation of suitable fodder trees, Good quality grasses and legumes should be taken as mentioned above. These works shall preferably be carried out under JFM programme. **No fencing is advised as the social fencing is expected under the JFM programme.**

14.10 Other Regulations:

- Seeding of Grasses:** In the closed coupe to allow seeding of fodder grasses, cutting of grass will be prohibited from first June to 30th November, after which the grass will be allowed to be removed by cutting.
- Fire Protection:** The areas will be strictly protected from fire every year with the involvement of local JFM Committees.
- Frequent Inspection:** The area closed to grazing will be inspected frequently by ACF and RFO. The villagers will be persuaded to stall feed their cattle from the grasses obtained from closed areas. Close co-ordination will be maintained with the agriculture and the animal husbandry departments, so that the villagers of these areas can be benefited by other Rural Development Programmes implemented by these agencies.



Chapter XV

THE WILDLIFE (OVERLAPPING) WORKING CIRCLE

15.1 General Constitution of the Working Circle: The location of Bhandara Division's forests is very important from the wild life management point of view and the said areas have already been included in the proposed Tiger Habitat and corridor management. These forests are important for corridor management between the P.As like Tadoba, Navegaoan, Nagzira, Kanha, Pench (MP) and Pench of Maharashtra, as it provides the continuity of forests among these P.As. Out of these six P.As, four are Project Tiger areas. For the adjoining P.As, like Navegaon and Nagzira, these forests provide an additional space too, for the wild animals. Under the present circumstances when most of the P.As are facing the problem of corridor, the forests of Bhandara Division can provide the solution to this problem, if managed properly with a futuristic approach.

Considering the importance of these forests a separate Working Circle has been included in this Working Plan. This is basically an overlapping working circle, but a few exclusive areas from the point of wildlife management are proposed to be given special protection and treatments for better management of wildlife in the areas, specially where there is a Protected Area around it. The prescriptions given in this chapter, applies to the forest area of the Division as well as to the issues relating to control the illegal trade in wild animals and animal articles in and around Bhandara city. It includes the total area of the Bhandara Division.

15.1.01 General Condition of Flora and Fauna: The general condition of vegetation has been prescribed in various working circles. The general condition and density of wildlife in the Division is good, however, its distribution is quite uneven. Wildlife population density varies with the habitat depending upon availability of food, water and shelter. The forest of Bhandara Division is miscellaneous forest which is devoid of natural grass land, essential for the growth of herbivores. Therefore, most of the wildlife confined to the compact forest grass of Tumsar, Tiroda and Sakoli ranges adjoining to Nagzira Sanctuary and Navegaon National Park. The minimum concentration of wildlife is in Paoni range. The common wild animals found in tract are given as under: List of animals is given in Appendix – LVII.

A. Carnivores: (i) Tiger (*Panthera tigris*) (ii) Panther (*Panthera pardus*) (iii) Wolf (*Canis lupus*) (iii) Striped Hyena (*Hyaena hyaena*) (iv) Wild dog (*Cuon alpinus*) (v) Jackal (*Canis aureus*) (vi) Indian Fox (*Vulpes bengalensis*) (viii) Leopard



Cat (*Felis bengalensis*) (ix) Jungle Cat (*Felis chaus*). (x) Common Mongoose (*Herpestes edwardsi*).

Tiger is usually found in Tumsar and Sakoli range and in the Nagzira sanctuary. Panther is found in almost all the ranges. Hyena, Jackal and Foxes are found very frequently near the inhabited areas. Wild dogs are found in and around Nagzira sanctuary. Jungle cats are common.

B. Herbivores (i) Gava (*Bibos gaurus*) (ii) Nilgai (*Boselaphus tragocamelus*) (iii) Sambhar (*Cervus unicolor*) (iv) Cheetal (*Axis axis*) (v) Barking Deer (*Muntiacus muntjak*) (vi) Wild boar (*Sus scrofa*) (vii) Sloth bear (*Melursus ursinus*) (viii) Four horned antelope (*Tetraceros quadricornis*) (ix) Common Langurs (*Presbytis entellus*), (x) Rhesus Macaque (*Macaca mulatta*), (xi) Bonnet Macaque (*Macaca radita*).



Herd of Gava in Nagzira Lake. (Nagzira Wildlife Sanctuary)

Gava are confined to Nagzira Sanctuary and Navegaon National Park and they can be seen in the adjoining forests of Bhandara Division. Nilgai and Sambar are found in hilly ranges. Chital is found all over the tract. Wild boars are confined to hills and valleys all over the tract. Langur and monkeys are quite common. Barking deer is found in Nagzira Sanctuary, Tumsar and Jamkandri Ranges.

Blue Bull (Nilgai) is found all over the tract. Rest of the herbivores are found mostly in the compact area. Hares are common throughout the Division.





Sambar and Cheetal are found in the forest, specially in the areas adjoining Nagzira

C. Rodents: (i) Three striped palm squirrel (*Funambulus palmarum*) (ii) Jungle striped squirrel (*Funambulus sublineatus*) (iii) Porcupine (*Hystrix indica*) (iv) Hare (*Lepus ruficaudatus*) and (v) Jungle Rats and Moles.

D. Snakes: Kadu (*Typhlops braminus*), Kawda (*Lycodon aulicus*), Gavtya snake (*Macropisthodn plumbicolor*), Dhondya (*Natrix piscator*), Dhaman or Common Rat-snake (*Ptyas mucosus*), Indian Rock Python-Ajgar (*Python molurus*), India Cobra or Nag (*Naja naja*), Dandekas (*Bugarus caeruleus*), Russel's Viper or Ghunus (*Vipera russelli*). Checkered keel back (*Xenochrophis piscator*)

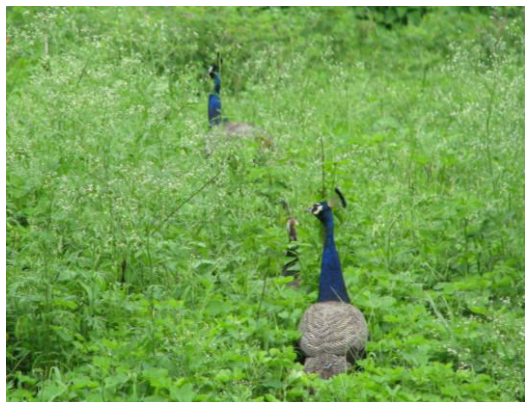
The rich natural setting has been responsible for rich snake pollution in the area, whereas Python (Ajgar) is commonly found deep in the forest.

E. Fishes: Besides large irrigation reservoirs, many small irrigation tanks are resources for future potential of fishery development in the district. The major catch from the riverine resources comprises local fishes e.g. Tambir (*Labeo fimbriatus*), Waghur (*Clarias batrachus*), Bodth (*Bagarius bagarius*) and Tambu (*Anguilla bengalensis*). Prawn rearing mainly of *Macro-brachium malcolmsonii*, constitutes an important fishery in the district. The prawn found in the Wainganga river is famous for its quality and taste. The important species of fishery found in the tank and other reservoirs are Catla (*Catla catla*), Mrigal (*Cirrhina mrigala*), Botri (*Channa purctatus*), Dookkar machhi (*Nsindus nandus*), Bam (*Mastocembelus pencaulus*).

F. Wild Birds: (i) Painted sand grouse (*Pterocles indicus*) (ii) Common sand grouse (*Pterocles exustus*) (iii) Pea fowl (*Pavo cristatus*) (iv) Grey jungle fowl (*Gallus sonne ratil*) (v) Red jungle fowl (*Gallus gallus*) (vi) Red spur fowl (*Gallus spadicea*) (vii) Painted partridges (*Francolinus pictus*) (viii) Grey partridges (*Francolinus pondicerianus*) (ix) Jungle bush quail (*Perdicula asiatica*) (x) Black breasted quail (*Cturnix coronandelicus*) (xi) Indian Bustard quill (*Turnix suscitator*) (xii) Common or grey quail (*Coturnix*), (xiii) Pigeon (*Treron phoonicoptera*) (xiv) Crane (*Grus antigone*) (xv) Dove (*Streptpotia spp*)



(xvi) Cotton teal (Nettapus coromandelianus) (xvii) Whistling teal (Dendrocugna javanica) (xviii) Comb duck (Sarkidiornis melanotus). (xxix) Little Grebe (Podiceps ruficollis) (xxx) Cormorant (Phalacrocorax carbo) (xxxi) Grey Heron (Ardea cinera) (xxxii) Large Egret (Ardea alba) (xxxiv) Black ibis (Pseudibis papillos) (xxxv) Pariah Kite (Milvus migrans govinda) (xxxvi) Shikra (Accipiter badius) (xxxvii) India Whitebacked Vulture (Typs bengalensis).



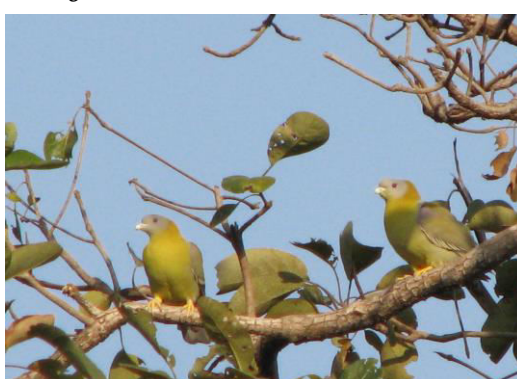
Pair of Pea-fowl



Cattle egret



Blossom Headed Parakeets



A pair of Yellow Legged green pigeon

(xxxviii) Parakeets (xxxix) Moorhen (Gallinula chloropus), (xL) yellow Legged Green pigeon (Terno phoenicoptera).

15.2 History of the Wildlife Management in General:

From time immemorial the wild animals have occupied a place of pride in the folklore of Indian culture. They were respected and protected by the tribals who never used to kill the animals for fun or pleasure. However, hunting became an important pastime for the Rajas and Maharajas who used to hunt and kill the animals for meat as well as for preparing trophies. In the Reserved Forests, hunting was restricted and licenses were used to be issued for small game, big game, etc. and shooting blocks were set apart, where the animals specified in the license only could be hunted.



The population of some wild animals in Bhandara Forest Division as per 2005 census is as given below in the table:

Table No.15.1 Census Report (2005) of Bhandara Dn:

Sr No	Name	Population	Sr No	Name	Population
1	Tiger	4	10	Langur	2334
2	Panther	8	11	Gaur	55
3	Sloth Bear	62	12	Jungle Cat	8
4	Sambar	115	13	Mongoose	11
5	Nilgai	167	14	Barking Deer	219
6	Wild Boar	981	15	Jackal	62
7	Wild Dog	76	16	Wolf	7
8	Cheetal	434	17	Hyena	9
9	Chousinga	9			

Prior to the abolition of the proprietary rights, hunting in the *malguzari* forests was done with the permission of the *malguzars*. Consequent to the vesting of these forests in the Government as Protected Forests, hunting in these forests was also regulated by fixing shooting blocks and by issuing licenses. Census data of Navegaon National Park and Nagzira Wildlife Sanctuary are given in **Appendix – LVA and LVB respectively**.

However, after the enactment of the Wildlife (Protection) Act, 1972, the hunting and trading of wild animals and its trophies were strictly monitored and subsequent amendments in this act in 1991 and 2002, hunting of any animal included in the Schedules of Wildlife (Protection) Act 1972, (other than vermin), as game or sport, has been completely banned.. Hunting of wild animals however can be allowed for special purposes but only in exceptional circumstances. This act also enjoins on us the responsibility for wildlife conservation outside the protected areas. The maintenance of biological diversity is the new mandate of National Forest Policy, 1988. Restriction of degraded habitats outside the protected areas is one of the strategies for action listed in National Wildlife Action Plan (2002-2016). Therefore, primacies of environmental concerns and biodiversity conservation have been dealt in this chapter.

The wildlife, which used to flourish in the forests of the Division, is threatened due to various factors like population explosion, encroachments, over grazing, regular forest fires, improved network of roads and availability of sophisticated weapons. Due to increase in demand for wildlife products all over the world, poaching problems have increased over the years in and around Nagpur, which is adjoining to Bhandara, special efforts are required to be made by the Division to protect the wildlife in the region.



There are many Wild Animals seen in the forest. Their habits, behaviour are different, according to that they are categorised as below.

Table No.15.2 Table Showing Category wise Animals of Bhandara Dn.

Sl. No.	Category	Name of Wild Animals
1	Primates	All type Monkeys
2	Canidae	All Dog Family animals like Jackal, Wolf, Foxes, Wild Dog etc.
3	Ursidae	Sloth Bear
4	Mustelidae	Common Otter.
5	Viverridae	Civet Cats, Toddy Cat, Common Palm Civet
6	Herpestidae	Mongoose
7	Hyaenidae	Hyena
8	Felidae	Cat family, Tiger, Panther
9	Sciuridae	Flying Squirrel (common giant)
10	Hystriidae	Indian Porcupine
11	Muridae	Rat Family
12	Leporidae	
13	Bovidae	Indian Bison(Gava or Gaur)
14	Corvidae	Black Buck, Blue Bull, Four Horned Antelope, Indian Gazelle, Spotted Deer, Sambar
15	Tragulidae	Mouse Deer
16	Suidae	Wild Pig, Pig Family
17	Manis	Pangolin

Besides these mammals there are many other animals belonging to amphibian, reptilian, and avian groups. Out of them many birds are migratory and visit the area in a particular season, mostly during winter. They are under great threat from poachers and (aquatic birds) fishermen.

There are many endangered insects and plants also included in the wildlife Act's schedule. They silently play a very important role in the ecology but do not get proper importance from the forest department. These lower animals and plants also need special treatment so that their viable population can survive.

15.2.01 Existence of Wildlife in Forest: Existence of particular wild animals in a particular forest can be identified from the following observations.



1. **By Actual Sighting:** In the early morning or evening, near water holes, grazing sites or on the roads, we can see the wild animals.
2. **Pug Marks:** By keen observation of these pug/hoof marks we can identify the category of wild animals, their sex and age.
3. **Grazing Marks:** The method of grazing of different herbivores is different. We can identify the category of herbivore by the nature of grazing and browsing.
4. **By Excreta:** By the examination of excreta we can know the category of wild life, their numbers, way of walking and, quantity of food etc.
5. **Antlers Marks (on the stem of tree):** Before falling of antlers, Spotted Deers and Sambers rub their antler to some stem. In Spotted Deer and Samber this habit can be observed.
6. **By Smell (odour):** Many animals having the smell glands. In Hyena these glands are found in his Anus and in case of Black Buck they are found below their eyes.
7. **By Salt Licking Places:** In forest some soil contains more percentage of salt and minerals and wild animals use to lick this soil to get the necessary amount of salt.
8. **By Sound:** In forest we can hear different types of sounds of wild animals. Some wild animals give signal of danger to other animals with the help of different sounds. for ex. Deer, Samber, Monkey etc.
9. **By Wallowing Sights:** Samber, Wild Boars etc like mud and they wallow in mud. By this they clean their skin and protect it from insects.
10. **Nail Marks:** Tiger and Bear with the help of their Claws/nails scratch the bark of some trees.

15.3 Injuries to Wild Animals:

15.3.01 Poaching : In spite of stringent provisions in the wildlife and forest laws, poaching for skin, bones, pets and flesh, continues to be the most important reason for destruction of wildlife in the Division. Poachers usually shoot the animals when they (wild animals) come to waterholes. Therefore the animals are particularly vulnerable during summer, when number of such water holes is drastically reduced and also water in a water hole recedes to minimum.

It has been recently noticed that a new and very dangerous method of poaching through poisoning of drinking water by mixing urea in large concentration has been innovated by the poachers. When an animal drinks such water, it dies within hours due to intense gas formation in stomach and chocking of breathing organs. The poachers then remove the skin or bones of the dead animal for trafficking.



Setting of nets, snares and traps for catching birds, hares and sometimes small animals like deer has been recorded in the past but of late the poachers have been found using the improvised traps for killing the large animals, like Tigers and Panthers, very effectively and regularly.

Electrocuting the animals including Tigers by laying live electric wires on the tracks followed frequently by wild animals and by drawing electric current by high tension lines passing through the forests is another new method which is proving to be a potential threat to animals, besides sometimes being hazardous to local people. Data pertaining to poaching of Tiger and Panther as well as natural deaths of Tiger and Panther in Bhandara Division during 1996 to 2006 is given in the tables below:

Table No. 15.3 Natural/Accidental Death of Tiger/Panther during 1999 & 2006

Year	Death	No	POR No & date	Cause of death
1999	0	0	0	0
2000	0	0	0	0
2001	0	0	0	0
2002	0	0	0	0
2003	Panther	1	3456/11,Dt. 10-6-03	Accident by Railway
2004	0	0	0	0
2005	0	0	0	0
2006	Panther cub	1	91/22,Dtd. 1.2.06	Death due to fall in well

Table No. 15.4 Death of Tiger/Panther due to Poaching during 1996 to 2006

Year	Death	No	POR No & date	Cause of death
1996	0	0	0	0
1997	0	0	0	0
1998	0	0	0	0
1999	0	0	0	0
2000	0	0	0	0
2001	0	0	0	0
2002	0	0	0	0
003	0	0	0	0
2004	Panther	1	4849/2 Dt. 10-4-04	Electric current
2005	Panther	1	4847/9 Dt. 13-1-05	Poaching
2006	0	0	0	0



15.3.02 Degradation of Habitat: Due to various human activities the habitat of various wild animals are degrading very fast and is manifested in the form of reduced population of many animal and bird species. The main factors adversely affecting the wild habitat are:

- Heavy biotic pressures, like over grazing, encroachments on forest lands, large scale human and cattle movement in the forest areas, forest fires etc. are responsible for the general degradation of these habitats.
- Large scale diversion of Forest Land for **projects like, irrigation dams and canals** are also adversely affecting the wildlife habitat by fragmenting the forest areas and creating permanent barriers for the movement of wild animals on one hand and risk to their lives, specially for the young ones, on the other hand. The Forest department should convince the Irrigation department to construct suitable passages for wild animals at suitable regular intervals. This could have been avoided, had the Dy.C.F. put the condition for these passages in the proposal of the project under Forest (Conservation) Act, 1980.



Gose canal under construction through forest land – Detrimental to wildlife movement and threat to their lives.

15.3.03 Diseases: The livestock from the villages in the forests regularly frequent the forests and share the water holes used by wild animals. Therefore various diseases common in domestic cattle, and which spread through contact and are water borne (contagious diseases) are passed from livestock to wild animals. Most frequent is foot and mouth disease. Other diseases which may occur are (1) Anthrax (2) Rabies (3) HS (4) FMD (5) Canine distemper. FMD has a potential to wipe out large populations, while rinderpest, anthrax and rabies are highly infectious and lead to certain death.



15.3.04 Fires: Forest fires are of common occurrence these days. The fires in the interior of the forests, besides destroying the natural habitat of the forest fauna drive them to take shelter near the human habitation and make them easy targets of poacher's guns or local villager's weapons. Due to fire even the young ones of big and strong animals may perish, besides other animals, reptiles and birds, who live on ground and can not escape the fire and its heat. In case if they survive, their food, grasses, herbs and shrubs are destroyed which is already insufficient to meet the requirements of cattle as well as the wild animals. The whole tract experiences water scarcity in summer. These fires aggravate the already existing water scarcity and expose these animals to above mentioned risks. It increases the man animal conflict.

15.4 Damages to Properties and Injuries to Human due to Wildlife:

15.4.01 Damages to the Crops: Incidences of crop damages is increasing as the number of wild animals is increasing and the pressure on their grazing land is increasing due to the grazing and fire. The herbivores are coming out of the forest and damaging the agricultural fields leading to the man-animal conflict. Details about crop damage during the period 2004-05 and 2005-06, is given below:

Table No. 15.5 Table Showing Crop Damage by Wild Animals and compensation paid:

Period	No of Cases	Crop loss in ha	Wildlife	Compensation Paid (Rs)
2004-05	Nil	Nil	Nil	Nil
2005-06	70	26.18	Wild-Boar, Sambar, Chital	52,050

15.4.02 Injuries to Cattle and Human: The carnivores, Tigers and Panthers particularly sometimes kill domestic cattle grazing in the forests. There are also cases of human injury and even death due to attacks from wild animals. The villagers sometimes indulge in poisoning the carcass to take revenge and cases of electrocution of wild animals by the villagers to kill the animal suspected to have killed the cattle have also been reported. In such cases the persons involved in illegal killings of the wild animals do not have any intention of poaching or trade but such activities on the part of local people pose grave danger to animal populations in the forests. Human being attacked by Wild animals during 2002-03 and 2004-06 is given in the **Appendices – LV and LVI**. The Govt. of Maharashtra therefore has evolved a policy of compensating for the loss of livestock as well as for the injury or loss of human life.



15.5 Animal Health, Diseases and its Symptoms: Like other animals many times wild animals are also get sick due to contagious diseases. The reasons for their sickness are as follows:

From the observation of its behavior and condition of its body, we can come to know whether the wild animal is sick or healthy. The following measures are helpful for the identification of condition of wild life health:

Table No. 15.6 Table Showing Symptoms of Healthy and Unhealthy Wild Animals:

Sr. No.	Particulars	Healthy	Diseased
1	Behavior	Cautious, Clever, smart, swift	Drowsy
2	Head	Up-wards	Down-wards
3	Mouth and Nose	No bleeding	Bleeding may be seen
4	Hairs on body	Bright	Rough and erected
5	Ear	Erected	Fallen (Drooping)
6	Eyes	Bright	Drowsy
7	Diet	As usual	Avoid to take diet
8	Response	Alert	No response
9	Walking	Stylish	Prefer to sit
10	Milk kas	Good in condition	Found swollen
11	Back side observation	Backside high	Backside goes inwards
12	Ribs	Not seen	Seen
13	Waist bones, Back-bones and, skeleton of stomach	Continuous, bones not seen and , seen rounded from back side	Waist bones and back bones are seen, there will be deep portion on back
14	Two bones of waist	Seen triangular from back side	Waist bones do not seen as triangular.

Following Factors are Responsible Contiguous Diseases:

1. Common grazing areas with village cattle.
2. By contact.
3. Common water holes.
4. By excreta.
5. By meat.
6. By communication media.
7. By human being.
8. Other factors.



Types of Diseases Found in Wild Animals:

1. Bacterial disease
2. Viral disease.
3. Fungal disease.
4. Parasitic disease.
5. Protozoan disease.

15.6 Wild life First Aid: Some times wild animals get injured by accidents or by disease. Many times these injuries are so small that there is no need to get them to Veterinary doctor. Therefore it is necessary for forest staff to know about these small injuries and first aid to be given to the animals accordingly.

15.7 Special Objectives of Management:

- 1) To ensure wildlife (animals & plants found in wild) protection and conservation in the managed forests of this Division.
- 2) To ensure scientific management of wildlife in the managed forests by undertaking measures like habitat management, waterhole development and monitoring population of the wild animals.
- 3) To provide extra space for Nagzira Wildlife Sanctuary and corridor for other P.As.
- 4) To ensure protection of ecologically sensitive and special habitat sites for wildlife conservation, such as riparian zones, mesic sites (natural water seepage sites), perennial water holes, natural grasslands, natural wallows, salt licks, natural resting, breeding and nesting sites (caves snags, overhangs, groves of old Ficus trees, thick Bamboo groves).
- 5) To check wildlife trade and smuggling.
- 6) To promote and encourage ecotourism without disturbing and damaging wildlife.
- 7) To disseminate percept of biodiversity and wildlife conservation and generate awareness among local communities, to seek support for this cause.
- 8) To protect the wild animals from various diseases.
- 9) To provide best possible habitat to the wild animals in the forest areas to minimise the Man-Animal Conflict.

15.8 Recommendations for Future Management: Nagzira Sanctuary and Nawegaon National Park adjoin the Division, which is exclusively managed for wildlife protection and conservation. Besides these two PAs, the forests of Bhandara Division falls in between Project Tiger areas like Tadoba, Pench and Kanha. In order to provide extra space and safe corridor for free movement of wildlife and to reduce the impact of biotic pressure on the Protected Areas and to conserve the special wildlife habitat and sensitive ecological sites in



the area the proper management of the forests of Bhandara is extremely necessary. The improved habitat will discourage the wild animals from straying into the human habitation, thus reducing the chances man animal conflict. For better management of the Wildlife, the P.C.C.F(Wildlife) has issued a very comprehensive standing order and if it is followed by the field staff, most of the problems related to wild life will be solved. The Dy.C.F shall take initiative and educate all the field staff regarding this Standing Order and all the instruction shall be followed.

15.8.01 Standing Order (Wildlife) No. 001.

The PCCF (WL) MS, Nagpur has issued a standing order (Wildlife) No.001 (**Appendix LXXXIV**). This order prescribes duties and lists measures for the protection and conservation of the wildlife outside PAs. Following are the general prescriptions, majority of which are based on the guidelines under this Standing Order, for the protection of wildlife in the areas outside the Protected Areas. The territorial staff of the Bhandara Division shall scrupulously implement these prescriptions.

1. Duties of Forest Guard, Forester, RFO and ACF include-

- Keeping information of waterholes, particularly in summer and watch on the same, that is, special vigilance at all the water holes in the Division is prescribed.
- Keeping a watch on the electric lines passing through forests.
- Ensuring registration of arms licenses as required under Wildlife (Protection) Act 1972.
- Cognizance of cases of injury due to wild animals as per Govt. Orders from time to time.
- Keeping a track of animals like Tiger, particularly Tigress with cubs and a watch on such vulnerable animals.
- Proper disposal of carcass of wild animals found dead or killed.

Local staff shall maintain record of sensitive wildlife areas such as areas with heavy wild animal concentration.

A network of information system shall be established. A cell under RFO (MS) of the Division and also under DFO (Vigilance) in the office of CCF (Territorial) for handling wildlife offence cases, shall be established. There shall be regular short-term training/ workshops in anti-poaching activities and legal requirements in dealing with wildlife offence cases. Forest check posts shall be sensitized for keeping a watch on wildlife offences. Any transit of wildlife articles etc. from these check posts should be scrupulously stopped.

2. Nature education programme in the villages adjoining forests and in schools and colleges shall be arranged.



3. Ecologically sensitive habitats shall be identified and protected.
4. Antler trade is now banned; hence, no collection of shed antlers is to be allowed.
5. The involvement of Honorary Wildlife Warden be encouraged for nature education programme, as well as in establishing network of informers and in eliciting people's participation.
6. It will be insured that cattle grazing in forests near the important wildlife habitats are inoculated against contagious diseases.

15.8.02 Creation of Data Base: It is prescribed that the Division will undertake compilation of data of floral and faunal resources, as well as ecologically sensitive sites in the Division and creates a comprehensive database for the Division.

The Division will also carry out survey of *riparian zones, mesic sites, perennial water holes, saltlicks, natural wallows, resting places, breeding and nesting sites, etc.* and map them (with GIS) for the purpose of their protection and management. The staff will also identify the areas where these sites are under stress and threat. The Division will also maintain a meticulous record of these sites on a register the "Register of the Special Wildlife Habitat" and update it annually by an officer not below the Range Forest Officer.

The Division will undertake census survey for estimation of the wildlife population, including the migratory and other rare birds, at the frequency decided by the Chief Conservator of Forests (Territorial); in addition to All India Tiger and Panther Census. Special note should be taken if any nesting site of endangered birds like Vultures is noticed.

15.8.03 Delineation and Mapping of Special Habitat Areas: Delineation of the special wildlife habitat sites including natural water seepage sites (mesic sites), water holes, natural wallows and saltlicks used by the wildlife, breeding sites, dens or nesting sites of animals and birds appearing in the Schedules of the Wildlife (Protection) Act, 1972 shall be carried out and marked on the Divisional/range maps. For instance, the Mango and Jamun groves on moist sites are generally the mesic sites. **A strip of 50-meter around special habitat sites shall also be delineated and mapped to serve as buffer for the site.**

While preparation of treatment map of coupe for working in the area-specific working circles the special wildlife habitat sites given above shall be identified and marked on the map along with its buffer of **50 metre width strip around.**

15.8.04 Habitat Development Works: Due to continuous biotic pressure, the wild life habitat has also deteriorated and today it has reached a critical condition. The most important factors in the habitat are water, food, safe



places for resting, breeding, and nesting. Wallows and salt licks are other factors. To meet the minimum requirement of the wild animals the following activities are recommended: (List of Compartments, where various habitat development works are recommended, is mentioned in the **Appendices – LVII A&B**)

A. Water Hole Development: Water availability, or the scarcity of it, is one of the major factors that decide the health of the habitat. Its non-availability at sufficient places in the forests also increases probability of animals being found on the limited water holes or near villages and thereby increases their susceptibility to poaching. Water is a major limiting factor during the summers in these forests. The water hole density shall be commensurate with the density of wild animals found in the area and as per the wildlife management regulations. To meet the requirement the following steps may be taken:

- i. All the perennial and ephemeral water holes will be identified, recorded and marked on Divisional/range maps.
- ii. De-silting, if required, shall be carried out during summer to provide adequate drinking water.
- iii. Creation of additional water holes (permanent and temporary) is prescribed so that undisturbed water holes are available within about 5 kilometres of the areas, frequented by the large herbivores.
- iv. Small nalla-bunds, underground bunds and other technically sound small water harvesting structures may be constructed across the streams to create water holes and habitat development.
- v. Small water harvesting structures with submergence area less than 1/2 hectare shall be taken up. However, creation of water holes or water harvesting structure should not damage the riparian ecosystem.
- vi. Small cement concrete saucer shaped water holes shall be constructed at suitable and safe places. These waterholes will be filled with water by Bullock carts.

The work of water hole developments were taken up in Bhandara Division during the year 2005-06 under 7% zilla parishad grant. Division should improve the wildlife habitat in the region by taking the works are as follows:

1. Repairs to anicuts.
2. Construction of Bore wells, with attached cement saucer shaped tank of 3 metre diameter in 5 ranges.

Sometimes wild animals become dangerous to human population, due to increased population of wild life in that area; in such cases, they are to be transported to other suitable places like National Parks, Sanctuaries, dense forests etc. Keeping such aspect in mind, it is proposed to procure



animal cages (both trapping as well as transport) and tranquillising gun to tranquillise the animal to put them in cage. The required fund may be allotted to the Division. Besides these, proper video and still digital cameras should also be procured to document all wildlife related activities.

D. Food/Prey Base: Whether the prey base is adequate or not shall be ascertained from regular herbivore count. Supplements of cattle kill should be taken into account while computing existing herbivore population. Any downward trend should be looked into seriously and possible reasons for its downslide must be found out and rectifying steps must be taken.

To improve the prey base, care of herbivores should be taken by improving the assured fodder availability in the forest, specially during the summer season, when the forest grasslands are burnt. Fodder trees like Ber etc. should be protected and propagated for this purpose. The open areas in interior forest areas should be developed into meadows for the herbivores.

E. Development of Nesting Sites: Bhandara Division has many water bodies, small and large and lots of water birds are found in these water-bodies. To provide suitable nesting places to these birds, seed sowing of species like Babul and takes planting of species like Banyan and other Ficus spp. should be done near water-bodies and in the riparian areas.

F. Mitigation of Canal Induced Fragmentation of Habitat: It has been observed that very good forest areas, rich in vegetation and wild life, have been fragmented due to the construction of canals of Gose-khurd and Bawan Thadi Irrigation Projects. This is highly detrimental to the wildlife conservation. The D.C.F. will take initiative in mitigating the fragmentation of the habitat, induced by the construction of canals, with co-operation of the project agencies. The D.C.F, with the project authorities, will identify the areas where passages (Bridges with natural look) can be constructed on these canals for the wild animals, so that the corridor for these animals is not obstructed and they can move and migrate freely. For the under-construction project of **Bawanthadi, it is proposed that three Bridges, each at least 25 mts. wide, should be constructed between 1) 4 & 10 km., 2) 13 & 16 km., 3) 17 & 19 km. of the main canal, from the dam.** These works shall be appropriately designed and technically approved by both Irrigation Project authority as well as the Chief Wildlife Warden of Maharashtra. The D.C.F is also advised that, in future, while recommending any such projects for diversion of forest land, proper care must be taken regarding corridor and all precautions should be taken to avoid any fragmentation of the habitat. If it is unavoidable provision of proper and safe passages for the wild animals should be included in the project at the cost of the project authorities.

15.9 Protection Measures for Wildlife:

There are many villages within and nearby the forest. They are dependent on agricultural and forestry works. These villages, with large



number of live stock, are threat to the wild animals as they share the same water bodies and grazing grounds. Due to common grazing and drinking water at same places, many contagious diseases may spread in the wild animals. To protect the wild animals from such contagious diseases, forest department with the help of Veterinary doctors, should take the following preventive measures in such villages:

Vaccination of Village Cattle: All cattle of adjoining villages should be vaccinated every year for Foot and Mouth disease.

Regular Health Checkup for Cattle: Forest staff, with the help of veterinary doctor of the area, should organize annual cattle health checkup camps in villages. Required vaccination should be done and if required, proper treatment to sick animal should be given.

Proper Sensitization of Staff: The field staffs of the Division should be trained in day to day wildlife management and protection works. They should work in close cooperation with the Wildlife wing, i.e. Staff of Nagzira Sanctuary and Navegaon National Park.

Protection from Poaching and Trade: The forest staff shall develop an intelligence system with the help of local people, specially with Joint Forest Management Committee, to gather information about any activities related to poachers and traders of wild life.

- Regular patrolling by the staff shall be carried out in the areas where the population of wildlife is more, specially during summer when these animals become more vulnerable due to shortage of water in the forest areas.
- Poaching of birds is also common and it is not given due importance. The aquatic migratory birds are to be protected from the fishermen.
- The fishery department and the local villagers should be convinced to use fishing nets of such size so that small fishes are left in the tank for these water birds.
- The forest staff shall also be vigilant in the towns' market where at times birds like Parakeets, Partridges, Quails, Water-Birds, Monitor lizards, Tortoise, Turtles etc. are brought for sale.

Protection of Forest from Over-grazing and Fire: After poaching, uncontrolled grazing and fire are the most important factors, adversely affecting the wildlife. To restrict illegal grazing , by cattle including goat, sheep etc., and during the fire season, to prevent the forest fires, patrolling parties should carry out regular patrolling in the sensitive areas of the forest.

Supply of Books: Books, related to Wild animals disease, treatment, tranquilization, wildlife management etc. should be supplied to the field staffs to improve their management skills. Short period training of tranquilization of



wild animals, to the forest staff and Veterinary Doctors, will be given by the wild life staff. This will facilitate safe capture and transportation of wild animals in trouble.

15.9.01 Transportation of Wild Animals: In case some wild animal is rescued, they should be safely transported to a safe place, without any delay, after giving it the first aid.

1) Precautions to Be Taken while Translocating the Wild Animals:

- Generally the transportation is done by Truck.
- The schedule of program should be prepared and should be intimated to the staff concerned.
- The cage with the trapped animal should be immediately covered so that the animal can not see out side specially the human crowd and is not scared or disturbed by people while loading, transporting and unloading.
- The crate should be kept smoothly in the truck with the help of crane.
- Before transportation wild animal should be tranquilized and should be lifted with the help of stretcher.
- Health of wild animal should be examined by a veterinary doctor before and after transportation.

2) Material Required for Transportation:

- Empty crate.
- Nylon rope, heavy duty wire rope, iron mesh, crow bar.
- Drinking Water.
- Bucket, Mug.
- Tarpaulin.
- Stretcher.
- Torch, Walky Talky, Mobile Phones.
- Phenyl.
- Other essential materials.

Transportation Crates: Following 4 types of crates used for transportation of wild animals. The size of crates varies according to size of animal and nature of transportation.

1) Transportation Crate: Used for transportation. General size is - length--8 feet, Width--5.5 feet, height--4.5 to 5 feet.

2) Treatment Crate: Treatment to wild animals is given in these crates. Sometimes transportation is also done in these crates. Size is according to the requirement.



3) Bait Crate: Without tranquilisation or where tranquilisation facility is not available, wild animals can be captured and transported in such crates. General size is Length-8 feet, width 4feet, height 4feet.

4) Combined Transportation and Treatment Crates: Many times wild animals gets injured while capturing in such cases, it is necessary to give them treatment before transportation.

3) Materials Required for Tranquilization.

Materials Required:

- Blow pipe with standard equipment
- Gas rifle model no. 50 with standard equipment. (range 70 m)
- Gas pistol model no. 35 with standard equipment. (range 50 m)
- Pneumatic blow pipe model 45 delta-special with equipment.

Medicines for Tranquilisation :

- Ketamine 100 (50 ml. x 2)
- xylazil 100 (50 ml. x 2)
- Antagozil SA (20 ml x 10)

15.10 Marking Reservations, Other Restrictions: The following, prescriptions have been made for implementation along with coupe operations and other treatment prescriptions, in the wildlife area-specific coupes.

- No felling of trees or harvesting of any sort shall be allowed on these sites and in 50 metre wide buffer strips around them.
- While marking of dead, wind fallen and malformed trees in annual coupes, 2 trees per hectare shall be kept reserved, as snags and dens to provide for nesting and resting of wildlife. No fruit tree of wildlife importance shall be marked for felling in the annual coupes.
- While harvesting at least 2 down hollow logs, of low commercial value, per hectare shall be reserved for shelter of wildlife.
- Tendu collection centres or labour camps shall not be allowed near water holes frequented by the large mammals or other important wildlife species. The labour camps shall be established away from areas of high wildlife density.

15.11 Development of Fodder and Browse

- The carrying capacity for grazing is determined after excluding the forest area required to meet fodder requirements of the wild animals and ecologically sensitive sites and special habitat sites for wildlife in the area.



- Habitat improvement is proposed at places having high density of wildlife and the areas frequented by both domestic animals and wildlife.
- Plantations prescribed in various working circles shall include at least 10 percent of fodder and fruit species of wildlife importance. *Ficus* spp. (*Vad*, *Gular*, *Umbar*), *Ber*, *Anjan*, etc. are recommended for this purpose.
- In the areas falling within the FTL 2-4 metre level of major and medium irrigation projects, planting of good fodder grass shall be taken to increase the grazing facilities for the wildlife.

15.12 Annual Works and Requirement of Fund: The Dy.C.F. Bhandara will take special care to motivate and orient the field staff in favour of Wild life through regular meetings, guidance and workshops. Some of the RFOs and Foresters shall be sent to short term training in the Wildlife Institute of India. Besides this help of trained officers and staff of wildlife Divisions may also be taken.

To start the work of habitat improvement some demonstration works and visits to wildlife areas should be carried out to expose the field staff to the technical aspects of Wildlife Management. The details of year-wise works to be carried out and its financial requirements are given in the **Appendix - LXXXV**

15.13 Other Protection Measures:

- Special vigilance is prescribed at water holes during summer season because of vulnerability of wildlife to poaching. Anti-poaching intelligence network of the wildlife wing should be used and supplemented to prevent wildlife offences in the Division.
- The field staff should be trained in anti-poaching activities and dealing with offence cases related to wildlife. Forest check posts should be made sensitive to the wildlife offences to check its illicit transport.
- The areas near sensitive water holes frequented by the wildlife may be excluded from grazing, and specially mentioned in the grazing license. Inoculation of cattle grazing near sensitive wildlife habitat sites and waterholes frequented by wildlife.
- The special wildlife habitat sites shall be effectively protected from fire, grazing and other adverse influences.
- Removal of flower, fruit and other medicinal parts and harvesting of herbs shall not be allowed in ecologically sensitive areas. The NTFP harvesting should be watched and monitored to prevent loss of genetic material from the forest area.



- Any person possessing a firearm and residing within 10 kms of the forests will register his name with the Deputy Conservator of Forests.
- Joint patrolling with police on the identified wildlife sensitive routes has been taken up in all the ranges.
- There is growing trend in killing the wild animals by electrocution. Normally the farmers take electric current illegally by attaching wire to the over head line wire in the night. The animals get killed due to electric current due to tripping. MSEB officials are involved in Tiger Cell meeting. Tripping prone areas identified where vigilance is increased.

15.14 Compensation For The Loss of Live Stock : The scheme, which was introduced for the first time in 1971, covers the loss of Cow, Buffalo, Bullock, Sheep, Goat and other livestock (as per definition given under Section 2(18A)) due to attack of a Tiger, Panther or any other wild animal. The present rates of compensation as per the GR No.WLP-1002/C.No.258/F-1 of 27.1.2003 are as follows and compensation is to be paid within 3 months.

- 1) Cow, Buffalo, Bullock 75% of the market price or Rs.9000/-and whichever is less;
- 2) Sheep, Goat, other livestock 75% of the market price or Rs.3000/- and whichever is less.

Cattle killed by wild animals and compensation given by forest department; the details are given below:

**Table No. 15.7 Compensation Paid for the Loss of Livestock
During the 1996-97 to 2006-07**

Year	No of Cases	No. Cattle Killed	Compensation (Rs)
1996-97	62	68	82800
1997-98	28	28	51675
1998-99	36	41	95100
1999-00	46	48	116150
2000-01	51	56	98250
2001-02	52	52	105950
2002-03	51	54	131175
2003-04	62	69	226675
2004-05	58	61	267500
2005-06	10	10	52075
2006-07	17	20	59780



The conditions to be fulfilled for Compensation:

- 1) Death to be reported within 48 hours.
- 2) Carcass is not to be removed before case is made.
- 3) No death of any wild animal within 10 km radius area in the next 6 days.
- 4) Immediate investigation by forest officers as to the wild animal, which killed the cattle as well as likely amount of compensation.
- 5) Compensation to be sanctioned by an officer not below DCF/DFO.
- 6) No compensation in case the livestock was grazing illegally.

15.15 Compensation for the Injuries to and Loss of Human Life:

Introduced through GR dated 27.1.1986, the scheme covers death as well as injury including minor injury caused to any individual in an attack by a wild animal. Any such attack by Tiger, Panther, Sloth Bear, Bison, Wild Pigs, Wolf, Hyena, Jackal and wild dogs is covered under the scheme. Present rates of compensation have been fixed through GR No.WLP-1002/C.No.258/F-1, dt.17.1.2003 and dt.20.5.2003. These are as follows:

- 1) Death or permanent disability Rs.2.00 lakhs to legal heir.
(Adult as well as minor)
- 2) Major injury Rs.50,000/- to the individual injured.
- 3) Minor injury Cost of medication, preferably in govt. hospital, but in case of unavailability, private medication, limited to Rs.7500/-per individual.

There is considerable number of human casualties in the area due to wild animals. Information is in the **Appendix - LV.**

Conditions for the Claim of Compensation for Injuries or Death of Human Being: Following are the conditions put for the claiming and deciding above compensation:

- 1) Such attack should not have occurred when the individual was indulging in violating the Wildlife (Protection) Act 1972.
- 2) Relative/friend should report the attack within 36 hours.
- 3) Police/forest officer to investigate within 3 days.
- 4) Death/injury due to wild animal is to be certified by the govt. medical officer.
- 5) Compensation due to death is to be given only to legal heir and compensation due to injury is to be given to individual concerned.



- 6) Compensation is to be sanctioned by the officer not below the rank of DCF/DFO.

15.16 Eco-Development, Awareness Generation and Eco-Tourism:

- Effective protection and management of sensitive ecological and special habitat sites/areas is not possible without active involvement and support of village communities in the vicinity. Their help and support can only be ensured if their genuine needs and concern are given due consideration by the department. If the people living around are poor and anguished, the objective in question can not be achieved. Thus, to seek their willing support and goodwill it is proposed to undertake eco-development works by the Division in villages around these sites. It is also proposed to promote and encourage eco-tourism in the Division by extending and developing camping and nature interpretation facilities at sites/spots, rich and unique in natural and cultural beauty and diversity. It is, in accordance with, the current policy focus of the State and Government of India on eco-tourism. The forest department should be in touch with the MTDC for the development of such sites.

- The prominent **water bodies and specific habitat sites** in the Division are proposed as sites for creation of **Eco-centres** with facilities of nature interpretation and eco-tourism and to serve as centres for awareness generation and dissemination of issues and concerns of forestry and wildlife.

The villages adjoining sensitive sites are proposed to be taken up under eco-development program for their overall development. Eco-development plans shall be prepared with the help of local communities.

It is also prescribed to delineate sacred sites/grooves and worship sites, including, sites for tribal deities with involvement of the local village communities. They are marked on the Division/range maps.

- Archeologically important sites identified as such by the Archaeological Survey of India or the State Department of Culture shall be delineated to serve as focal sites for eco-tourism.

- The Division will maintain record of sacred and cultural sites on a register *the "Register of the Cultural Sites"* and verified and update it annually by an officer not below the Range Forest Officer.

- Awareness generation campaign be taken up to involve local villagers in the wildlife conservation programme. *Village Panchayats* and *JFMCs* shall be involved actively to further the cause of wildlife protection.

Teaching institutions viz. schools, colleges, etc. and NGOs shall be involved through nature camps, wildlife film shows, exhibitions, seminars, competition, etc.



Chapter No XVI

BAMBOO (OVER-LAPPING) WORKING CIRCLE

16.1 General Constitution of the Working Circle:

16.1.01 This working circle includes all the areas where Bamboo is present in workable quantity, natural or planted. Workable means that there are sufficient Bamboo clumps which require independent working. This includes areas of SCI as well as Improvement working circles. The total area of the working circle is 22626.218 ha. and is spread over 54 Comptts. in all the ranges except Lakhandur range. Actual area under Bamboo is 5161.974 ha. There are some old Bamboo plantations in the division, some of which are not growing due to congestion. Details of these plantations are given in the **Appendix-LI**. They are proposed to be worked as per the prescriptions given in this working circle.



Working of such congested clumps is necessary to improve the crop.

16.2 General Character of the Vegetation:

16.2.01 The general character of vegetation in the areas included in this working circle is given in the respective working circles; the condition of Bamboos only is described here. There is only one species of Bamboo i. e. *Dendrocalamus strictus*, occurring in these areas. In almost all the ranges, the Bamboo has come up due to plantations taken in different years in the past. The natural Bamboo is rare in these ranges and is confined to some nalas. The natural Bamboo slumps have deteriorated primarily due to illicit cutting.



Even new recruits are cut by the illicit cutters. The position of Bamboo in plantations varies greatly. In the PBI areas of previous plan, Bamboo has overlapped the other crop, in many coupes and the growth is luxuriant. Some of the patches appear as pure Bamboo forest, specially in coupes no. A, B and C of almost all felling series of previous plan. In addition to this, Bamboo has been planted in old PBII, PB un-allotted and CWR coupes of the previous plan.

The survival and growth of Bamboo varies from area to area. In most of the cases the clumps have become congested. In some areas, cleaning of clumps has been done in the past. But the work has been taken arbitrarily, therefore, all the areas need immediate attention. In some areas clumps of planted Bamboos are also being damaged by illicit cutting.

16.2.02 The growing stock has been considerably damaged due to over harvesting, frequent fires, illicit cutting and over grazing. The irregular working has resulted in extensive damage to the Bamboo clumps at places, and shrinkage of the Bamboo area over the years. Approachable areas have been heavily exploited and the interior clumps suffer from congestion. Many of the successful plantations have not been worked leading to deformation and congestion of clumps.

16.3 Blocks and Compartments: The abstract of Range wise Bamboo area distribution is shown in the following Table.

Table No. 16.1 Range wise Bamboo Area Distribution:

Range	No. of Comptts.	Area (Ha.)	Area under Natural Bamboo (Ha.)	Area under Bamboo Plantations (Ha.)	Total Area under Bamboo (Ha.)
Bhandara	2	900.155	151	0	151
Adyal	2	805.162	200	0	200
JamKandri	2	877.604	251.874	0	251.874
Lakhni	4	854.588	53	130	183
Landejhari	8	3607.767	540	190	730
Nakadongri	13	5644.354	916.9	607	1523.9
Pauni	10	4824.586	911	0	911
Sakoli	3	1279.937	180	50	230
Tumsar	10	3832.065	651.2	330	981.2
Total	54	22626.22	3854.974	1307	5161.974

16.3.01 Bamboo area have been divided into 9 Felling Series, each felling series further divided in to three coupes i.e. A,B & C. Felling series and coupe wise details of compartment and Bamboo area is given in **Appendix LI & LIA**.

16.4 Special Objectives of Management:

To meet the requirement of the local people as Bamboo has a significant place in local economy. Local tribal and non-tribal families use Bamboo for construction, fencing and for making variety of implements.



Bamboo has a great potential as an alternative to the timber and supports handicraft artisans called *Burads* for their livelihood. It has significant value for interior decoration, furniture making and manufacture of other articles of domestic use. Hence, increasing the Bamboo productivity, in the division, is very important for the development of local inhabitants of this region.

- This working circle aims at improving the Bamboo productivity for meeting local needs and demand in the surrounding areas.
- Harvesting of Bamboo on scientific manner to obtained maximum sustained yield.
- To meet the local people demand Agricultural, Crafts and, Artisans.
- To protect the Bamboo clumps, both natural and artificial, from illicit cutting, browsing, fire and congestion.



Protection and Tending of Bamboo clumps, damaged due to browsing by goat, is necessary to improve the crop.

16.5 Method of Treatment: Each clump is prescribed to be treated as an independent identity for the treatment. Silvicultural system shall be the Culm selection system, each Culm to be treated as a stem. Clump cleaning is prescribed as an integral part of Bamboo harvesting operation. Successful old



Bamboo plantations and patches of gregariously flowered areas are prescribed to be cleaned as per para 16.10 under Bamboo harvesting.

16.6 Cutting Cycle and Sequence of Cutting:

- Cutting cycle of 3 year duration is proposed for the Bamboo harvesting.
- The entire area in the working circle has been divided into 9 Felling Series of an average area 2514.02 hectares.
- Each cutting series is further divided into three cutting sections of average size 838 ha. in the cyclic order viz. A, B and C; that will serve as annual coupes in each cutting series. The sequence of cutting is given in the **Appendix – LIA**.

16.7 Agency for Harvesting: Since the harvesting of Bamboo will require close supervision, it will be worked departmentally. The harvested Bamboos will be brought to the sale depots for further disposal.

16.8 Method of Harvesting :

- **Demarcation:** The coupe due for working will be demarcated before the onset of monsoon, in the year in which they become due for harvesting, by erecting poles at suitable intervals. On the poles, compartment number, coupe number and name cutting series will be written. The coupe due for working in the regular working circle will be excluded from this, to avoid duplication of work.
- **Estimation of Clumps:** Most of the areas included in this working circle contain planted Bamboos at 6m -6m. The growth of Bamboos differs from compartment to compartment and even in the same compartment. In natural Bamboo growth, the clump size varies.

Soon after the demarcation, the whole coupe due for working will be thoroughly inspected by RFO. The inspection will be carried out compartment wise and the area containing Bamboo will be shown on the map. In area 5% enumeration Of Bamboo will be done and the Bamboo will be classified in to above three categories. Since in plantation, Bamboos are planted at 6m-6m, therefore, exact estimate of Bamboo clump can be made. In case of natural Bamboos also, the approximate estimate can be made as the Bamboos in this case will be confined to nalas or slopes. As per the enumeration the estimates of various works and yield of Bamboo will be made.

16.8.01 Method of Working: The method of working will be as per Rules for Bamboo harvesting works 1994. Present practice of working Bamboo forest areas on three years felling cycle shall continue.

- i) No harvesting works should be permitted from 15th June to 30th September.
- ii) No clump should be considered fit for harvesting unless it contains more than 12 mature culms (one year as well as two year old included).



- iii) No culms below the age of two years will be felled.
- iv) Following culms shall be removed from all clumps.
 - (a) All dead, decayed and dry Bamboos.
 - (b) Culms whose half or more top part is broken or damaged.
 - (c) Twisted or malformed culms.
- v) In a matured clump the following type of culms (green and living) will be retained:
 - (a) All current seasons i.e. less than one year old culms.
 - (b) From rest of culms equal in number to the current seasons (i.e. less than one year old) culms or eight, whichever is more.
 - (c) The remaining culms will be considered available for harvesting.
- vi) The cutting height of culms will be between 15 cms. to 45 cms. above ground level i.e. above the first internode above the ground. The cut shall be made with a sharp instrument.
- vii) In case of any flowering, no Culm from flowered clumps shall be felled in the year of flowering.
- viii) Harvesting of Bamboo shall be done in a manner so as to ensure that the retained culms are evenly spaced and that some mature culms i.e. more than two years old are retained on periphery for the purpose of support to the new culms.
- ix) Following acts will be strictly prohibited.
 - (a) Digging of rhizome.
 - (b) Lopping of Bamboo culms for fodder.
 - (c) Use of tender Bamboo culms for bundling.
- x) Climbers affecting the growth of Bamboo clumps shall be cut.
- xi) A clump will be distinguished as an independent clump where its periphery is easily discernible from the adjacent clumps, irrespective of its distance from other. Only when such a distinction is not possible, two clumps within one meter distance will be considered as one.
- xii) The exposed Bamboo or rhizome on the periphery should be covered with the slash and earth to provide nourishment to spreading rhizomes and thus promoting peripheral growth of culms.
- xiii) Very often soft and flexible, current year culms are demanded by Burads for basket weaving, this practice is much against the silvicultural norms. This practice is injurious to the Bamboo crop; hence no immature Bamboo should be harvested.

16.9 Identification of Bamboos: Since the marking of Bamboo is highly selective, it is essential to distinguish current year or a previous year or mature culms from each other.



- a. **Current Year:** Culms sheath is present on lower half of the culms, branches are present throughout the length of the culms and white bloom is present abundantly and comes off easily.
- b. **Second Year:** Culms sheath is absent, branches are present practically at all nodes. White bloom is patchy and comes off easily.
- c. **Third Year:** Culms sheath is absent, branches are present practically at all nodes, white bloom is absent, and replaced by blackish gray.

16.10 Bamboo Flowering: Flowering is either periodic (Gregarious) or annual (Sporadic). It is either gregarious, sporadic or both. Gregarious flowering is usually followed by the death of clumps, but in some cases of sporadic flowering, the clumps do not die after flowering. The details of treatment given to such a area is as given below.

16.10.01 Gregarious flowering: Period, extent and location of the flowering will be recorded in the divisional notebook. Extraction of Bamboo will be deferred for one year in case of the gregarious flowering. The clumps will be clear felled after seeds are mature and have been collected. Strict protection from fire and grazing will be provided for 7 years to the area where Bamboo seeds would be found viable. **All Gregarious flowerings should be immediately reported to the Chief Conservator of Forests, (T) Nagpur Circle**, who should issue necessary instructions for management of the flowered area. The incidence of gregarious flowering should also be brought to the notice of the Working Plan Officer, the Conservator of Forests, Research Circle and the Officers-in-charge of specialised seed units in FDCM and the Department. Seed collection, disposal of Bamboo from dried clumps after flowering and tending operations for Bamboo seedlings requires extensive planning and timely action. Very often seeds after the gregarious flowering are subjected to fungus attack and if such incidence is noticed, following treatment should be effected: The area should be sprayed with a very light solution of fungicide like Bevestein.

16.10.02 Treatment of Gregariously Flowered Areas: The area of gregarious flowering must be closed to grazing and special fire protection measures must be implemented.

The Bamboo seeds falling on the ground should germinate and establish into seedlings. The resultant clump formation generally takes nearly 8 years to reach at the harvestable stage. Hence, the grazing closure should continue for 7 years in areas, where Bamboo seedlings would be found adequate.

Once the seeding is over, all the flowered clumps will be clear felled and removed in the year following the gregarious flowering

Collection of Bamboo Seeds: Fresh and viable seeds of Bamboo are proposed to be collected from the areas near the clumps. The seed collection should preferably be organised under the management of the specialised seed units.



Tending Operation of Natural Crop: The gregariously flowered areas will be tended every 3rd. Year, matching with the annual Bamboo coupes. The tending operation will cease, if the new clump foci fall below 100 per hectare, clumps become harvestable, or eight years after the Bamboo seeding.

Bamboo Seedlings 1-3 years Old: To induce formation of healthy clumps, evenly distributed, 250 clump foci of 80-cm diameter will be formed in the area having good Bamboo regeneration. Groups of Bamboo seedlings showing good growth will be preferred for the foci formation. Weeds, climbers and other Bamboo seedlings up to 1.50 meter around Bamboo foci should be cleared in July-August to assist growth of Bamboo seedlings in the selected foci. The entire area will strictly be protected from fire.

Beginning of the Clump Formation: 4 - 8 years old: Immature crop will receive cleaning operations till the crop becomes harvestable. All badly grown, twisted and damaged culms will be removed from the selected foci. Weeds, climbers and other Bamboo seedlings up to 1.50 meter around Bamboo foci should be cleared, and soil working should be carried out in August. The entire area will continue to receive protection from fire and grazing.

Mature Bamboo Crop: Fully mature clumps may be harvested in the eighth year onward depending upon location in the annual coupe.

Cleaning Operations: All clumps will be cleaned during the coupe working. Cleaning operations in Bamboo clumps will include following elements:

- (a) Climbers infesting Bamboo clumps will be removed.
- (b) All dead, decayed and dry culms will be removed.
- (c) All culms, cut high above the ground, will be cut above the first inter-node.
- (d) Twisted culms will be removed.
- (e) Top-broken culms, with more than half of the top damaged and malformed culms will be removed.

16.11 Other Regulations:

- **Fire Protection:** Fire causes extensive damage to the new shoots of Bamboos and, therefore, these areas must be completely protected from fire by removing all debris from the forest in the form of cleaning.
- **Grazing Control:** These areas should be protected from grazing especially after flowering and in the rainy seasons in which the recruitment of new culms takes place.
- **Control of Injuries Due to Insects:** The Bamboo culms damaged by the insects like, *Estigmina chinensis*, *Chrysomelidac colioptera* and *Bryotrachelus longipipes*, should be cut and burnt during winter, when these insects hibernate. The insects hide under the debris, and can be eliminated by causing light ground fire during the winter in the affected areas. Bamboos are highly susceptible to insect attack and



moderately susceptible to fungal attack. They are also often attacked by *Lyctus* (powder pest beetle) and by *Dinoderus minutus*. *Dendrocalamus strictus* responds well when it is treated with a mixture of Boric Acid, Copper Sulphate, Zinc Chloride and Sodium Dichromate in a ratio of 3:1:5:6.



Chapter XVII

OLD TEAK PLANTATION (OVERLAPPING) WORKING CIRCLE

17.1 General Constitution of the Working Circle: Teak and other plantations have been raised in Bhandara Forest Division in the past. Among these old plantations, Teak is the most valuable species, it requires altogether different treatments and periodical cultural operations for its optimum commercial production on a sustained basis. All areas with old and successful Teak plantations are proposed to be included under a separate working circle, 'the Old Teak Plantation (Overlapping) Working Circle'. As the plantations have not been done in a planned manner, the Teak plantations have been done haphazardly and intermittently. All these plantations have not been successful, and any attempt to achieve normal distribution of age classes has not been made in the last working plan. The areas of under Teak plantations seem to have been irregularly selected and hence the plantations are found scattered throughout the Division. Many plantations have been suppressed and have not grown properly due to unsuitable sites, mainly due to under planting. At many places it is noticed that in spite of good survival percent, the saplings have not grown properly as they are suppressed by already standing miscellaneous trees.



Congested Teak Plantation (Lendejhari Nursery)

17.1.01 Area Distribution: The list of various old Teak plantations have been compiled by the Working Plan Division, Nagpur, it includes the Teak plantations raised between the year 1958 and 2003. The current stock maps as well as the stock maps of the previous working plan, written by Dr. Nandkishore also show old Teak plantations and some information provided by the Dy.C.F., Bhandara. Efforts were made to obtain up to date detailed information and maps of old Teak plantations, but in vain. The information about these plantations is given in the **Appendix - L** and the range wise abstract is as follows:



Table No.17.1 Table Showing Range wise area Distribution of Teak Plantations:

Sr No.	Ranges	No of Sites	Area (in ha)
1	Adyal	0	0
2	Bhandara	17	487.80
3	Jamkandri	9	605
4	Pauni	15	415.800
5	Lendejhari	5	517.00
6	Nakadongri	6	669.00
7	Sakoli	11	425.800
8	Tumsar	18	1669.300
9	Lakhani	6	483.00
10	Lakhandur	0	0
	Total	87	5272.700



One of the successful but highly congested Teak Plantations of Bhandara Dn.

17.1.02 As per the list mentioned above, total Teak plantations till the year 2003 were raised on 5272.7 ha. Plantations proposed to be raised during the plan period under Selection-cum-Improvement and Improvement working circles are, for the purposes of their silvicultural management, also to be included under this working circle during the next revision.

17.1.03 Considering the above situation regarding the lack of clarity about the plantations in the Division, it is felt necessary to create database of the old and successful plantations and to begin this work with Teak plantations. Teak plantations, which could not be included under this chapter due to the



lack of information, shall be identified on the ground and mapped accurately during this plan period. It may be worthwhile to locate and map the plantations with the help of GPS. Bhandara Forest Division, with the help of Nagpur Working Plan Division, will jointly endeavour to reconcile the records and create an accurate database of the successful plantations during the course of implementation of this plan. The Teak plantations not included in this working circle due to lack of information shall also be given required silvicultural treatments according to the prescriptions prescribed in this chapter. In case the information regarding any particular plantation is not available, the concerned ACF should be assigned the duty of identifying such plantations and collect all relevant data by getting the age (Stump analysis method) of the plantations and by checking the relevant records of that year.

17.2 General Character of the Vegetation: The plantations are scattered in various compartments. Separate enumeration of the plantations has not been done. The various compartments in which these plantations are located contain the representative forest crop of the particular working circle, which that compartment has been allotted to.

17.3 Blocks and Compartments: Details of these plantations have been given in the **Appendix - L**.

17.4 Special Objectives of Management: To maintain perpetual growth in the plantations throughout their growing phase by carrying out required suitable silvicultural operations as per the prescriptions in the Miscellaneous Regulations.

17.5 Analysis and Valuation of the Crop: The data-base related to the Old Teak Plantations is being created and during this plan it will be completed. All the plantations, for which the information has been collected, shall be shown on the maps generated with GIS technology. The plantations could not be included in this plan due to non availability of information or some other reasons will also be considered for the appropriate treatments at appropriate time, whenever it come to the notice of the Dy.C.F Bhandara. It will be mentioned on the maps also.

17.6 Silvicultural Operations: The Silvicultural operations are the regular thinnings and the schedule is mechanical thinnings in 6th. and 11th. Year followed by silvicultural thinnings every tenth year till the age of 65 year of formation of the plantation. Thinning Rules are given in the **Appendix-LIII**.

It is seen that the plantations in Bhandara Division have not been thinned in the past and therefore a thinning system different from the traditional one is required to be developed. This is also important because sudden and large openings in the canopy due to heavy thinning in old plantations may have adverse effect on growth. Hence, the schedule has been altered accordingly and 1st thinning in plantations, except those which are



formed in the year 2003 and afterwards, will be B grade silvicultural thinning. This will be followed by C grade thinnings every 10th year subsequently till the plantations attain the age of 65 years. In case of plantations raised in 2003 and afterwards, the first thinning, which will be done in the 6th. year of its formation, will be mechanical followed by the second mechanical thinning in the 11th. year and first silvicultural thinning (C grade) in the 16th year and every 10th year subsequently. This schedule is given in **Appendix - L**.

(A) Mechanical Thinning: Teak is traditionally planted at a spacing of 2m x 2m i.e. 2500 seedlings per hectare and, in ideal conditions, it would have required a thinning of 5 years old plantations. Two mechanical thinnings of removing alternate rows before the start of C (low) grade silvicultural thinning were prescribed earlier. The Indian Forest Record 1957 mentions two mechanical thinnings at the age of 5 and 10 years i.e. in the 6th. and 11th. year. It prescribed following standard:

Year	No of Saplings/ha	Spacement
1 st . year	2500	2m x 2m
6 th . year	1767	2m x 2 $\sqrt{2}$ m
<i>(After the 1st. Mechanical thinning by removing alternate diagonal lines)</i>		
11 th year	1250	2 $\sqrt{2}$ m x 2 $\sqrt{2}$ m
<i>(After 2nd. Mechanical thinning, by removing alternate straight lines)</i>		

It has however been experienced that the Teak plantations do not follow the growth in a copybook fashion. The plantation of Teak, which is supposed to have survived 100% till its 5th year of its existence, actually contains only 65-80% seedlings. Rest are eliminated in their race for survival. The canopy competition in real sense does not start at this stage. There are limiting factors like moisture availability and root competition. The sigmoid growth curve between Age (on X axis) and Volume (on Y axis) for Teak indicates that its growth follows a moderate slope till 10th year and then it picks up and forms a steep curve upto 50 years. Hence, first mechanical thinning at the age of 5 years and the second mechanical thinning at the age of 10 years of the plantation has been prescribed. As a result, the stems will be free from canopy interference and also the poles produced from the thinning operations shall be saleable. The mechanical thinning will be done by considering a cluster of three poles in diagonals. One of them will be removed. However, if one of the poles in this cluster is absent removal may be differed.



(B) Prescriptions For Silvicultural Thinnings: The various operations required for thinning in a Teak plantation are summarised below :

1. Stock mapping and delineation of the area of different site quality classes of the plantation to be thinned will be done before actual operations are started.
2. Cleanings to remove undesirable undergrowth which hinders proper growth of planted Teak and which may obstruct the thinning work is to precede actual thinning operations. Extent of cleaning as well as the species to be removed is to be decided by the Deputy Conservator of Forests himself. Cleaning should also include systematic climber cutting.
3. Sample plots will be laid for detail measurements and total enumeration in such plots to work out entire growing stock (planted as well as naturally regenerated trees) will be carried out girth class wise. Basal area per ha. of such plots shall also be measured. Average crop diameter shall also be calculated.
4. Yield and stand tables will be used to compare girth class wise actual stocking and basal area of the plantation under consideration. If such comparison indicates that basal area measured, exceeds that of given in the yield table for the same site quality, this would necessitate removal of material to the extent basal area given in the yield table is achieved. What girth classes and their extent to be removed can be ideally found out by comparing actual stocking with the stand table (main crop) for the particular site quality and age.
5. The average crop diameter may be taken as guiding rule to decide the individual trees to be marked for removal, i.e., trees below average crop diameter only are to be marked for removal and only when they are silviculturally available.

Following order of marking, regarding silvicultural availability of trees in thinning, shall be maintained.

- i. Non-Teak coppice trees (except any rare tree) are first to be marked.
- ii. Teak coppice trees till all are marked.
- iii. Non-Teak trees of seed origin till all are marked. **However trees of Haldu, Bija, Shisham, Semal, Tiwas and all trees of NTFP will be retained even if the number is more than desired number.**
- iv. Sound Teak trees of seed origin to be marked for felling only in the last.



6. a. As mentioned above, since no tending and thinning have been done in the plantations in the past, the first thinning (B grade) in plantations raised before 2003 will therefore include the removal of the following:

- Dead, dying, diseased and suppressed trees.
- Defective, dominated stems and whips.
- Branchy and badly shaped advance growth, which cannot be, or is undesirable to be, pruned.
- Trees having defective stems or crowns, that is, those trees whose crown space is cramped by neighbouring trees; those trees whose main stem is forked or has other defects. Such categories of trees do not have much promise for future due to above defects and hence they shall be removed.

b. Subsequent thinnings will be done every 10 years after B grade thinning prescribed above and these will be according to prescriptions in paras 1 to 5. In the younger plantations, that is, those formed in the year 2003 and afterwards, however, all the silvicultural thinnings will be according to prescriptions in paras 1 to 5 above.

17.7. Inspection of Marking: After the marking for thinning in the crop is over, the inspecting officer must measure the basal area per ha. (with the help of a wedge prism of BAF-1) of the crop by point sampling as if the trees marked are already felled. In other words, while measuring the basal area, the trees marked shall not be counted whether they fall in the category of 'full tally' or 'half tally'. If the basal area so measured is within around + or -0.5 Sq. mt./ha. (i.e. equal to the least count of the wedge prism) of that given in the Yield Table for that particular site quality and age, then the marking done can be approved. If the basal area exceeds 0.5 sq.mt/ha. then some more marking of trees (to the extent of exceeded basal area) will be done. If the basal area falls short, then marking of trees to that extent will be cancelled.

The marking for thinning will be done by an officer not below the rank of an RFO. ACF and D.C.F will do 10% and 5% checking respectively.

17.8. Agency of Harvesting: The operations for tending and thinning of Teak plantations are highly skilled and require regular monitoring through recording and analysis of growth measurements periodically. The working therefore is proposed to be done strictly through departmental agency.



Chapter XVIII

NON TIMBER FOREST PRODUCE (OVER-LAPPING) WORKING CIRCLE

18.1 General Constitution of the Working Circle:

18.1.01 This is an overlapping working circle covering the entire forest area of the tract dealt with. The Non Timber Forest Produce includes both Minor Forest Produce (MFP) and the Medicinal Plants found in this tract.

18.1.02 Non-Timber Forest Produce (NTFP) plays a key role in the life and economy of communities living in and around forest. NTFP is mostly collected by the economically backward people living in and around forest area. The tribal people have been conserving plant and crop genetic resources as well as the knowledge on their utility. The people living in forest mostly supplement their food with Leaves, tubers, flowers and fruits all year around.

18.2 Availability of Non-Timber Forest Produce:

18.2.01 A sizeable portion of the forests of this division are of Mixed Forest type, supporting species of great NTFP value, namely, *Tendu, Mahua, Biba, Char, Kullu, Dhaoda, Beheda, Mowai, Khair, Salai, Aonla etc.* These trees are found scattered in the entire division and well mixed with other species. NTFP collection also generates employment opportunities.

The important NTFPs found and collected in this tract are Mahua flowers, Mahua seeds, Tendu leaves, Kullu gum, Dhaoda gum, Salai gum, Dikamali gum, etc.

18.2.02 The tract is rich in variety of Medicinal plants which are used for curing various ailments by the local people. There are several species, with medicinal value, found in Bhandara Division and are used by the local people **(Appendix-XXVI.)** Different parts of different species used for medicine, are given in the following table :



Table No. 18.1 Plant Parts of NTFP used for Medicine.

Plant parts	Number of Species
Leaves	12
Flowers	10
Fruit	25
Seed	11
Pods	9
Stem	5
Roots	11
Bark	17
Gum	11

Table No. 18.2 Distribution of Some Important NTFP Species in the Forest Compartments

Sr. No.	Name of specie	No. of compartment in which the NTFP is found		
		RF	PF	Total
1	Behada	61	73	134
2	Mowai	107	110	217
3	Salai	67	31	98
4	Aonla	85	51	136
5	Kullu	34	13	47
6	Bore	32	16	48
7	Tendu	107	154	261
8	Achar	108	143	251
9	Moha	108	147	255
10	Chinch	25	7	32
11	Sitaphal	7	16	23
12	Biba	75	57	132
13	Semal	68	30	98
14	Dhaoda	109	128	237
15	Bel	95	63	158
16	Hirda	32	17	49
17	Khirni	26	10	36
18	Palas	101	135	236
19	Khair	91	61	152



Table No. 18.3 Compartment wise Distribution of Some Important Species of Medicinal Plants:

Sr. no.	Name of Spp.	No. of compartment in which found		
		RF	PF	Total
1	Behada	61	73	134
2	Khobarvel	22	5	27
3	Gunj	30	7	37
4	Aonla	85	51	136
5	Bell	95	63	158
6	Biba	75	57	132
7	Bija	98	76	174
8	Kullu	34	13	47
9	Dhaoda	109	128	237
10	Chinch	25	7	32
11	Hirda	32	17	49
12	Shatawari	24	1	25
13	Khair	91	61	152
14	Medsing	11	5	16
15	Moha	108	147	255
16	Safed Kuda	22	5	27
17	Palas	101	135	236
18	Decamali	57	30	87
20	Murud sheng	15	3	18

Table No. 18.4 Number of Some Important Usable Plant Species for Various Purposes.

Sl.No.	Purpose	No. of Species
1	Food	9
2	Fodder	8
3	Fibre	1
4	Household Articles	2
5	Medicinal	20
6	Ornamental	1

Besides the above mentioned tree species there are many herbs and shrubs found in the forests and need to be properly documented. Many



species have been listed in the **list of common names and scientific name**, on the basis of field inspections of the Working Plan Officer and his staff.

18.3 Special Objectives of Management:

18.3.01 As per the National Forest Policy, 1988 and '**The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006**', the development of Non Timber Forest Produce (NTFP) has been one of the most important objectives in forest management. Therefore consistent with the above policy and law, the special object of management is enunciated as below:

- i. To manage the marketable NTFPs on sustained basis in the division and to help ensure reasonable returns to the local villagers especially the tribal communities
- ii. To improve stocking of various NTFP species in the forest areas and enhance collection of various NTFPs by improved collection techniques.
- iii. To get enhanced economic returns by training the local communities on value addition techniques and marketability of various NTFPs found in the division.
- iv. To generate employment and improve the economy of the local people and there by improving their socio-economic conditions.

18.4 Ownership and Monopoly Procurement of the NTFPs:

18.4.01 The statutory provisions have vested ownership rights over the listed NTFPS species in the village communities in the Scheduled Areas without granting such rights over the trees and the land. Till recently, this list did not include Tendu, Apta and Bamboo, the prominent NTFP species in this tract. But after the enactment of '**The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006**', even these forest produces have been included in the category of NTFP. Now the working plan has to be in accordance with this Act.

18.4.02 The Seventy-third Amendment of the Constitution of India has brought the NTFPs under the management of the Village Panchayat. NTFPs (MFPs) in the state and its sale procedure can be categorised into two parts:

- A) 33 NTFPs (MFPs) in scheduled areas
- B) Other NTFPs (MFPs) excluding 33 NTFPs in scheduled area and NTFPs in Non Scheduled Areas.

A) 33 Minor Forest Produce in Scheduled Areas :

- 1) "Govt of India passed the Provisions of the Panchayat Extension to the Scheduled Areas in 1996". In pursuance to this, Govt of Maharashtra passed Maharashtra Act No XLV of 1997, "Maharashtra Transfer of



Ownership of Minor Forest Produce in the Scheduled Areas and the Maharashtra Minor Forest Produce (Regulation of Trade) (Amendment) Act 1997.”

- 2) As per 1997 amendment, 33 Minor Forest Produce (list enclosed in **Appendix – XXVIII A**) found on Govt land in Scheduled Areas; ownership lies with Village Panchayat.
- 3) Ownership rights of NTFPs in practice have not been handed over to village Panchayat because today village Panchayat are not technically sound.
- 4) These 33 Minor Forest Produce are sold to Maharashtra State Co-operative, Tribal Development Corporation, authorised, vide RDD & Water Conservation Dept. GR No (Marathi) PRJ-1203/CR 366/PR-2(06) dated 11.05.2004.
- 5) RDD & Water Conservation Dept. GR No PRJ-201/CR 43/06 dated 21.04.2001 vide which royalty for NTFPs is required to be paid to village Panchayat by Tribal Development Corporation.
- 6) Collection wages for NTFPs are paid to labourers by Tribal Development Corporation.

B) Other Non Timber Forest Produce, (excluding 33 NTFPs in Scheduled Area), and NTFPs in Non Scheduled Areas:

1. Other NTFPs excluding 33 NTFPs in Scheduled Areas and NTFPs in Non Scheduled Areas are auctioned unit wise by DCF in open auction. The amount received in the auction is Govt. revenue.
2. Units are formed for this NTFP.
3. Yield is not notified for these units.
4. Concerned contractor pays the wages for collection of NTFPs.
5. Due taxes are levied on the amount received in the auction.
6. Collection of NTFPs, processing and its auction is done by concerned unit purchase.

Seventy-third Amendment of the Constitution of India has brought the NTFPS under the management of the Village Panchayat. ‘The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006’, has defined the NTFP, which includes all forest Produce other than Timber and firewood. This Act also recognises the rights of the indigenous peoples over the forest produce and forest land.



18.5 Agency for the NTFPs Collection:

18.5.01 The Maharashtra Tribal Economic Condition (Improvement) Act, 1976 empowers the State Government to enforce monopoly procurement of certain goods including the NTFPs in the Tribal Sub-Plan Areas. **Tribal Development Corporation (TDC) of Maharashtra**, serves as the Chief Procurement Agent. This procurement provision is binding and, therefore, prescribed to be carried out, accordingly in the Schedule Areas. Procurement of NTFP should be according to **‘The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006’, and it’s Rules.**

The Government shall decide the ownership on these NTFPs and develop the mechanism of collection, value addition and disposal of these NTFPs.

Table No.18.5 Year wise Revenue Obtained from Various Types of NTFPs:

Year	Sabai Grass (Rs.)	Sitaphal fruit (Rs)	Khirani fruit (Rs)	Palas Seeds (Rs)	Gum (Rs)	Lac (Rs)	Grazing (Rs)	Total (Rs.)
1	2	3	4	5	6	7	8	9
2001-02	5500	6360	6000	3100	179100	20140	63513	283713
2002-03	6500	6500	6500	0	129550	30061	57000	236111
2003-04	6000	5300	7000	1000	39500	3100	60651	122551
2004-05	5500	800	7000	3000	84950	1550	0	102800
2005-06	6100	5550	7000	0	76700	25200	0	120550
2006-07	6100	7000	7100	0	103000	3420	45297	171917

18.5.02 As the figures in the above table indicate, the revenue realised from the gum collection is meagre and further it shows declining trend in gum availability. It will therefore be preferable to stop this auction and earmark gum collection to the FPCs under JFM. In this connection specific rules are to be framed for which necessary, proposal be moved to the Government by the division.

18.5.03 There may be many other forest species which yield various products or leaves, flowers, fruits etc. of such trees are of some use or the other including medicinal uses. However systematic information in this respect is not available at present. But such NTFPs should also ideally find their due place in the JFM micro-plan. Proper grading, value addition and exploring new markets for the traditional NTFPs (such as gum), shall be include under the JFM programme of the Division. The possibility of involvement of NGOs in such an endeavour should be explored.



18.6 Methods of Treatment:

18.6.01 Modifications According to the Legal Provisions: Since legal provisions are not very explicit, it is recommended that Govt. of Maharashtra may notify the guidelines regarding:

- Ownership of NTFPs,
- Creation of a scientific data base for NTFPs and other valuable spp.
- Conservation and propagation of NTFP species
- Improving the methods of harvesting to avoid destructive harvesting
- Value addition and marketing of all valuable NTFPs
- Agency for harvesting and marketing

18.6.02 Fire Protection Measures: Collection of NTFPs is often associated with forest fires, because the villagers set fire around the NTFP yielding trees for clearance of leaf litter and undergrowth. Fires are also caused by agents of Tendu contractors under the belief to get better flush of Tendu leaves. If it is left unattended, such fires spread into forests as forest fires.

- The Village Panchayats and FPCs shall be involved in awareness generation programme to help control forest fires.
- In case of forest fire, legal action should be taken against the defaulters. Strict vigilance is necessary during the months of March-April to check the spread of fires specially during the Tendu and Mahua flower season.

18.6.03 Training Programme for NTFP Collection: To reduce the Destructive Harvesting Techniques, training programmes and work shops for proper NTFPs collection, value addition and marketing shall be organised in each range to ensure their sustainable harvest and use. The Education Circle should prepare and oversee the training modules.

18.6.04 Documentation of NTFP Collection : The Beat Guard will send a monthly report to the Range Forest Officer on the quantity of NTFPs collected in their Beats, both by contractors and villagers. The Beat Guards will also maintain these records in his Beat Khairyat Report. The Range Forest Officer will compile and send the detail report, mentioning the quantity as well as the market price, to the division office. The Division office will compile the figures for each species for division with the view to monitor the collection and to improve the productivity of these NTFP to sustainable limit.

18.6.05 Non-destructive Removal of NTFP: The areas in Bhandara Division, capable of producing NTFPs, have been identified and marked. Compartments having promising regeneration areas of NTFP species shall be well demarcated on the ground and on map. Unless detrimental to the wildlife conservation and site conditions, sustainable harvesting and non-destructive



removal of flowers, fruits, Gums, Barks and other parts can be permitted. For this the local villagers shall be given proper training regarding no-destructive methods of harvesting of various NTFPs. Species, which are endangered, need to be prohibited from removal. Poor class of the villagers when not engaged on agricultural works collect Mahua flowers and fruits, char, gum, honey, wax, bark, roots, leaves etc and sell them locally to supplement their meagre income. Mahua flower, Char, gum etc are sold in the weekly market at many places.

18.6.06 The treatment to be given will be different for different types of NTFPs. therefore, each NTFP will have separate treatment as follows.

18.7 Management of Tendu:

18.7.01 Collection of Tendu Leaves: Tendu is the prominent revenue generating NTFPs of this tract. Tendu leaves are used for manufacturing *bidis*. Tendu trade has been nationalised by the Govt. of Maharashtra Act No.LVII of 1969. Tendu leaves were collected by the department through agents till 1990 season. During the 1991 season Tendu units were sold on lump sum basis. The area of Bhandara Division divided into 20 units. The collection of Tendu leaves commences from the last week of April each year



New Flush of Tendu Leaves



Tendu tree heavily lopped for Leaves collection.

and continues up to first week of June. Quality of leaves is a major criterion for bidi manufacturers. The quality depends on the colour, texture and presence of nodules and veins. The best quality leaves are those ranging from ashy to palest hue; Almond colour is also prized shade. Leaves with leathery texture either too thick or thin are good quality for making Bidi. The leaves are collected at various collection centres called phadies. The leaves (pudas) are dried and then packed in gunny bags. The quantity is measured in standard bags.

- Tendu leaf collection is the monopoly of the State Government under the Maharashtra Minor Forest Produce (Regulation of Trade) Act, 1969. The Tendu leaf collection shall be carried out in the



manner prescribed by the Principal Chief Conservator of Forests from time to time.

- Tendu leaf collection is an income generating activity for most local and tribal villages in the region. The local village communities shall be gainfully engaged in Tendu collection in the Division to support their livelihood.

Table No.18.6 Revenue Realized From Tendu Leaves Collections:

Financial Year	Tendu	Value RS.
1996-97	46333	21932404
1997-98	40849	19386718
1998-99	34551	11508797
1999-00	47458	23117267
2000-01	45910	23253228
2001-02	43163	25440236
2002-03	45117	25798043
2003-04	43700	25920175
2004-05	42400	15071482
2005-06	23620	10992275

- A-1 type areas in working circles should be excluded from Tendu units. Tendu leaves shall not be collected from buffer area i.e. 50 meter surrounding the special habitats of wildlife.
- Pruning of young Tendu plants does help in increasing leaf yield. Saplings having more than 5 centimetres collar diameter shall not be pruned. However, felling of Tendu trees or branch lopping for leaf collection should be dealt with firmly.

18.7.02 Tendu Regeneration: In view of importance of Tendu to support the livelihood of forest dwelling communities and its economic value for the region, sustainable management and use of Tendu is prescribed to be given added focus.

- Maintenance and improvement of Tendu in the forest crop composition is prescribed by ensuring regeneration of Tendu and its subsequent protection.
- Singling of shoots and soil working around Tendu seedlings is prescribed in the plantation and rootstock areas to promote growth of Tendu seedlings along with the annual coupes in area-specific working circles.
- It is proposed to ensure the inclusion of Tendu in mix plantations prescribed under various area-specific working circles.



18.8 Management of Mahua:

A. Mahua Collection: There is substantial number of Mahua trees in the crop. Inventory of Mahua trees shall be made to have an idea of its production potential and regeneration status. The villagers in the tract have local system for allocation of collection rights of Mahua flowers and fruits. In view of the viability of traditional of allocation of collection rights by the local communities no intervention is warranted in the process of Mahua collection. For better protection of Mahua trees and to increase its stock, few Mahua trees be numbered and these trees be allotted to members of JFM committee. The members of committees who have been assigned with job of protection & nurture of Mahua trees, they should protect them from fire. Range Forest Officer is supposed to monitor this activity of JFM committee regularly and make proper documentation.



Mahua seed and flower are important NTFPs for local people

B. Mahua Regeneration: It is prescribed to provide soil working along with other planted seedlings during coupe operations of area-specific working circles. Mahua will be one of the species in mixed plantation. **Seedlings of Mahua, raised during the previous season i.e. 13-14 months old, should only be planted in the mixed plantation schemes.**

18.9 Management of Gums: Gum is an important NTFP and is exuded by plants, partly as normal phenomena and partly as the result of disease or injury to the bark. Wood Gum is a substance of more or less sticky nature.





Unscientific Harvesting of Kullu Gum leads to serious injuries to the tree.

The Kullu (*Sterculia urens*), Dhaora (*Anogeissus latifolia*), Salai (*Boswellia serrata*) and Acacia gum (*Acacia nilotica*) are main sources of gums in the area. These gums are used in medicines, chemicals, cosmetics, food industries and incense. Indian Gum, Arabic or babul gum is from *Acacia nilotica* and is of great commercial importance. The gum is used in calicoprinting, dyeing and as a sizing material for silk and cotton and in the manufacturing of paper. Salai gum is mostly used in the Indian medicines for the treatment of rheumatism and nervous diseases. Salai gum has the potential of becoming mounting media by substituting imported Canada balsam in the preparation of microscopic slides. It has the possibility of becoming an important substitute for imported Canada balsam, used as mounting media in the preparation of microscopic slides. Dhaoda gum is used in food industry for making sweets. It may also be suitable in the manufacture of elastic adhesive, lacquers, oilcloth compositions, ink and perfumery.

Table No.18.7 Year-wise Revenue Obtained From Gum:

Year	Revenue obtained in Rs.
1996-97	27000
1997-98	115000
1998-99	104100
1999-00	140400
2000-01	139500
2001-02	179100
2002-03	129550
2003-04	39500
2004-05	84950
2005-06	76700
2006-07	103000

Dhaoda and Salai Gum: Dhaoda trees are quite common in the forest crop of this tract. Salai trees are also found in a large number of comp. Hence collection of Dhaoda and Salai gum is also permitted.



No scientific method for tapping has been used so far in this area. For the purpose of scientific extraction of gum the FRI Gum Tapping Rules, have been proposed for tapping of gum.

The Forest Department should collect species wise data for various types of Gums.

Tapping Rules:

- The tapping season will commence from November to end of May each year.
- No tree below 90 cm in girth will be tapped.
- Tapping will be confined to the main bole of trees between 15 cm from ground level to the point from which first branch is given off.
- Each tree shall be tapped continuously for 3 years; and, thereafter, will be given rest for 3 years.
- The initial blaze 20 cm wide and 30 cm in length or height may be made in the month of November on trees at 15 cm above ground level with a sharp axe having 7.5-cm wide blade. The blaze is made 0.6 cm deep in the bark.
- Blaze may be made horizontally leaving approximately equal space between the blazes. The blazes should not have any loose fibre. The lower surface of the blaze should be slightly slopping outwards to avoid lodging of Guggul in the blazed pocket, in case, initial blazing is done by axe.
- The Guggul starts oozing out soon after blazes are made and may be collected initially after a month, that is, by about December when the blazes may also be freshened. Subsequent collections and freshening may be done fortnightly up to May. Overall, 12 freshening are required to be made, during the year.
- In each freshening, the lower surface is not to be freshened. The edges may be scraped so that only 3.8 cm is increased on either side in width, at the end of 12th. freshening. This means that about 0.3 cm should be scraped off from either side in width in each freshening.
- The lowest row of blazes will be at one meter above the ground level. The next row of blazes will be made at the height of 60 cm from the lower that is, at a total height of 1.6 meter from the ground level. The vertical portion of the blaze of upper row will alternate with similar portion of the row and no two blazes of the two rows will be directly one above the other.



The number of blazes to be made on each tree will depend on its girth at breast height, as given below:

Table No.18.8 Maximum Blazes Allowed on Each Tree:

Category	Girth at BH	Maximum Blazes Allowed on Each Tree
I	0.9 to 1.3 m	2
II	1.3 to 2.0 m	3
III	2.0 to 3.0 m	4
IV	Over 3 m	One blaze for each 45 cm girth in addition to the category III above.

- No fresh blaze will be made on the partially healed up surface or old wounds.
- Each blaze will be in a shape of parabola with a 2.5 cm wide base. The curved side of the parabola will be upwards and of height not more than 7.50 cm and the depth of the blaze will not exceed 0.6 cm in the wood.
- At the end of the season, the height of the blaze shall not be greater than 12.50 cm. Maximum permissible dimension of each blaze shall be 10cm x 12.5cm x 0.6 cm in width, height and depth, respectively.
- Since the tapping is to be done continuously for three years the total height of the blaze at the end of three years of tapping will be 37.50 cm, the width and depth remaining the same.
- In the second cycle that is, in the 7th year (after three-year rest) new blazes will be made in the same way in the un-blazed portion, in between the blazed portions of the first cycle. This blazing will continue for another three years in the manner described above and the operations will be repeated till un-blazed portion is fully covered.
- In addition, tapping of trees below 90 cm GBH shall be prohibited. Collection period will be confined from November to May, to minimise the damage to the trees. The areas around the trees should be cleaned to facilitate gum collection and to prevent fire in the forests. A strict watch is necessary to enforce tapping rules and check unauthorised collection of gum. No gum producing trees should be felled. No tapping of gum should be carried out during the period of rest.
- The agency, the organisation or the individual collecting the Dhaoda or Salai gum in violation of the prescribed tapping rules should be treated as a forest offence and dealt with accordingly.



Formation of Gum Units: The gum units for collection of Dhaoda and Salai gums are formed and well demarcated, range as a unit, they are coterminous with protection ranges which ensure effective monitoring and control.

Besides, Kullu and Salai saplings are prescribed to be provided soil working along with planted seedlings in various area-specific working circles.

Singling and tending of Salai shoots would further help the Salai regeneration. Gum-yield species are prescribed for plantations.

18.10 Management of Hirda, Beheda, Aonla, Char and Other NTFPs.

Collection of Hirda, Beheda, Aonla, Char and other NTFPs: Fruits of Hirda, Beheda, Aonla and Char are marketable items. Similarly, fruits, flowers and leaves of certain shrubs and trees are used for variety of purposes. Current level of collection is quite erratic and, therefore, poor indicator of their potential in the tract.

Collection of species, which are not covered under the monopoly procurement by government agencies, should be allowed by the Joint Forest Management Committees or Village Panchayats for better protection of Hirda, Beheda, Aonla, Char trees and to increase its stock, few of the above trees be numbered and these trees be allotted to members of JFM committee. The members of committees who have been assigned with job of protection & nurture of above trees, they should protect them from fire. Range Forest Officer is supposed to monitor this activity of JFM committee regularly and make proper documentation.

If these village bodies are not interested in collection, the collection rights may be auctioned. Collection units shall be co-terminus with the protection ranges.

Removal of NTFPs shall be within the sustainable limits of production. Felling of trees and lopping of branches shall not be permitted for NTFPs collection. Destructive removal shall not be permitted, in any case. Digging up of plant roots, branch cutting, debarking on a plant will be considered as destructive removal.

Regeneration of Hirda, Beheda, Aonla and Char: Compartments having Natural regeneration of Beheda, Aonla and Char are shown in **Appendix - XXX**. Required tending is prescribed where saplings of *Beheda*, *Aonla* and *Char* are found prescribed, to remove congestion. Soil working and mulching are prescribed along with planted seedlings and to be done during coupe operations of various areas in working circles. *Hirda*, *Beheda*, *Aonla* and *Char* are prescribed for plantations.

18.11 Kosa Cultivation Management: Tassar i.e. Kosa Cultivation is traditionally done in few villages of Bhandara Division. Sixty three families from 9 villages in two ranges are involved in this activity. Generally, each family manages 2Ha or 5 acres area for Kosa cultivation. The extent of such



area is 175.59 Ha. These areas are included in this working circle. Distribution of these areas is as under:

Table No.18.9 Table Showing Area under Tassar Cultivation:

Sr.No.	Range	No. of villages	Area in ha.
1	Pauni	4	125.03
2	Pimpalgaon	5	50.56
Total	2	9	1745.59

In Pauni Range, Kosa cultivation is done in 4 Compartments of Reserve forest and in 2 Khasras of Protected Forests. In Pimpalgaon Range, Kosa cultivation is done in 9 khasras of Protected Forests.

18.11.01 General Character of Vegetation: Kosa cultivation areas are mostly situated near villages. The crop in these areas mostly consists of Ain, Dhaoda, Tendu, Kasai, Char, Mahua, Jondhurli, Palas, Bharati etc. Growth of these species is found to be mostly stunted, with density of crop less than 0.4. The average height of crop is about 1 to 2 meters. Most of the ain, Arjun trees pollarded. The soils of Kosa cultivation area are suitable for undertaking Ain Plantations or plantations of other host trees, for Kosa worm. Besides these areas, Bhandara Division has raised Ain/Arjun plantations over 164 ha. In some of the plantations, dying back phenomenon is observed in Arjun plants and therefore growth of plantations is retarded. Out of 164 Ha. of Arjun plantations, 104 Ha., are in Reserve Forest and 60 Ha., in Protected Forests.

Table No.18.10 Table Showing Range wise Area of Arjun Plantation:

Plantation Year	Range	Comptt. No. (P.F)	Area in Ha.
1986	Pimpalgaon	Comptt No.377	40
1987	Pimpalgaon	Comptt No.377	20
1988	Pimpalgaon	Palaspani P. F.	40
1989	Pauni	Comptt No. 393	40
1991	Pauni	Comptt No. 323	24

Besides above plantations of Bhandara Forest Division, DCVL has raised 80 Ha. Plantation at Siregaon in Pimpalgaon Range. This plantation is excellent, having almost negligible casualty, due to special care, DCVL is taking. One more plantation has been taken by DCVL at Siregaon (H) in Pauni Range over 50 Ha.



18.11.02 Kosa Cultivation Practice: Tassar i.e. Kosa cultivation is practiced in Bhandara Division traditionally. Villagers are utilising Forest lands for this purpose. People of Dhinwar community are mostly engaged in this trade. As per information gathered from Bhandara Division office, 63 families in 9 villages are engaged in this work. These 9 villages are :1. Singori Hamesha 2.Jogikheda Kamesha 3. Nishti and 4. Thanegaon in Pauni Range & 1. Bhivkhidki 2. Chandori 3. Dongargaon (Nyaharvani) 4. Baradkinhi and 5. Belde (Wangi) in Pimpalgaon Range. The families engaged in this practice, earn their livelihood from this cultivation.

18.11.03 Traditional Method of Kosa Cultivation: Eggs which are used for formation of Kosa cocoons are for two types. One is Mulki & others is Sukinda. Mulki is local variety while Sukinda is from M.P. Interstate Tassar Project, at Armori supplies these eggs to cultivators through societies. These eggs are placed on leaves of Arjun or other host plant which bear new flush of leaves, emerged due to pollarding. Cocoons are formed within a month, which are harvested by the end of next month.



Saja trees damaged due to regularly pollarding for Kosa cultivation.

Three crops taken in this manner, they are as under:

1st crop - From July to August.

2nd crop - From September to October.

3rd crop - From November to December.

Cocoons so formed are purchased by the society, at centres situated at Nishti, Ekode and M. Arjuni etc.

Market: The units for measuring the cocnoos are as under -

10 Cocoons - 1 Muth.

20 Muths - 1 Tor

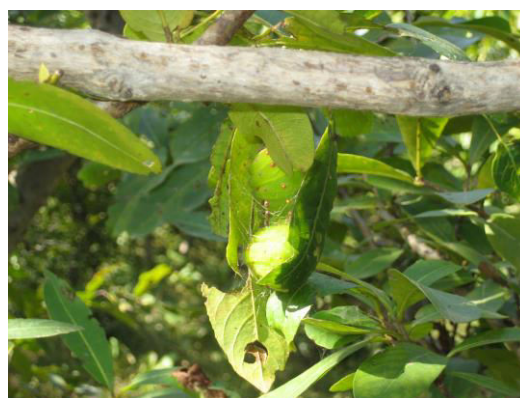
20 Tor - 1 Khandi



It means that 4000 cocoons make one Khandi. The cocoons are purchased at Rs. 500 to 1000/- per Khandi.



Kosa moths coming out of cocoon and copulating. Small larvae are planted on Saja leaves



Larvae of Kosa feeding on Saja leaves.

Larva converting into Pupa (Cocoon formation).

18.11.04 Returns: Good quality cocoons are purchased at rate upto Rs.1000/- Khandi. Low quality cocoons are called as Chalpats and broken cocoons are known as Dudri. These Chalpats and Dudri are purchased at the rate upto Bijai cocoons. These are purchased at Rs. 1500/- to Rs. 1700/- per khandi. DCVL prepare yarn out of these cocoons. The rate of preparing yarn is Rs. 13/- for 100 cocoons and one labour can take out yarn from 100 to 125 cocoons per day & Therefore the labour gets about Rs. 20/- day, which include 8.33% Bonus. Kosa cloth is woven by handloom, which can fetch upto Rs. 200/- meter, depending on quality of cloth produced.

The earning of a Kosa cultivator, on sale of Kosa cocoons can be from Rs. 1000 to Rs. 3000/- per acre, depending on climatic conditions.

18.11.05 Special Objectives of Management: Tassar cultivation is being practised in villages mentioned above, since many years. The quality of forest, where this cultivation is practiced is totally degraded, due to continuous pollarding of crop, haphazard working and total lack of scientific knowledge of Kosa cultivation. The status of these forests should be and can be upgraded by taking help of Kosa cultivators, who are totally dependent, on this cultivation. Considering this, the objectives are decided under:



- Up gradation of the forests, degraded due to Tassar cultivation in past by planting food plants of Tassar worm.
- Economic upliftment of Kosa cultivator by their participation in management of forest under Kosa cultivation.

As per guidelines of Govt. of India three species out of the above list are to be selected for planting at a spacement of 1.2m x 1.2m. It is proposed that following three species should be planted in mixture of 70% *Terminalia alata* and 30% *L. parviflora*. In the interfering space Sabai grass is to be planted at spacing of 45cm x 45cms. **Arjun Plantation should be discontinued as it has been found that this species is unsuitable for Kosa cultivation. The D.C.F should consult the scientists of Kosa Extension Centre and accordingly go for plantations only if required.**

18.11.06 Planting Technique for Kosa Host Plants: Initially pits of size 30x30x30 cm should be dug in planting area and one year old plants, raised in poly-bags should be planted at spacement of 1.2 x 1.2m. Besides this, Sabai grass at spacement of 45x45 cm should be planted in intervening spaces. The details of PPO-PYO to be carried out are as under -

- Survey & Demarcation - Planting area should be selected from the area allotted to Kosa cultivators.
- It is suggested that the Division should tackle 80ha per year, so that entire area of 175.59 ha is planted with suitable species in 2 years period.
- Soil conservation measures should be taken where ever necessary.
- Preparation of TCM along the periphery of plantation along the work.
- Alignment of pits at spacing of 1.2 x 1.2 m and the size of the pits should be 30 cm. x 30cm x 30cm.
- Nursery stock should be raised in nursery at a convenient place.
- Clearance of site and cutting the live stumps of suitable valuable species.

18.11.07 Tending Operation: As stated previously DCVL has raised a plantation of Arjun in Pimpalgaon range. Survival of that plantation is excellent. So it is suggested that tending of the planted area should be done on the same line. Seedlings at spacemen of 9.6 x 9.6 m. should be retained to provide shade to other seedlings. 108 to 110 plants per ha will be retained. These will never be pollarded. Pollarding of other plants will be carried out, when they attain height of 4' to 5' with a view to start Kosa cultivation

18.11.08 Yield Regulation: The yield will be regulated by area. Production of timber cannot be the aim. Production of cocoons is the aim and to



maximise this 108 to 110 trees/ha., are retained. This retention indirectly fulfils objects of providing the cover to denuded area.

18.11.09 Kosa cultivators can harvest the Sabai grass planted and by doing so; they can earn monetary benefits also.

18.12 Management of Grass:

18.12.01 The common grasses are Kusal, Bhurbhusi, Ghonad, Sheda and Marvel. Coarse grasses are used for thatching and palatable grasses for stall feeding. The demand for grass is local. For fodder Marvel, Sheda, Paunia and Mushan are preferred. Some villagers also collect Broom grass (Jhadu gavat). Broom grass may be propagated in the suitable areas.

18.12.02 The demand for grazing is very heavy in some area of this division, aiming to provide good grazing site to the local cattle without deterioration of the productive capacity of the site. The quantity of fodder can be improved by introducing superior grasses, legumes and fodder tree species.



Grasses, other than fodder grasses, are collected and sold by the local people.

The management of grasses shall be done as per prescription enshrined in Fuel wood Fodder & Pasture Working Circle.

18.13 Future Management:

A. For building the data of NTFPS, it is proposed that weekly markets will be surveyed extensively to find out the types of NTFPs coming from forest area, their extent, purpose of utilisation, rate, chain and the agency of marketing and final destination. The local schools, village level functionaries and NGOs are proposed to be associated in building up this database.

It is proposed that the above information should be used to formulate correct prescriptions at the time of next revision. **Depending upon the speed with which the information is made available, working plan division may be asked to revise this chapter even during the currency of this plan - at the time of mid term review.**

B. To make a beginning towards NTFP cultivation, each forest (Beat) guard and his van-mazoor will be given target of collecting seed material of most traded NTFPs and to propagate it as part of his beat patrolling duties.

C. The division will endeavour the following:

- Explore possibility of developing a methodology for collection and disposal of NTFPs under the provisions of various Acts and Rules, specially “**The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006’**, and its Rule”
- The Dy.C.F of Bhandara Division will improvise a system to develop a NTFP related data base through his field staffs and the JFMCs.
- Each NTFP purchaser to maintain a register, in which the information like the type of NTFP; person/s who collected it; quantity, rate and place of collection (comptt.); rate at which and to whom it has been sold, will be maintained.



Chapter XIX

JOINT FOREST MANAGEMENT IN THE DIVISION

19.1 Background of the Joint Forest Management: Degradation of forests is a continuing process, besides, very heavy pressure of human and live stock, population, alienation of rural communities from forest resources protection and management is an important factor responsible for degradation of forests. In the past, local communities enjoyed free access to the forests. With the bringing of forests under Govt. control & consequent, reservation of forests permitting only specified usufructory concessions, local communities were denied access to forest resources. Forest reservation policy came in conflict with the interest of local communities dependent on these forests to meet their basic needs of forest products. The forests were managed as govt. property in larger national interest as provided for in the National Forest Policy 1952 which stated that the use of forests by village communities in their neighborhood should in no event be permitted at the cost of national interest. Such policy of managing forest only in larger national interests, overlooking the basic needs of local communities did not succeed and forests were degraded as a result of over use. Forest Deptt. could not effectively protect the forests whose degradation continued.

Forest conservation necessitated active participation of local communities. The National Forest Policy, 1988 accordingly provided for creating a massive people who suffer the most as a result of forest degradation.

The National Forest Policy, 1988 emphasized that domestic requirements of the tribal and other poor people living within and near the forest for fuel wood, fodder, NTFP and construction timber should be the first charge on forest produce and the holders of customary rights and concession in forest areas should be motivated to identify themselves with the protection and development of forest from which they derive benefits. In pursuance to the National Forest Policy the Ministry of Environment and Forests decided to ask the State Govts. To adopt the JFM system for the protection and rehabilitation of degraded forest. The Govt. Resolution No.SIF-1091/199/F-11, dt.16th. March 1992. JFM approach was adopted for degraded forest areas of this state and now new guidelines have been issued vide G. R. No. MSC/2000/C. NO. 143/F-2, dated 25.4.2003.

JFM is a concept under which Forest Deptt. and village committee jointly protect and manage the forest. The starting point of JFM has to be the realization of the need of JFM both by Forest Deptt. and the local people.



Generally, the scarcity of forest products such as fuel wood, fodder etc. as a result of degradation of forest on which the local communities depended, forces the people to think of steps for the protection and improvement of degraded forests. The people are usually reluctant to participate in JFM where sufficient forest areas are still available to meet their requirements. On the part of Forest Deptt., the problems in protecting forest without the help of local people make the Forest Deptt. staff realize the need of JFM. The JFM program succeeds where the initiative comes from the people's side and it usually fails where it is forced from Forest Deptt. side as a govt. driven and target oriented program. Villagers themselves are required to voluntarily participate in the program. Forest Protection Committee (FPC) is to be formed in each village. Each Forest Protection Committee constitutes a Managing Committee consisting of members elected from general body and ex-officio members representing concern Govt. Deptt. at village level and with local forester as the member secretary. The managing committee is responsible to implement the decision of general body with regard to the execution of JFM works in partnership with Forest Deptt. Memorandum of Understanding (MOU) is signed between Forest Deptt. and managing committee clearly specifying the duties and responsibilities of both parties. Entitlement of FPC members to the share in forest produce is subject to the fulfillment of conditions of MOU.

The members of the FPC will help in protection and development of forests and they will receive in turns of share in the usufructs at output from the forest areas assigned to such committee. The JFM area will be managed & according to the micro plans prepared jointly by the Deputy Conservator of Forests and the member of the FPC. These micro plans shall contain the details of forest and village developments. This has to be sustainable, should cater to needs of local communities and the same time, the silvicultural requirements of the forest are to be made properly.

Later the Govt. of India also advised the State Govt. to take up the JFM in well stocked areas on experimental basis and accordingly guidelines dated 25 th April, 2003 mentioned above have authorized the forest deptt. in the state in this in this respect. Summary of these guidelines is as follows:

- i) Good forests within 2 km from a village are to be covered under the program on experimental basis and stage by stage other villages containing good forest are to be brought under it.
- ii) JFM is to be implemented with the help of Gram Panchayat and forest produce available is to be provided on priority to meet bona fide local needs. (Hence local rights as enshrined in Nistar Patrak and Wajib-ul-Arz are not to be curtailed).
- iii) Non forest land available in the village, which has agreed to participate in the program, may be brought under the scheme if villagers and the Panchayat agree to do so.



- iv) Help of institution of local self-govt. NGO, environmental experts, if any available locally, may be solicited.
- v) The scheme though does not intend to facilitate agriculture based professions but non irrigated horticulture scheme in (private) wastelands may be encouraged if approved in micro plan.
- vi) The program underlines conservation of forests and wildlife and therefore any activity/agreement etc. that is not in accordance with the Forest (Conservation) Act, 1980 should not be incorporated in the micro plan.
- vii) All JFM activities should be in conformation to the silvicultural prescriptions of the working plan.

19.2 Present Experience With the JFM in the Division:

19.2.01 Objective of the JFM working circle on multi pronged strategies for developing forest resources, water resources and human resources in the JFM villages, they are as follows:

- To develop the degraded forest resources by promoting natural and artificial regeneration (through plantation activity) with active participation of the villagers. It also aims to provide effective protection.
- To empower village communities to play a crucial role in forest resource conservation and enable them to resolve their issues and problems.
- This JFM approach should be widely applied even at places where formal JFM committees have not been constituted.
- JFM should be evolved on the basis of its capacity to generate sustainable employment.

19.3 Potential Areas For JFM:

19.3.01 The following area priority wise prescribes one selected for JFM program.

- Areas prescribed under the Afforestation Working Circle are the potential areas for undertaking JFM program.
- Areas under miscellaneous management, especially the Jhuppi jungles suitable for afforestation are proposed to be covered under JFM.
- Areas under Improvement Working Circle, Selection Cum Improvement Working Circle, Fuel-wood, Fodder and Pasture Working Circle are also proposed to be included in JFM.
- Regeneration and protection of NTFP areas and collection, grading, value addition and marketability of various NTFPs in the division are proposed to be given focus for working under JFM program.



19.4 Present Status of JFM Committees:

19.4.01. JFM concept has been introduced in this division in the year 1998. So far 98 villages over a period of 5 years have been covered and rest of the villages are under process. The present status of the committee formed in this division is as under:

Table No.19.1 Range wise Area Distribution under JFM Committees:

Sr. No	Range	No of villages adjoining to forests	Total forest area in Sq. Km. (he.)	Committees formed			No of villages to be deleted
				Name of scheme	No of JFM committees formed	Area Handed over to committee	
1	NDongri	31	9246.684	JFM	28	2642.153	03
2	Adyal	51	744.918	JFM	32	3442.037	19
3	Bhandara	60	9416.311	JFM	2	250.000	58
4	J/Kandri	16	9641.930	JFM	16	1497.949	0
5	Paoni	56	11285.878	JFM	37	3806.259	19
6	Lakhandur	24	5160.997	JFM	20	1467.455	04
7	Sakoli	33	9606.166	JFM	20	1725.687	13
8	Lakhani	72	7029.469	JFM	16	2718.101	56
9	Tumsar	32	9366.277	JFM	32	2426.967	0
10	Landezari	11	9575.522	JFM	7	2637.663	4
Total		386	88229.787		210	22614.271	176

19.4.02 Recommendations:

- JFM Micro-plans will be prepared for each village through the process of participatory rural approach. Micro plans are linked with the working plans objective oriented site specific planning adopted for the assigned areas. Villages & watershed development planning shall be given utmost importance.
- Silvicultural management, maintenance of forest boundary, removal of forest encroachment and control over illicit cutting , illicit grazing and fire should receive high priority.
- Forest protection can not be viewed in isolation. The forest department may be designated as Nodal agency for all developmental works in the villages, recommended in the micro plans.
- In carrying out the developmental activities, the expertise of NGOs has to be fully utilized.



19.5 Development of JFM Under The Maharashtra Forestry Project :

19.5.01 Under Maharashtra Forestry Project 4 villages were undertaken namely Bhojapur, Rampuri, Rengepar (Kohali), Papada. Details of work done is as under:

Table No.19.2 Showing the Progress of JFM under the World Bank Project:

Name of villages	Koka, Sawarband, Saygaon, Bhojapur	Rampuri, Bhojapur	Papada, Regepar (Kohali)				
Plantation year	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
Area in ha	120	60	60	---	---	---	---
Seedling planted	134250	85770	61078	---	---	---	---
Grant to FPC Rs.	1073393	911032	827518	297509	81835	1096	2089
Protection of Forests	Patrolling squad were formed. Due to intensive patrolling the assigned area has been fully protected from illicit felling & grazing.						
Entry Point Activities	Construction of Pandal, Supply of Patravali Machine, Supply of Utensils. etc.						

The financial assistance under Maharashtra Forestry Project (World Bank Aided) ended in 2000.

19.5.02 There are 660 villages in Bhandara division. Out of which 386 villages are adjoining to forest out of this 176 villages are unfit for formation of FPC due to high population and hence deleted. So far 210 FPCs have been formed. At the district level Forest Development Agency (FDA) has been registered under Societies Registration Act, 1860 by Assistant Registrar of Cooperative Societies, Bhandara division vide registration in 51 villages of this district. Micro plan of each village proposed and approved by competent authorities. It is envisaged to protect and treat the forest area 32,865.38 ha covering 51 villages and to take up 1500 ha area under plantation and different models. Under Entry Point Activities the villagers in the Gram-sabha propose village developmental works. PPO/PYO works are required to be completed by 31st of March 2005.

19.6 Area Covered and Committees Formed Under FDA: The Government of India started direct funding to the circle in charge for the developmental works in the forest with the participation of the Villagers under the JFM programme. The table below shows the area covered in various ranges and villages under this scheme.



Table No.19.3 Area Covered and Committees formed Under FDA:

Sr. No	Forest Range	Village	Details of Forest Land			
			RF (ha)	PF (ha)	Jhudpi (ha)	Total
1.	Pauni	Khokari Dhorapa		105.00		105
		Amagaon		100.00		100
		Nisti	100.00	0		100.00
		Bhuyar		85.674		85.674
		Waigaon		73.940		78.940
		Shiagori		74.493		74.493
2	Bhandara	Kesalwada		150.00		150.00
		Sonegaon		80.00		80.00
3	Adyal	Reagola		69.840		69.840
		Madagi		139.938		189.933
4	Sakoli	Yerandi devi		266.781		266.781
		Papda		162.673		162.673
		Umarzari		221.968		221.968
		Chandori		194.046		194.046
		Dhanod		174.110		174.110
		Zadgaon		219.781		219.781
		Tudmapuri		202.383		202.383
		Bardkinhi		173.00		173.00
		Malutola		333.562		333.562
		Wadsgaon		0	110.977	110.977
5	J/Kandri	Hiwara		172.792		172.792
6	Tiroda	Ghoti		61.790		61.790
		Khara		193.700		193.700
		Majitpur		154.910		154.910
		Junewani		125.00		125.00
		Gangazari	130.00			130.00
7	Tumsar	Temani				203.049
		Chandpur				207.469
		Asalpani				207.756
		Total	230.00	3535.376	110.977	3876.353



19.7 JFM under ITDP Scheme: Integrated Tribal Development Project can be implemented in the tribal areas of Bhandara district in 6 villages through participatory forest management with the involvement of tribal people by adopting JFM approach. It covers 3750.9 ha of forest area out of which 871.5 ha assigned to FPC for protection. As well as plantation under different models like medicinal plants, fodder development, bamboo plantation, mixed plantation on 149 ha would be taken. G.R. dated 25th. April 2003, shall be applicable for benefit sharing in such areas. The aim of the project is to enhance the economic and social status of the tribal people by taking various plantation activities, soil moisture and conservation works. This project will have a great impact on about 500 families i.e. about 2000 tribal people and will generate self employment about 10500 man days.



Chapter XX

FOREST PROTECTION

20.1 General Constitution: Preparation of a working plan and all its' prescriptions will be proved to be a futile exercise, if the forest resources, like any other precious treasures, are not provided with an appropriate and effective protection from the factors injurious to them. Therefore forests are to be protected from factors like fire, grazing, illicit cutting and encroachments etc. Considering the importance and gravity of this problem, the National Working Plan Code, prescribes this 'the mandatory Working Circles' for the Forest Protection Working Circle' in all the Working Plans. The State Level Working Plan Committee, in March 2008, recommended, while giving sanction to the PWPR II, that Forest Protection should be a chapter and not a Working Circle.

The forests are burdened with heavy biotic interferences, hence addressing these problems in a systematic manner necessitated the constitution of this Chapter. Illicit felling, Grazing, Fire, Encroachments and Poaching are the major causes for the damage of the forests.

20.2. Special Objectives of Management:

20.2.01 The special objectives of management are:

1. To enforce the Indian Forest Act 1927, Wildlife (Protection) Act 1972 and Forest (Conservation) Act, 1980, for effective control of Illicit felling, grazing, encroachments, poaching, fires and diversion of any forest land for non-forestry purpose.
2. To develop a database to monitor various forest and wildlife offence cases in a systematic manner.
3. To motivate and sensitise the staff and to strengthen their hands and capabilities so that they face the challenges and threats from organized groups of offenders.
4. To equip and train the staff to meet the field challenges, including their own protection, while discharging their duties.

20.3 Illicit Felling: Illicit fellings are done either by

- i. Commercial wood smugglers to feed the demand of urban market and
- ii. Local people to meet their house hold requirements of timber and firewood.



- iii. Supply of timber and fire wood to the nearby towns by the local people as Headloads.

Illicit felling in the forest area is growing at an alarming rate. Illicit felling is observed near villages particularly in Bhandara, Sakoli, Pauni, Tumsar, Nakadongri and Lendejhari Ranges. To deal with the offenders of illicit felling with the help of better communication system, the forest department has installed wireless communication system in Bhandara Dn. Various base-stations have been established in the Division for this purpose. Range wise details of existing base stations are given below:

Table No. 20.1 Range wise Location of Base Stations.

Name of Range	Location of Base Stations
Bhandara	Bhandara, Koka
Sakoli	Sakoli, Umerjhari
Tumsar	Tumsar, Chicholi
Jamkandri	Jamkandri, Mangurli
Pauni	Pauni
Adyal	Adyal, Kitadi

To check the illicit felling in the forest it is necessary that the forest produce are not transported without transit permit, as the transit permit is the most powerful tool for controlling the illegal harvest and transport of any forest produce. To have a control on transport of the forest produce, 12 check posts have also been established in the Division. They are located at Kardha, Kalagota, Girola (Bhandara range), Pauni, Nilaj (Pauni range), Chicholi, Hardoli (Tumsar range), Nakadongri, Bapera (Nakadongri range), Kandri and Lowada, Pangadi (Jamkandri range).

Regular patrolling in the sensitive areas, faster communication including Motor vehicles facilities, adequate self protection capabilities, frequent training and establishment of forest stations at strategic places are recommended to control illicit felling and transport of wood. Establishing intelligence network, with the help of Forest Protection Committees, for this purpose is strongly recommended.

20.3.01 In addition, to address supply-side management by augmenting wood production on forest and other community land, the demand-side management should be taken up like efficient wood utilization and energy efficient alternatives

like, Community Kitchens of Hindustan Petroleum, Biogas, solar cookers, etc. The following general principles are prescribed for the effective protection of the forest:

1. Rapport establishment with the local villagers through JFM and other development schemes
2. The Forest Department shall try to meet the bonafide needs of wood of the local population from the regular coupe working, including thinning and cleaning.
3. Employment through forestry works shall be generated in the remote villages where there is no other job opportunity so that the economically weak population is not get involve in illicit felling for big smugglers.
4. An intelligence network will be very useful in preventing any offence
5. The forest field staff shall stay at their respective headquarters.
6. Regular patrolling shall be done in the sensitive areas and a squad of 6 to 10 persons, as per requirement, can be made for this purpose.

Besides this, the following measures are also recommended:

- i. Review of beat wise offence cases, every month.
- ii. Review the *varas*, *bevaras* offence cases monthly; efforts are made to find out the offenders in each *bevaras* case.
- iii. Every *varas* case having more than Rs.10,000/- worth forest produce/loss to the forest invariably is submitted to the court within the prescribed time.
- iv. Charge sheets should be filed in the courts without any delay.
- v. IPC sections may be used for offences where the IFA is not applicable
- vi. To properly monitor the forest offences, a modern data compilation and analysis system, with suitable software, should be developed at Range, Division and Circle levels.
- vii. Wireless, phone or internet systems shall be used for fast communication.
- viii. Use the provisions of rewards for gathering of information through intelligence.
- ix. The staff should be given regular exposure regarding all the legal aspects of handling the offence cases.
- x. Suitable staff should be posted at suitable places
- xi. History sheets of all the offenders along with their photo and bio-data are



maintained at Round Level, Range and Division Level.

- xii. Prepare the list of offenders, showing the offence cases involved by him, against the each offender.
- xiii. The provisions of the G.R. dated 8/5/2003 shall be implemented. If any difficulties are there be communicated to the Govt. with supporting data.
- xiv. Sufficient funds for protection related works should be made available in time.
- xv. Beat checking should be carried out as per the standing orders.
- xvi. Every beat guard shall maintain a register of stumps in the following proforma. Every stump is registered by a serial number followed by/ and year, for example, if the number is 198/05, means 198 is tree no. and 05 is the year.
- xvii. Every year from January 1, onwards start the new series.
- xviii. The supervisory officers, during the beat inspection, verify the registered stumps and unregistered stumps. The beat guard shall be held responsible for non-registering the illicit stumps.
- xix. Every Range and Division office shall maintain the Xerox copies of the judgments of all forest cases for the guidance and improvement purposes.
- xx. Inter state co-ordination meetings with the authorities of M.P. Govt. shall be made, to arrest and prosecute the offenders of M.P who are involved in the offences of Maharashtra state.
- xxi. The RFO shall collect the monthly beat *khairiyat* report from each forest guard and Round officer and shall submit Range *khairiyat* report to the DCF in the first week of every month
- xxii. All cases of violation of the Forest Conservation Act, 1980 shall be referred to the Nodal Officer for necessary legal and administrative actions

20.4 Fire Protection: Forest Fires are one of the most important factors adversely affecting the forest resources, specially, natural regeneration, growth rate of trees, ground Flora, soil organisms, wild life and site productivity. Effective fire control as prescribed in the plan is essential for the conservation of forest resources. The division officials and local people shall be sensitized about the need of effective fire control. All fire incidences must be meticulously recorded and investigated to assess the damage caused.



In Bhandara division, fires occur annually over most of the areas due to increased biotic interference. Fires are mostly set by Tendu collectors to obtain profuse flush of leaves on Tendu shoots. Fires are also set by local villagers to facilitate movements in the forest for the collection of Mahua flowers, gum and other forest produce and to get new flush of grasses. Sometimes fires spread from the adjoining cultivation area or through half burnt cigarette or bidi stubs thrown by the people passing through the forest. Natural fire is extremely rare. Fire is the major factor responsible for the degradation of forest. It also leads to degradation of forest soil. Many valuable species of NTFP in the form of herbs, shrubs and climbers are also vanishing due to regular fire in the forest.

Besides the damages to the flora of the forest, fire causes immense damage to the Fauna found in these forests. The sufferers are all types of animals like insects, amphibians, reptiles, mammals and birds nesting on the ground. Besides these the micro organisms found in the surface soil is also destroyed.

20.4.01 Classification of Fire Control Areas:

A. Class-I (Complete Fire Protection): The Class-I fire control areas include all felling coupes (for six years) of SCI, Improvement Working Circle, Afforestation WC, Fuel-wood, Fodder and Pasture Working Circle, Protection and Catchment Area Management WC, thinning coupes (for six years), plantations (for five year), the A-type areas (permanent), forest depots (permanent), forest nurseries (permanent), Special habitat areas (permanent) and any other areas of special importance decided by the CCF.

B. Class-II (General Fire Protection): The Class-II fire control areas include the remaining areas of the Selection-Cum-Improvement, Improvement Working Circle, Afforestation Working Circle, Fuel-wood Fodder and Pasture Working Circle, Protection and Catchment Area Management Working Circle as well as any other areas, which deserve the protection in the opinion of the CCF (T).

C. Class-III (General vigilance): The remaining forest areas (that is, areas not included in the above two classes) are identified as the Class-III fire control areas. Special measures for the fire protection are not undertaken, but deliberate setting of fire and burning the forest is prohibited.

20.4.02 Fire control measures:

A. A fire protection scheme for the entire division which would be consistent with the instructions given in this working Plan, shall be prepared before November each year, identifying the watch points (including watch towers), strategic locations, and strength of firewatchers at each location, deployment of vehicles, use of wireless sets, supervisory forest staff and the co-ordination protocol.



- B.** Each location is proposed to have 5 to 10 persons including regular staff and firewatchers. The staff shall be trained in the application of modern fire-fighting tools. The fire prevention shall be trained as a high priority item. The scheme shall be implemented sincerely during the fire season.
- C.** Areas deliberately burnt for silvicultural reasons under the sanction of the Chief Conservator of Forests (T) shall be excluded from the fire protection scheme. Fire in such areas need not be reported unless spreads beyond such area.
- D.** All the Class-I and Class-II areas will have external fire lines and internal fire lines dividing the forest area into convenient blocks.
- E.** Fire Watchers and local forest staff shall constantly patrol the Class-I and Class-II fire control areas. The directives require that fire in the Class-I areas be reported to the Deputy Conservator of Forests immediately along with details of the area burnt and the damage inflicted to the forest crop.
- F.** The group of firewatchers shall immediately rush to the site and extinguish fire as soon the fire spot is located by upcoming smoke in their area of operation. Modern fire fighting tools shall be used for extinguishing the fire. The supervising officials should mobilize reinforcement in case of large fire. Utmost care will be taken to quench the smouldering material. Providing a thick layer of soil over such material is generally effective.
- G.** The fire lines shall be kept clear of all growth and combustible material during the season. Leaf litter and other dry material on the fire lines shall be collected periodically along the edge and burnt before the fire season starts. Firewatchers engaged for this purpose will have a duty to sweep the fire lines continuously and keep them clean of any debris or leaf litter. Depending upon the watchmen and other manpower available in the area, suitable blocks may be identified around which regular clearing of the fire lines should be ensured.
- H.** The cutting of fire lines shall be completed by December. Fire tracing (burning) shall be completed by February 15, and thereafter burning should require permission of the Deputy Conservator of Forests and physical presence of a gazetted officer.
- I.** The division office shall maintain a "Register of Fire Lines" showing the length and width of fire lines, and enter the period of cutting and burning of fire lines. The register will be kept up to date and checked every year, in March. In addition, a map showing the length and width of fire lines division wise and range wise as far as possible shall be prepared in the beginning of the fire season and the same shall be used to depict the areas burnt every fortnight.
- J.** Negligence in the fire protection shall be taken as dereliction of duty. The supervisory officers shall extensively verify fire control measures.



K. Efforts will be made to motivate the JFM Committees to protect the forest from fire by assigning them certain areas of forest, in case they agree and sincerely protect the assigned forest from fire, the grants earmarked for protecting that area should be given to JFM committees after verifying the area protected.

L. It was observed that the existing fire lines are not maintained in their prescribed width for its full length. Hence their efficacy could not be assessed in the absence of clearly laid fire lines. The committee formed by PCCF, based on its report, shall examine the scheme submitted by CCF (T); the PCCF shall take decision for further implementation of the scheme, if any.

M. Three rows of agave suckers in 1.5 m. wide strip along the contours shall be planted during the monsoon season at the foothills of steep slopes to prevent the spread of fire, as agave acts as a fire barrier. This activity shall be carried out along with regular coupe work.

N. Standard widths of fire lines are prescribed in the Table No.20.2

Table No. 20. 2 Standard Widths of Various Types of Fire Lines:

Sl. No.	Characteristics of the area	Width of fire line in Meters
1	External boundaries of the forest	12
2	Naturally or artificially regenerated areas (For 5 years) (coupes)	6
3	Remaining coupe boundary	3
4	Both sides of road and cart tracks through the forests	6
5	Timber, bamboo and firewood depots	40

Daily monitoring of fire incidences and the areas burnt and the efforts taken by the staff to control the fire shall be monitored through wireless on day-to-day basis by D.C.F. and D.F.O. vigilance under the supervision of CCF Territorial.

20.5 Grazing Regulations:

20.5.01 The entire forests are liable to damage from grazing including grazing by goats, except the interior areas, which are away from the villages. The 'A' class forests adjoining the *Berar* plains are very hilly, and the upper slopes are steep. The grazing is, therefore, confined to the lower hills and the calculated incidence does not give the true picture of the grazing pressure here, while a large inaccessible area of the units remains un-grazed. A realistic calculation of grazing incidence is required.



20.5.02 The grazing incidence figures are much heavier than estimated. Damage caused by uncontrolled grazing is heavy due to large cattle population. The grazing incidence, as prescribed in the grazing policy of 1968 of Govt. of Maharashtra, is not followed. The Cattle of the erstwhile forest villages are also grazing in the immediate vicinity of the villages. The true grazing incidence in the areas adjoining the villages is therefore, very detrimental to the forest conservation. Moreover, the Protected Forests have Nistar rights for grazing and they have so far not been worked under any scientific forest management. Due to this the protected forests are more vulnerable to heavy grazing. Even large number of goats is also seen grazing in the forest. Continuous and heavy incidence of grazing, not only prevents regeneration of tree species, but also the plantations and young regeneration obtained during the period of closure is lost soon after the areas are open to grazing. In fact the closure of forest areas are only on paper, in reality grazing is carried out in all areas including the current coupes and plantations.

Areas with clayey soil, the trampling by cattle results in compaction, change in structure of the soil and reduction in soil aeration. In sandy soils heavy grazing results in accelerated erosion and denudation. Due to over grazing the wild animals also suffer due to scarcity of fodder in the forest.

Grazing by sheep and goat is highly damaging to the flora as well as for the soil. These animals not only browse the foliage of plants and grasses but also uproot and eat away the roots and rhizomes of the grasses as well as the bark of the young plants, leading to exposure of the soil and drying of saplings. Due to the structure of the hoof of sheep and goats, the pressure exerted on the soil due to their body weight is very high which leads to the compaction of the surface soil. Once the soil becomes compact, it becomes very difficult for the wild seeds to germinate during the rainy season.

20.5.03 Grazing shall be regulated as per guidelines of Grazing Policy 1968 of Maharashtra State issued vide Resolution No. MFP-1365/132211-Y dated December 6, 1968 and Grazing Rules issued vide No. MFP-1371/237035-Z dated November 3, 1973. However no grazing beyond carrying capacity shall be permitted.

20.5.04 Heavy cattle pressure adversely affects the forest regeneration and soil condition. The present political economy of domestic animals in the area throws up strong challenge, and implementation of the Grazing Regulations in its current form. Therefore special efforts need to be taken up to ensure that no grazing is allowed beyond carrying capacity.

20.5.05 The situation may be substantially improved by establishing effective communication with the local people, by awareness generation and efficient animal husbandry programme. The forest officers should take up these



preventive measures in co-ordination with the Animal Husbandry Officers.

20.5.06 Maximum admissible grazing incidence according to the current policy has been shown for various working circles in Table 20.3. A systematic survey of fodder availability is recommended during the plan period in each round.

Table No. 20.3 Admissible Grazing Incidence in Various Working Circles:

Working Circle	Functional Classification	Maximum Grazing incidence (ha/Cattle unit)	Period
Special Areas(overlapping)			
Protection areas (A1 & A2) & Special habitat areas	Protection forest	Nil	Permanent
Flowered Bamboo area	Protection forest	Nil	Till seventh year
Annual coupes	Protection forest	Nil	Till six years
Plantations	Protection forest	Nil	Till fifth year
Other Area (under Working Circles)			
Selection-cum-Improvement	Tree forest	1.2	
Improvement	Minor forest	0.8	
Afforestation	Open forest	0.8	Except plantations
Fuelwood Fodder & Pasture	Minor forest	0.8	Except plantations

Note: Area required for wildlife population should be calculated accordingly, and deducted from the available area for the domestic cattle. If relevant data is not available 20% area should be marked for the wildlife.

20.5.07 The carrying capacity and period of closure should be calculated for the forest area adjoining each village. The grazing passes, free or otherwise to individual families are proposed to be distributed on the calculated carrying capacity basis. Village bodies should also be actively be engaged in the implementation of grazing regulations.

20.5.08 The surplus cattle should be kept under regular watch, and villagers should be encouraged to adopt stall-feeding or other means to address mismatch between cattle-heads and fodder availability.

20.5.09 Fodder development on the community lands and translocation of surplus cattle may be encouraged.



20.5.10 Animal Husbandry and Dairy Development Agencies should be motivated and influenced to take up breed improvement program. Fodder in the plantation areas should be made available free of cost on cut-and-carry basis.

20.5.11 The DCF shall carry out cattle census of each village during the winter season at the beginning of the plan period to find out the local cattle once for all and maintain record and passes shall be issued limited to those cattle subject to the availability of carrying capacity.

20.5.12 All forest officers while visiting the forest areas should check the grazing pass if any cattle found grazing in the forest. Stringent action should be taken if any person found his cattle illegally grazing in the forest. The passes shall show the compartment numbers meant for the grazing by writing clearly.

20.5.13 Hacking and felling of young plants and big trees be dealt seriously and offenders shall be prosecuted.

20.5.14 The misuse of transit passes of cattle for grazing be strictly checked and if found their passes be cancelled and be dealt according to law.

20.5.15 Recently the Govt. of Maharashtra vide it's G.R No.MFP-2103/Case No.135/F-1. dated 29.10.2007 has granted permission for grazing of sheeps in the forest area including Bhandara division. The illegal grazing by goats and sheep is already in practice and if it goes uncontrolled it will lead to heavy degradation of forest leading to severe scarcity of fodder in the forests. The degradation of forest will not only limited to the flora and fauna but it will degrade the land itself, as the single biotic factor contributing to the desertification is the uncontrolled grazing in general and grazing by herds of sheep and goats in particular.

20.6 Encroachments on Forest Land:

- i. There have been large scale clearances of the forests in the past for encroachment with a purpose to get agricultural crops. The State Government has issued orders vide GR Nos. LEN/1078/3483/G-1, dated 27.12.1978 and FLD/1079/1366/F-3, dated 12.09.1979 to regularize all the encroachments on forest lands done during the period from 01.04.1972 to 31.03.1978. This has increased the tendency of people to encroach upon the forest land with a hope that in future also such encroached lands will be regularized by the Government. The problem of encroachment is more on Protected Forests, as they are adjoining the cultivation and villages and there is no proper demarcation at most of the places.



- ii. The encroachment problem is more prevalent in the *Tumsar, Jamkandri, Bhandara and Pauni* ranges and mostly made for agricultural purposes. The eviction operations led to animosity between the villagers and foresters.
- iii. The causes of forest encroachment shall be examined thoroughly and addressed in a comprehensive manner. A proper boundary management and standard administrative guidelines will help to control encroachment.
- iv. Renewed and concentrated efforts on the part of division staff is required to prevent new encroachment on forest land.
- v. Small isolated patches of the forestland are often neglected and become vulnerable to encroachment. Special care shall be taken to ensure protection of such patches from encroachment.
- vi. The civil powers of eviction are entrusted with ACF and DCF vide Govt. Res. No. R and F.D/PWR/1196/296/CR.No.17/LII, dated 30-1-97. The procedures laid out in the Land Revenue Code shall be followed before the execution of eviction.
- vii. Habitual encroachers shall be prosecuted as per Indian Forest Act.1927.
- viii. All external boundaries shall be demarcated with concrete pillars.
- ix. All sensitive and important boundaries and wherever disputes are there, be surveyed with DILR and concrete pillars be laid immediately.
- x. All encroachments be listed with their names, age, residence, profession whether belongs to SC, ST, OBC/NT, extent of encroachment, S. No. and location of encroachment, village/block.
- xi. A Detailed report of the encroachment cases after 13.12.2005 be prepared for each encroacher and be submitted to ACF to obtain summary eviction orders, in a time bound program.
- xii. After the completion of due procedure of Land Revenue code and after giving a reasonable opportunity of being heard to the encroacher, the ACF shall pass a summary eviction order if he satisfies so, quoting the findings.
- xiii. The concerned RFO shall execute the eviction order.



- xiv. If the encroachments in a village are more in number police protection be obtained for the operation.
- xv. Use of Cr. P. C. provisions like section 106 and 110 be used to obtain good character of offenders before *Tahsildar* and SDO respectively to smoothen the eviction operations as well as to prevent the tendency of future encroachments.
- xvi. For the encroachments on the un-classed forests (though 7/12 shows clear possession of the departments) FIR shall be lodged in the concerned police station for the prosecution.
- xvii. To prevent the tendency of encroachments, improved crop techniques be propagated in the problem villages to enhance the crop productivity with the help of Agricultural Department.
- xviii. Regarding encroachments before 13.12.05, action as given in the Schedule Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and rules made there under be taken.
- xix. In the month of May, a drive for encroachment prevention be taken up in all the sensitive areas by taking meetings in the villages by *Dawandi* and distribution of leaflets and posters.
- xx. Keep a watch on all the sites meant for debris cleaning, ploughing etc., in the month of May, so that encroachments are removed even before the sowings.
- xxi. A total of 433.27 ha. of encroachment was registered by the Bhandara Division. The detailed list of encroachers is given in the **Appendices – LXIII & LXVIII.**
- xxii. The actual encroachment may be much more than recorded by the Department. Now, action is required to be taken as per the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and Rules made there under.

20.7 Protection of Valuable Minerals in Forest Land:

The forest lands of Bhandara division are rich in valuable mineral deposits and they are highly vulnerable to theft. Most of the forest staff is not aware about this fact. The Dy.C.F. should sensitise the field staff about the importance and vulnerability of the forest areas where the deposits of valuable minerals are found. The name of minerals and locations where they are found should be mentioned in the beat, round and Range maps. The list of minerals



and its location (Latitude and Longitude) are given in the **Appendix - XXVII.**

- i. These minerals should also be considered as a forest produce and should be given the same priority as timber or other forest produce.
- ii. In case of any theft, prompt legal action should be taken.
- iii. A proper watch should be kept on all trucks moving in the areas, rich in minerals.
- iv. The beat, round and range Khairyat Reports should include the report about these minerals.
- v. Any large scale illegal mining or quarrying should be immediately reported to the Nodal Officer.

20.8 Poaching of Wild Animals: The issues related with poaching have been dealt in detail under Chapter on Wildlife (Overlapping) Working Circle.



Chapter XXI

MISCELLANEOUS REGULATIONS

21.1 Boundary Demarcation

21.1.01 Demarcation Priorities: In order to keep the integrity of forests areas intact, strict vigilance over the forest boundary and periodic verification of the demarcation on the ground for the entire forest area has been prescribed. However, in view of the position of demarcation and boundary pillars on the ground, priority areas for the demarcation work have been identified. For the purpose of boundary demarcation, the following areas have been identified in the order of priority;

- Notified Reserved Forests.
- Notified Protected Forests.
- Outer boundary of compartment in which erstwhile forest villages are located.
- All unclassified forests with the Division.
- Jhudpi Jungles transferred to the Division.
- Disforested areas against various projects.
- Forest areas where exact boundaries are not shown on the forest maps.

21.1.02 Special Objective of Management:

1. To collect all relevant Notifications , Maps and other records
2. To identify and carry out the survey and demarcation work of all un-demarcated forest lands
3. To maintain boundaries of forestlands in the Division by permanent pillar marks, to act as psychological barriers.
4. To ensure effective protection of the forest resources against adverse influences.

21.1.03 Approach to the Forest Demarcation: Well-defined forest boundary is a prerequisite for effective forest protection and its sustainable management. However, in case of most of the protected forests, the land is neither properly surveyed nor demarcated on the ground. In case of demarcated protected forests, the forest boundary marks are either missing or in a very poor state. Forest areas vulnerable to boundary obliteration, need



to be identified for survey and demarcation so that forest encroachment on the forest fringes could be detected promptly. Presence of boundary marks also serves as psychological barrier against the forest encroachment. Artificial boundaries adjoining non-forest land are proposed to receive the highest priority to ensure protection of these areas.

The procedure for Demarcation of un-demarcated Forest Lands should have the following steps:

1. All the notifications should be collected
2. All the relevant maps (Topo-sheets of RF, Bandobast Maps, Consolidation maps and resurvey maps for PF, Un-classed Forests and Jhudpi jungle) to be collected. Demarcation should be carried out with the help of the map, which was the basis for the notifications under Indian Forest Act.
3. In case of Protected Forests and recently declared RF, ground Survey to be carried out with the help of TILR.
4. Appropriate pillars to be fixed immediately after the survey.
5. Boundary lines between forest and non-forest land to be taken on priority.
6. Proper records of boundary demarcation to be maintained in the boundary register, both at Range as well as the Division level.
7. Reconciliation of Forest and Revenue records should be done every year.

The forest maps, by using GIS software, have been developed and the total length of external boundaries is being calculated, by digitising external boundaries in Geo-media software.

21.1.04 Application of GPS: The D.C.F shall take initiative in training the field staff of the Division in handling a GPS instrument. All field staffs should develop the skill in handling and using a GPS instrument in the field for demarcation and fixing the location of boundary pillars. While using the GPS, proper care should be taken and its limitations should be considered. The GPS should be considered as an additional tool to locate any point or boundary or to measure area of any piece of land in the field, within short period of time and the department should not fully rely only upon it, especially in legal matters. **Appendix - XXVA shows** the methods of using a Garmin-72 GPS instrument.

21.1.05 Demarcation of Jhudpi Jungle: The Jhudpi Jungle areas were taken over by the Division, without due verification of records and demarcation on the site. Most of these areas were not demarcated before taking over. Hence, examination of records, collection of relevant authentic



maps and demarcation of the area is essential for the entire Jhudpi Jungle. Majority of these areas have been proposed for notification under section 4 of IFA, 1927. This process shall be completed expeditiously and enquiry will have to be conducted in a time bound manner.

21.1.06 Fixing Boundary of the Erstwhile Forest Villages: There were six forest villages, which were located within the Reserve Forest compartments. They have been formed into the revenue villages in the year 1977 by disforested the requisite area of the reserved forest of the respective compartments. These details are given in the **Appendix – XIV**. The boundaries between the forest land and the village within these compartments however are not clear on the ground. Therefore, it is necessary that outer boundary of village is surveyed and new pillars are to be erected and accordingly maps may be generated.

21.1.07 Boundary Demarcation and 1/5th Boundary Demarcation Scheme: It is prescribed that the boundary of all the lands, Reserved Forest, Protected Forest, Un-classed Forest, Jhudpi Jungle and non-forest land, in possession of the Bhandara Division, should be properly surveyed and demarcated on top priority and should be completed within 5 years period. These boundaries then should be annually maintained under the 1/5th Boundary Demarcation Scheme. Details of the compartment boundaries, for survey and demarcation purposes are included as shown in **Appendix – XXIII**.

- 1. Demarcation of the External Forest Boundaries:** The length of the external boundary of the Reserved Forests is 1192.53 km, of which about 121.82 km, is formed by permanent natural features. Whereas, the boundary line of Protected Forests is 1333.278 km, out of this 142.200 km. formed by permanent natural features and 1191.078 km. is the artificial boundary. Large portion of this artificial boundary along the PF is not demarcated and it is under progress by fixing new RCC pillars. The survey works are carried out with the help of TILR (**Appendix-XXV**). **Appendix-XXIII** shows the 1/5th Boundary demarcation and verification scheme of already demarcated forest lands.
- 2.** In May 2001 the Principal Chief Conservator of Forests approved a demarcation model, using a series of concrete pillars. This model as modified, till date, shall be followed for the external boundary.
- 3.** Cement-concrete pillars at bends and corners of the artificial boundaries should be raised immediately after the survey. This work will require substantial fund allocation, as it will need sizeable manpower and resources.
- 4. Demarcation of the Internal Forest Boundaries:** Internal boundaries between compartments or those between the Reserve



Forests and the Protected Forests may be demarcated using traditional stone cairn, earthen cairn or standard wooden pillar.

- 5. Routine Boundary Maintenance:** The Beat Guard after his personal inspection of the entire compartment must submit the '*Compartment Inspection Certificates*' every month before disbursement of the monthly salary. The certificate must record condition of forest boundaries including pillar numbers and inter-pillar visibility conditions. Separate certificate should be submitted for each compartment. The Round Officer should submit similar certificates for his inspections.
- 6.** The Range Forest Officer should check accuracy of the '*Compartment Inspection Certificates*' according to the prescribed norms covering each round. He should personally check vulnerable compartments other than those covered by the Beat Guards and the Foresters.
- 7. Specification of Boundary Pillars as per BFM Vol.III:** The prescribed design must be followed to carry out the task of fixing the boundary pillars as prescribed. According to provisions contained in the BFM Vol. III, Conservator of Forests is empowered to give sanction to the design of the pillars. However, May 2001 instructions referred to as above have given uniform specification for this purpose. Accordingly 1.40-meter long cement concrete pillars at roughly 50 meters interval on the external forest boundaries will be erected. Wherever the external boundary is shared with other government land, the interval should be increased to 100-150 meters and intermediate pillars may be 0.90 meter long. Both types of pillars should be embedded to 0.40-meter depth in the cement-concrete base. The prescribed tapering cross-section of the 1.40-meter pillar is 0.10 x 0.15 meter at the top and 0.15 x 0.23 meter at the base. The 0.90 - meter pillars are parallel pipe with 0.15-meter width and thickness.
- 8. Specification of a Boundary Cairn:** Artificial boundaries should be marked with a series of boundary Cairns. A Cairn should be made of loose stones upon excavated foundation to a depth of 30 (thirty) centimetres and shaped like a truncated cone. A cairn will be 1.20 meter high, and have 1.20 meter top diameter and 1.80 meter base diameter, as described in the *Central Province and Berar Forest Manual*. A slab stone (0.20 x 0.20 x 0.90 meter) or a timber stake projecting 1/2 (half) meter in the centre will be fixed firmly on the top of the cairn, and marked with cairn serial number. Each boundary marks (cairns) must be visible from its neighbouring ones on both sides. Distance between two consecutive boundary marks should not exceed 250 meters. **The cairn stone or post should be colour washed with white colour for the open forests and red for the**



closed forests. Such Cairns can be made of earthen mass, where stone boulders are not available.

- 9. Recording Locations of the Boundary Pillars or Cairns:** The location of the boundary pillars and Cairns along with their numbers should be shown on the maps. The numbers shown on the topographic sheets will be maintained.
- 10. Clearance for the Boundary Line:** Boundary line should be cleared and only matured trees should not be felled for the boundary line, but shrubby undergrowth should be cleared. Norm for the external boundary line is *12 meters*. The internal compartment boundary lines should be *3 meter wide*.
- 11. Compartment Plates:** Metal plates on the boundary trees at a height of 2.5 to 3.0 meters will be fixed on the corners and roughly at half-kilometre interval on the side away from the compartment. The colour of the plate and lettering should agree with the state-level general guidelines. Till such guidelines are available, red letters on white plates will be used. Size of the plate and letters should not be less than *15 cm and 10 cm*, respectively. Strokes should be at least 2 cm wide.
- 12. Colour Wash on the Boundary Marks:** The Beat Guard will be responsible for annual freshening of the pillar numbers, the compartment plates and the colour-wash of the boundary pillars carried out in September-October.

21.2 Demarcation, Preparation of Treatment Map and Marking of Coupes:

21.2.01 Demarcation of Coupes:

1. The annual coupes to be worked as per the prescriptions of the plan, will be demarcated one year in advance, and each coupe, if so required, is proposed to be subdivided into four sections for effective management and control. The Range Forest Officer will thoroughly inspect the coupe after demarcation and issue 'Coupe Demarcation Certificate' in the prescribed format, given in the following paragraph, which is to be verified by the concerned Assistant Conservator of Forests.
2. Format for the Coupe Demarcation Certificate is prescribed, as follows, in Form No. 21.1



Form No. 21.1

"I ----- R.F.O. -----
-----hereby certify that I have personally inspected the
demarcation of the coupe No. ----- in the Compartment No. -
----- of F.S. ----- of W.C. -----
-----on dated-----/-----/----- and found
that the coupe has been demarcated as prescribed in the working plan.
The area of the coupe is ----- hectares.

Name, Signature

Date:

and Official Seal of the RFO.

3. Annual coupes have been prescribed to be demarcated by cutting and clearing bushy undergrowth on 3 (three) metre wide line and by erecting pillars or posts up to 2 meter height in middle of the cut line at suitable intervals, so as one pillar shall be visible from the other one, except where the coupe boundary runs along streams, fire line or road. The pillars shall bear the coupe number, name of the felling series and the working circle on the side away from the coupe.
4. Selected trees, above 45 cm gbh, at suitable intervals standing on the periphery of the coupe will be given two coal tar bands and a geru band in between after scrapping the loose dead bark. The lower coal tar band will be at B.H. and the other coal tar band will be 15 cm above it. Just below the lower coal tar band *Tree serial number* in Arabic will be given on the side away from the area of the coupe. The bands and serial numbers of such trees will be maintained in the marking register in, the following,
Form No. 21.2.

Form No 21.2

List of trees on the coupe boundary

Sl. No.	Name of species	GBH (OB)	Remarks
1			

5. No tree, bearing the coupe demarcation bands, is proposed to be marked for felling.



6. **Demarcation of Sections:** For effective monitoring and control of the harvesting operations, each coupe marked for felling in SCI and Improvement Working Circles will normally be divided into four approximately equal sections. Sections will be demarcated by 1.5 m. wide cut lines by clearing brushwood, unless the section line runs along a permanent feature.
7. Trees above 45 cm girth, selected at suitable intervals on the inner edge of the 1.5 m wide cleared section line will be given two coal tar bands 15 cm apart, the lower coal tar band being at breast height. Just below the lower coal tar band section number will be given on the side away from the area they would denote.
8. **Demarcation of Protection Areas:** Selected trees, on the periphery of the *Protection areas* will be given two geru bands 15 cm apart, lower band being at B.H. In addition, a cross in geru colour between the bands will also be given on the side away from the protection areas. All those trees will be serially numbered. The serial number will be given on the side away from the protection area just below the lower geru band, on the side bearing the cross. All the protection areas will be numbered in Roman numerals and the trees standing on the periphery of each protection area will be numbered in Arabic, adopting separate series for each area, so that the trees on periphery of Protection Area No.I will bear the Sr. no. I/1, I/2, I/3, etc. and the similar trees on the periphery of Protection Area No. II will bear the Sr. no. II/1, II/2, II/3, etc. The protection area will also include sample plot and presentation plot, shown in Red. These are to be excluded from the marking.
9. **Demarcation of other Areas given in the Treatment Map:** The other categories of areas shown in the treatment map will be marked by giving one geru band at B.H and one coal tar band 5 cm above it.

21.2.02 Treatment Map:

1. Immediately, after completion of demarcation of the coupe, RFO will prepare the *Treatment map* of the coupe by clearly showing the various *Treatment-type* areas by laying a base line and 100m X 100m grid on the ground as well as on the map. The concerned ACF will verify the treatment map and make corrections, if necessary, before submission to the DCF for approval.

The treatment map will bear the date of preparation by the Range Forest Officer and the date of verification by the Assistant Conservator of Forests and their official seals and signature with name.

2. Preparation of treatment map will preferably be done one year in advance of the coupe working. Timely preparation would facilitate necessary checking and corrections, if any in time.



3. Immediately after seeking approval of the treatment map, site-specific Work Plan for the entire coupe shall be prepared by the RFO, verified by the ACF concerned and approved by the DCF.

21.2.03 Marking of Trees for Harvesting:

1. After approval of treatment map, marking of trees for harvesting shall be carried out as per the prescriptions given in respective working circles. Marking of trees for harvesting shall be done one year in advance of the coupe working and it shall be done departmentally. Timely marking would facilitate necessary checking and corrections, if any, in time.
2. Marking is prescribed to be done by the forester concerned under the close supervision of RFO and constant guidance of ACF concerned. The DCF shall himself inspect majority of the coupes to ascertain proper marking as per prescriptions of the working plan as well as to guard against the excessive marking. To ensure this close supervision, a marking certificate in following format is prescribed.

Form 21.3

I, RFO, personally inspected the marking of the coupe No. in the compartment No of felling series in Working circle on .../...../..... and found that marking of trees for felling has been done as prescribed in the working plan.

Date :

Name , Signature
and official seal of the RFO

These certificates shall be regularly and frequently checked and verified by the ACFs as well as the Deputy Conservator of Forests.

3. Trees marked for felling will be given *geru bands* at breast height and will bear marking hammer impression at the B H (breast height) as well as at the base on the blazes of sizes 10 cm x 10 cm.
4. Following trees in addition will bear digit serial numbers both at BH (Breast Height) and at the base.
 - a) All trees of Teak, Bija, Shisham, Ain, Tiwas, Haldu, Kalam, Dhaoda and Shiwan of 45 cm and above, girth at b.h (o.b).



- b) Trees of all other species, of and above, 60 cm girth at b.h.
5. The remaining trees marked will bear serial numbers, which will be given by coal tar. The digit and coal tar serial numbers will form separate series.
 6. The number of the tree marked shall be written vertically on the blaze, shown as under:

Table No. 21.01 Nail Marking:

XX (Hammer mark)	
For Tree no. 210	2
	1
	0

7. All trees bearing serial numbers will be individually recorded in marking (recording) book in, the following, *Form No 19.3*. Serial number given in coal tar must be recorded in the marking book.

Table.No.21.02 (Form No.19.3) Format for Marking of Trees for Harvesting:

Sl.No.	Tree No. Digit No.	Serial No. In Coal tar	Name of species	GBH(OB)	Remarks

8. Abstract of trees marked for felling will be made in 15 cm girth classes. Timber, poles and firewood trees will be shown, separately.
9. Malformed trees alone will be recorded as fuel trees, except that of Teak. A tree will be classified as fuel tree only when it is incapable of yielding any useful sawn timber or pole.

21.3 Soil And Moisture Conservation Works: This operation should be carried out in accordance with the 'Watershed Development Principles' and Guidelines of the Government. The local people should also be encouraged and motivated for Participatory Management of Water Resource.



21.3.01 The Soil and Moisture Conservation Works would start along with the marking of coupe and be completed before the onset of monsoon. Wherever feasible, the local material obtained from climber cutting, and shrub clearance shall be used for brushwood check dams to arrest the soil loss.

21.3.02 It is prescribed to follow watershed management approach viz. the **Ridge-to-Valley approach** for carrying out soil and moisture conservation works. The contour trenching and gully plugging/check dams, as given under, have been prescribed to constitute the major component of these works.

21.3.03 Contour Trenching: Contour Trenching as soil conservation measure could be taken in suitable places only with due precautions. **The estimates should be examined and sanctioned by the C.C.F Nagpur. Unnecessary digging of such trenches, only to meet the financial target or to provide employment to EGS labours should be avoided.**

The contour trenching is prescribed in areas having density less than 0.4 and slope below 25°. The size of the trench is prescribed as 30 cm deep and 45 cm wide. Dug up soil from the trenches will form a ridge on the downhill side, and pebbly material from the trench will be neatly pitched on the lower side. *Agave* Bulbils, *Khus* tussocks and seeds of other suitable soil binding species will be planted on the mound at one-meter interval in two staggered rows set 20 centimetres apart on the downhill side. The mound will also have sowing of seeds of *Khair*, *Babul* and *Neem*, etc. *Chilati* seeds may be preferred on refractory sites.

Trenches near the nalas are prescribed to be discontinued and curved upward at both sides of the nalas at 45° to prevent the run off of water stored. Contour trenches will normally be not more than 10 meter in length, and two contour trenches will be spaced at least 5 meter apart (horizontal distance).

The quantum limit of contour trenches is prescribed to be not exceeding 300 running meter per hectare in the B-type areas, and 100 running meters per hectare in the C-type and the D-type areas.

21.3.04 Nala-Bunding and Check-Dams: The primary objective of nala-bunding and check dams are to reduce the run off of water and to arrest the silt. They are prescribed to be made from the loose boulders found in and around the nala beds or from the dug up soil. **No blasting or quarrying shall be done for this purpose.** Where sufficient boulders are not available brushwood may be used. In this plan, check dams of both the loose rubble for arresting silt & soil loss and earthen gully plugging (nala bunds) for moisture conservation and water harvesting are prescribed.



- a. The structure and quantum of work will depend upon various factors such as the erosion status, ground conditions and local availability of suitable materials. However, to narrow the wide variations in implementation, the norm for gully plugging or nala bunding is proposed as 5 m³/hectare of loose rubble filling or earthwork **unless otherwise prescribed in the specific scheme or on special reasons the C.C.F Nagpur gives permission to increase the per ha. volume of the bunds .**
- b. The streambeds more than 8 meters in width shall not be covered under the nala bunding. Nalas more than 8 meter wide at the top should normally require elaborate engineering structures for bunding, and therefore, such bunds should not be considered as part of the quantity prescribed here. Each of such nala bunds, if required, should be treated as an independent project.
- c. The Forest Tanks (not more than 1 ha. submergence area) are proposed to be taken up in exceptional circumstances without causing damage to the tree crop will prove basically helpful for water conservation and availability of water for wild animals only and not for the use by the cattle and villagers.

21.3.05 Monitoring of Soil and Moisture Conservation Works:

Considering the amounts of fund being spent on Soil and Moisture Conservation Works, a proper monitoring is required to study and record the effects of these works in the field. The D.C.F with the help of the competent authority of Soil Conservation, in the Agriculture Department, will monitor the effects of these works and will develop a proper record of the activity and its effects on the Soil, Soil moisture, vegetation and wildlife habitat. **The future planning will depend upon the assessment results of the Soil and Moisture Conservation Works carried out by the division during the implementation period of this Plan. The DCF shall provide all these information to the Working Plan Officer before preparation of next PWPR- II of Bhandara Dn.**

21.4 Guidelines for Regeneration: Regeneration process is extremely important to restore the health and over all productivity of the forest. The regeneration may be either natural or artificial. The RFOs should prepare the Grid-based (100 mt. grids) treatment maps on the scale 1:5000, under the supervision of the ACFs. All the operations of Artificial Regeneration and Natural Regeneration should also be Grid oriented (50 mX50 m) with clear base lines and reference points, on the ground. **The Natural Regeneration should be given preference over the artificial one. Among Natural Regeneration, the Regeneration of Seed Origin will be given preference over the Coppice Origin according to the importance of the species.** A proper record, in the form of Register, will be maintained at Range level as well as Division level regarding all activities of Regeneration. All entries will



also be made in the relevant **Coupe Control Forms** and **Compartment History Forms**.

In case of Artificial Regeneration, proper Plantation Registers shall be maintained at Range as well as Division levels.

21.4.01 Natural Regeneration Management:

i. Tending of Natural Regeneration of Seed Origin: All seedlings and saplings (of seed origin) of valuable species, more *than 60 centimetres in height*, will be nursed as future crop. Spacing out operations, if required, will be carried out to leave nearly 400 saplings per hectare at an average of 5 metre spacing. While doing so (species like, Bija, Shisham, Haldu and Tiwas etc.) which are less in number in stocking and NTFP species shall however be given preference for retention. The natural regeneration shall be assisted and encouraged by soil working and mulching around them, in the following manner.

- **First year Operations:** Weeds in one-meter diameter around saplings of valuable species should be cleared during the first week of July. Uprooted weed, grasses and leaf-litter should be mixed in the upper layer of soil as the organic mulch and facilitate loosening and aeration of the soil by worms and insects. One soil working should be carried out in October.
- **Second year Operations:** The soil working in October will be repeated in the following year. However, one scrape weeding of one-meter diameter should be carried out in the first week of August around the shoots of seedling coppice within the rootstock management area.
- **Third year operations:** Singling of coppice shoots, management of damaged and malformed saplings, climber cutting and shrub clearance should be repeated as third year operations.

ii. Root Stock and Coppice Management : In the areas where there are no sufficient seedlings of seed origin, (at least 400-500 healthy and established saplings) are found the existing root stock shall be managed to increase the density and productivity of the crop. Preference will be given to encourage the valuable species of choice of the areas and will be managed accordingly. Tending of rootstock (Valuable spp.) in the B-1 type will be carried out as following :

- **Singling of Coppice Shoots:** One healthy and promising coppice shoot will be retained on the stumps and the rest be removed. However, coppice shoots interfering with promising saplings of seed origin shall be removed. Such coppice shoots should also be close enough to the ground so that it will not topple after gaining



volume and weight and would be able to develop root system of its own subsequently.

- **Coppice Management of Damaged and Malformed Saplings:** The saplings and poles of up to 45 cm gbh having one third of the stem damaged and malformed shall be coppiced by cutting flush to the ground. Such coppicing, however, should not expose the ground, causing erosion and leading to soil loss. Poles having at least 2.50 meter of clean bole will not be treated as malformed.

21.4.02 Artificial Regeneration: It has been observed that the soil depth in some areas, covered under plantation programme in the Division, is shallow and therefore the efforts made in the past in raising plantations (particularly the miscellaneous plantations) have resulted in failures. Hence, the plantations should be taken up on selective basis and only in the areas having good soil depth and which are well drained. Also the areas selected should have no or negligible grazing pressure. If the area was already planted and resulted in failure, such sites should be avoided. B2 type areas in the various working circles i.e. the under-stocked areas with scanty natural regeneration, are prescribed to be considered but such areas shall specifically be put to above tests before taking up plantation there. Only the areas neither having sufficient seedlings/ saplings of seed origin nor sufficient root stock but are found to be suitable for plantation of miscellaneous species shall be covered under the plantation programme. Two-stage plantation approach is prescribed in refractory sites of B-Type areas. The idea is to give the nature a fair chance to regenerate itself and to intervene by way of artificial plantation only as a last resort, whereas in remaining places; one stage plantation is prescribed to fill the deficit of natural regeneration. **In Bhandara Forest Division most of the areas are suitable for 'One Stage Planting'.**

21.4.03 Two-stage Plantation in Afforestation Areas: Two stage plantation, that is, **the Restorative Phase** followed by **Planting Phase**.

Restorative Phase: Restorative phase is proposed to include the soil and moisture conservation works and fencing in the year of coupe operations. Seed sowing of Neem, Chandan, Maharukh and Babul will be done in bushes. Planting of Agave on TCM and *Khus* on earthen soil conservation structures will be carried out in the following year. The restorative phase will be judged in the fourth year of the coupe working. Effectiveness of fencing and success of the soil and moisture conservation measures will mark the completion of the restorative phase.

All the areas covered under restorative phase shall not be allowed to be switched over in the fourth year to the planting phase. The areas do not have adequate regeneration (600 seedlings per ha.) from rootstock and from seed; such areas only will be switched over to planting phase. It shall be



applicable only after its evaluation. The areas failing these tests shall not be covered under plantation programme.

Areas having adequate regeneration from rootstock and of seed origin will be tended as described for the Natural Regeneration Management. PPO/PYO (pre-planting operations) shall be taken up in the fourth year of coupe working, while the seedling planting and other FYO (first year operations) activities shall be carried out in the following year, that is, the fifth year of coupe working. Other plantation works will follow in the sequence. The cleaning and thinning operations in plantations will be done in the fifth and tenth year of plantations.

21.4.04 One Stage Plantation in Other Working Circles: Plantations in the remaining working circles will be taken up in the single stage. The required field staff shall be provided with Plantation Targets, as per the norm and the target should not exceed the fixed norm for staff and officers at different levels. Plantation sequence is given in the **Appendices – XXXIV, XXXVII, XL, XLIII, and XLV.**

- **Planting Operation in SCI & IWC Working Circles:** In the coupes of SCI and IWC working circles the pre-monsoon works shall be carried out after completion of coupe working. The SMC works will be carried out with the work of demarcation and marking of the coupe and will be completed by the onset of monsoon. The PPO/PYO (pre-planting operations) shall be taken up in the following year of coupe working, while the seedling planting and other FYO (first year operations) activities shall be carried out in the second year of coupe working. Other subsequent plantation works will follow in the sequence. The cleaning and thinning operations in plantations will be done in the sixth and eleventh year of plantations respectively.
- **Planting Operations in Afforestation, Catchment Area Management and Fuel-wood Fodder and Pasture Working Circles:** Since these coupes do not have the work of timber harvesting, the plantation operations shall be one year in advance as compared to SCI and IWC Working Circles. Demarcation and SMC works will be carried out with the SCI & IWC coupes. Next year after carrying out felling, whatever little is required, the PPO/PYO will be carried out. The planting operation will be carried out in the next rains and the subsequent operations will be carried out accordingly. Cleaning and thinning will be carried out in 6th and 11th. year of planting respectively.

21.4.05 Seed Sowing and Stakes Planting: In areas where seed sowing and stake planting are prescribed, the work has to be carried out by the beat guards and Van Mazdoor working under him. The following steps will be followed for seed sowing operation:



- The RFO concerned, in consultation with the ACF, will decide the species of seeds to be sown.
- The RFO will identify the healthy source of the seed and get the seed collected by the Forest Guards and Van Mazdoors.
- Seed of unknown sources should not be used.
- The seeds should be sown at the appropriate places before onset of monsoon i.e. in the second half of May.
- The seeds will be sown under some bush by making the soil loose with the help of planting bar, 1-1.25 mt. long obliquely cut pointed iron pipe of ½ or ¾ inch in diameter.
- Waste small cut cloth pieces of bright colour, collected from tailors' shop, should be tied on the bush under which the seed has been sown to verify the germination of the seed after the rains.
- Proper records like Compartment no., species, quantity of seed sown, date of sowing etc. will be maintained in a Seed Sowing Register and the respective Compartment History Form at range level.
- Subsequently the number of germinated seedlings will be recorded in the register.

The stakes of Ficus and other suitable species will be planted at a distance of 6 m, along nala sides and other moist areas after onset of monsoon. This work will also be carried out by the Forest Guards and Van Mazdoors and entries will be made in the seed sowing register.

21.4.06 Seeds and Planting Stocks: Planning for plantation shall be done in advance so that good quality seeds can be collected and healthy seedlings can be raised in the nurseries. Plantations mainly depend upon the quality of seeds and planting stocks, it is therefore very important that all necessary precautions should be taken to get the best quality seeds and best planting stocks i.e. Teak stumps, seedlings of misc. spp. and Bamboo for artificial regeneration.

- **Seeds:** Seeds used for artificial regenerations **must be of high quality and from known sources.** The D.C.F should take all precautions that the best quality seeds are collected for raising the planting stocks.
- **Teak Stumps and Seedlings of Miscellaneous spp.:** The planting stocks either Teak stumps or seedlings of miscellaneous species should be raised timely and only the best stocks should be transported to the planting sites to avoid planting of inferior stocks.



The ACFs should supervise the sorting and transportation of planting stocks and all plantation operations under the direct supervision of the D.C.F.

- **Planting Stock of Bamboo:** The seed collected for plantation must be from known clumps so that the quality and species are known. Seeds should be sown in the bed and these rhizomes should be shifted in the beds, at least twice. After one year one single healthy rhizome should be transplanted in to the poly bags of suitable size. Two years old rhizomes should be planted in the site. Special care should be taken that the seeds are of known species of Bamboo. Regular cutting of shoots should be carried out to get well developed rhizomes.
- **Planting Stocks for Species with Short Lived Seeds and Slow Growing spp.:** Planting stocks of species like Mahua, Tendu, Hirda, Karanj, Bija and Anjan should be raised one year in advance **i.e. the seedlings of two monsoons old should be planted.**

21.4.07 Choice of Species: Valuable local species suitable for the site and favoured by the local village communities will be preferred in plantations. Teak, Shisham, Khair, Shiwan, Siras, Chichwa, Aonla, Chinch, Neem, Kullu, Mahua and Sitaphal should be considered among the recommended species. Neem, Khair, Aonla, Chinch, Chichwa, Karanj, Siras and Sitaphal may be preferred in areas close to habitation. *Dalbergia sissoo* (Sissoo) is not local specie, but may be used on suitable alluvial soil. Seedlings of edible fruit-yielding forest species and other important NTFPs like Kullu, may constitute up to 20 percent and seedlings of medicinal plants up to 5 percent of the planting stock. Stakes or tall planting of suitable species, such as, *Ficus*, *Umber*, *Ber*, *Anjan*, *Babul* etc. useful to wildlife are also proposed in plantations, up to 10 percent of planting stock. An officer not below the rank of Assistant Conservator of Forests should approve the final choice of species and source nurseries in consultation with the D.C.F.

21.4.08 Spacing in Plantations:

- Teak stumps from root-shoot cuttings should be planted on well-drained and suitably open sites only at two meter spacing (2x2-meter spacing). Teak seedlings raised in poly-pots or root trainer containers can be used in special cases only after duly recording the reasons in the prescribed register. Mixed species plantations should be carried out at two-meter interval (2x2-meter spacing) in 30cm X 30cm X 30cm pits.
- Bamboo and some NTFP seedlings like Hirda, Mahua etc, should be planted at six-meter spacing (6 X 6-meter) in 45 cm X 45 cm X 45 cm pits. Care should be taken to avoid planting of seedlings directly under the canopy of existing trees or established saplings.



- Grass plantation will be taken in 38 beds/ha of 1 m X 8m X 0.15 m. dimensions whereas, the fodder trees will be planted at 10m X 10 m spacing in pits of 30 cm X 30 cm X 30cm.

21.4.09 Fencing of Plantations: The plantation areas or the rootstock management areas are prescribed to be fenced effectively to protect it from grazing. The fence can be **(a) Traditional Fencings** like TCM (Trench-cum-mound), Live-hedge fencing or suitable mechanical fencing or more effective **(b) Social Fencing**, with the help of the villagers. The villagers through the JFM committees should be encouraged for the protection by sharing the expenditure of fencing with the JFM Committees. In case the social fencing does not materialise then the following traditional methods may be tried:

- TCM (Trench-cum-mound) of the standard cross section, one-meter deep and 1.90(On top) and 0.60 meter (Bottom) wide at top and bottom respectively is prescribed. Across the slope, however, rubble wall is proposed in place of TCM.
- Boundaries of the plantation areas or the rootstock management areas running across the contour or artificial boundaries inside the compartment are prescribed to have live hedge fencing on 1.20-meter wide ridge of worked up soil. Two rows of *Agave* will be planted at the outer edges along with seed sowing of *Chilati*, *Babul*, *Jatropha*, Bamboo and other local thorny species immediately after onset of the monsoon.
- The mechanical fencing, if found financially viable, may be used in areas prone to heavy biotic pressure, if the situation so demands. Justification for use of mechanical fencing should be recorded in the prescribed plantation register.

21.4.10 Pit Digging: Pits of size, preferably, 30-cm³ for planting seedlings of non-Teak miscellaneous species and 45-cm³ sides for Bamboo and NTFP Spp. like Mahua, Hirda etc., are prescribed. The dug up soil will be kept on the upper side of the slope, and allowed to weather from March to the first week of May. Pit refilling must be completed before the onset of monsoon. Pits for Bamboo planting shall be half filled during the refilling using topsoil from the heap.

21.4.11 Planting:

- i. Planting of Teak Stumps:** Crowbar planting of Teak stumps must be carried out within one week after the first monsoon shower.
- ii. Poly-pot or Root-trainer Planting:** Seedling planting must be completed within a fortnight after the first monsoon shower.
- iii. Bamboo Planting:** Bamboo planting must be completed within a fortnight after the first monsoon shower. Preferably, two-year-old



Bamboo seedlings with well-developed rhizomes should be planted. If stone mulching is feasible in the area, the pit should be refilled up to the ground. Otherwise, the ball of the earth and rhizome of the seedling should just be covered with soil and almost half of the pits should be left unfilled for reducing wild boar damage. In case the Bamboo plantation is to be taken in a planted area, **it should only be taken in the sixth year on ward so that the mixed or Teak plantations are not suppressed and the watch and ward of the planted area will be extended to 10 years (5 years for each plantation scheme).**

21.4.12 Subsequent Planting Operations: It is common in the field that all attention is paid only to the current year plantations and in the process of PPO/PYO the old plantations are neglected. The work of casualty replacement, weeding and soil working are neglected and not carried out properly and timely. The protection of old plantations from fire and grazing are also neglected. This leads to big losses in the form of failed plantations. To avoid this, D.C.F should fix the responsibility on Beat guards, Round Officers, RFOs and ACFs to inspect the old plantations regularly and see to it that all prescriptions are implemented and all steps are taken to protect it from any damage. The ACFs should supervise these works very closely and give a certificate in the first week of November that all due operations have been carried out properly and timely in all the plantations up to 5 year of age.

A. First Year Operations: All weeding and soil working should be carried out in a circle of one-meter diameter around the seedlings or saplings. The first scrape weeding should be started immediately after completion of the entire plantation and appearance of weed growth. Casualty replacement should be done along with the first weeding in July. The second scrape weeding should be done in the last week of August. The soil working and mulching should be done in the first week of October. In case of, prolonged hot and dry season, it is desirable to carry out one soil working in the month of January.

B. First Year Operations in Bamboo Plantations: The first weeding, casualty replacement and the second weeding should be carried out as described in the preceding paragraph. Stone mulching should also be carried out with the second weeding in Bamboo plantations as a safeguard against the wild boar damage. The third weeding and soil working operations are not required in the Bamboo plantation.

C. Second Year Operations: In the second year of plantation, casualty replacement should be done in the planting season. The first scrape weeding should be carried out in the first week of August, and the soil working and mulching should be done in early October. The first and second weeding should also be carried out around the seedling coppice in the plantation area.

D. Second Year Operations in Bamboo Plantations: The first weeding should be done in the first week of August, and it should include maintenance of the stone mulching in the Bamboo plantations.



E. Third Year Operations: One weeding in the third year should be done along with the soil mulching in September. Singling of coppice shoots, management of damaged and malformed saplings, climber cutting and shrub clearance should be repeated as third year operations.

F. Periodic Appraisal of Regeneration by Staff: The regeneration of the species in the forest area should be monitored in 2 years periodically, by territorial Division and their findings be sent to Working Plan Division.

21.5 Thinnings: Details of thinning guidelines are in **Appendix –LIII.**

21.5.01 Definition: Thinning is defined as a felling made in an immature stand for the purpose of improving the growth and form of the trees that remain on the ground, without permanently breaking the canopy. Thinning is chiefly concerned with promoting good growth in the stems that are retained.

21.5.02 Special Objectives in Thinning: Plantations are made with various objects in view; and thinning methods have to be varied accordingly. The maximum volume production (in a given form) is generally an objective. Plantation work is expensive and it may be desired to get some return as soon as possible; however, in this case, thinning will aim at giving some of the promising trees the adequate room and nutrition they can utilize, thus ensuring rapid volume growth. Plantations are often made in an attempt to minimize a foreseeable shortage of timber consequent to the rapid depletion of the matured stock of natural forests.

21.5.03 Observable Factors as the Basis for Thinning Procedure:

(a) Tree Classification: To describe the nature and intensity of a thinning, there is a choice between qualitative and quantitative methods; the former being almost mainly subjective. The older procedures were all of former category, as would be expected from the fact that the latter calls for standards of reference which are still only available for a few species. The individual trees in a crop were classified by height and size of crown, whilst the thinning prescriptions laid down which classes were to be removed. The standard adopted is, as follows:

I. Dominant Trees (D): All trees which form the uppermost leaf canopy and have their shoots free. These are usually subdivided as following:

- (1) Pre-dominant trees comprising all the tallest trees which determine the general top level of the canopy, and
- (2) Co-dominant trees which fall short of this, averaging about 5/6 of the height of predominant.
 - (a) Trees with normal crown development and good stem form.
 - (b) Trees with defective stems or crowns, e.g. :
 - i. Trees with crown space cramped by neighbouring trees,



- ii. Badly shaped old advance growth,
- iii. Trees with forked leader and similar defects
- (c) Trees with very defective stems or crowns, i.e. with same defects as (b) to such an extent that they are of little or no present value or promise.
- (d) Whips - Trees with very thin bole and very constricted crown incapable of existence without the support of the neighbouring tree

II. Dominated Trees (d): These trees do not form part of the upper most leaf canopy, but the leading shoots of which are not definitely overtopped by the neighbouring trees. Their height is about $\frac{3}{4}$ th. of that of the tallest trees.

- (a) Trees with normal crown development and good stem form.
- (b) Trees with defective crowns or stems.

III. Suppressed Trees (s), which reach only about $\frac{1}{2}$ to $\frac{5}{8}$ of the height trees, with their leading shoots definitely over-topped by their neighbours or at least shaded on all sides by them.

IV. Dead and Moribund (m). This class also includes bent over and badly leaning trees usually of the whip type.

V. Diseased Trees (k): This class includes those trees which are infected with parasites to such an extent that their growth is seriously affected or that they are a danger to their neighbours.

- (a) Dominant.
- (b) Dominated and suppressed.

Thinning Methods: Details about thinning methods for Teak are given in the **Appendix - LIII.**

21.5.04 General Considerations: Thinning is proposed to be carried out in plantations and patches of dense pole crop and, by doing it, average spacing is to be maintained at one-third of the crop height. The post-thinning crop should have basal area and number as close to the relevant stand or yield table for that site quality as possible.

- It is prescribed to be carried out in the plantations having at least 50% survival at the time of thinning.
- The first and second mechanical thinnings shall be carried out in the 6th. and 11th. year (of the coupe working) respectively and Subsequent silvicultural thinnings at 10 years interval till the age of 65 years. year. By this time such areas are expected to merge with the adjacent natural growth.



- All thinnings will be done either at the beginning or at the end of the growing season.

21.5.05 Mechanical Thinning: It will be desirable to provide extra growing space to the planted saplings by carrying out mechanical removal of complete lines of plants, or every alternate plant subject to provision to cover cases of local gaps. Where spacing is irregular, the “stick” method used in natural regeneration is a possibility whereby one tree of every pair of adjoining trees is removed if the distance between them is less than a prescribed length.

(i) This method is followed in Teak plantations for the first and less commonly for the second thinning. Each operation of removing 50% of the original planting lines, reducing the number of plants to 1/2 in each operation. For instance, in case of 2 x 2 spacing, number of plants will reduce from 2500 to 1250 and then 625 per hectare and increasing the spacing from 2 m x 2 m to 4 m x 4 m. In case of 3 m x 3 m spacing, as proposed in this plan, number of plants will reduce from 1111 to 556 and then 278 per hectare and increasing the spacing from 3 m x 3 m to 6 m x 6m.

(ii) It is usually provided that where there is a gap in the retained line, an adjoining plant in the cleared line should be retained.

(iii) This method is only practicable where casualties are very few and growth is both good and even under such conditions but it is out of question in poor or uneven plantations.

(iv) It is not suitable for mixed plantations. However, in rare cases, similar operation may be done in mixed plantations where one species has been introduced essentially to help cover the ground quickly and its removal or cutting back is necessary in the interest of the major species.

21.5.06 Silvicultural Thinning: Alternatively, thinning may be selective, the case for removal or retention being considered for each tree in turn according to a set of rules drawn up for the purpose. This is the most usual procedure even where additional checks are applied, being often described as a “*silvicultural*” thinning.

A. Technique for Silvicultural Thinning in Teak Plantation:

- a. First off all the Teak site quality of the area in respect of the each section shall be determined and recorded in the register maintained for the plantations. The site quality shall be determined from the table showing “Top Height by Site Quality and Age” after calculating average “Top Height” based on the measurements of height of several dominant Teak trees per ha in the crop. If difference in site quality is noticed, then the delineation of patches on the ground according to site quality should be done and the same be shown on the map in the manner as it is done while doing stock mapping of any forests.



- b. By the method of point sampling, the existing average of basal area per ha for each section shall, then, be measured by using a wedge prism of suitable Basal Area Factor (BAF). A wedge prism of BAF where least counts 0.5 sq m per ha can be used. If the difference in basal area per ha measured at different points in the section is high (say more than 2 sq mts), then the delineation of patches has to be done for giving required treatment to the crop accordingly. Arranging in such cases should be avoided.
- c. Section wise average basal area per ha so measured should then be comprised with the figures contained in the yield table in respect of that site quality and age.
- d. If the actual basal area measured exceeds the basal area as prescribed in yield table for that site quality and age, then it would indicate the need for thinnings in the crop necessitating the removal of basal area to the extent the actual basal area exceeds the basal area prescribed in the yield table. If it equals or falls short, then it would indicate that no thinning is needed in the crop.
- e. After averaging the test as mentioned in sub para II above, if the crop needs thinning, then the thinnings should be carried out keeping in view the distribution of stems per ha in various girth classes as contained in the stand table (main crop) for that particular site quality and age, provided that all past thinning have been done according to the parameters contained in the yield table.

B. Thinning Schedule: The other possibility is to be guided by thinning schedule which lay down the number of stems that should remain standing after thinning according to various criteria of dimensions, site quality and/or age. Such criteria should ideally be based on a wide Range of growth studies to reveal the development to be expected to take place under the conditions concerned. **Appendix - L**

21.5.07 Types of Thinning:

(a) Ordinary Thinning:

- i. The most usual method has been to view each tree in relation to its neighbours, and to remove those which appears already to have shown their inferiority by dropping behind, taking first the suppressed trees, then the dominated ones, and finally some of the dominants with restricted or, otherwise, inferior crowns. As this method begins with the removal of the lowest canopy class and then works upwards, it has been called *Low thinning*, but it is now known, on account of its widespread application, as *Ordinary Thinning*.



- ii. The smaller dominated and suppressed trees are usually removed, they may be retained as soil cover and as insurance against casualties among the larger trees standing over them.
- iii. Most foresters tend, at first, to thin very lightly corresponding to something between B and C grades, after experience however they mark heavily up to a full C-grade and D-grade. The term 'heavy thinning' implies the C-grade thinning.

(b) The Standard Grade of Ordinary Thinning:

- i. Light Thinning (A-grade):** This is limited to the removal of dead, dying, diseased and suppressed trees, i.e. classes V, IV and III. Grade A is of no practical use, it serves as the initial stage, especially, in comparative research on the effect of thinning on increment.
- ii. Moderate Thinning (B-grade):** This consists in the further removal of defective dominated stems and whips. Branchy advance growth which it is impracticable or not desirable to prune may also be taken, i.e. classes V, IV, III, II(b) and I(d) and an occasional I(c). B-grade is also of little use in practice, due to its having little influence on the increment of the remaining stems.
- iii. Heavy Thinning (C-grade):** This consists in the further removal of the remaining dominated stems and some defective dominants without making lasting gaps in the canopy, i.e. classes V, IV, III, II and I(b), (c) and (d).
- iv. Very Heavy Thinning (D-grade):** It consists further removal of some of the good dominants, subject to the condition of not making any lasting gap in the canopy. The trees for removal are selected in such a way that the remaining crop consists of trees, with good boles and crowns, well and evenly distributed over the area, and with space for further development, i.e. classes V, IV, III, II and I(b), (c), (d) and some I(a). If their removal is of no economic or hygienic value, class V, IV and III trees are not removed, in heavier grades.
- v. Very Very Heavy Thinning (E-grade):** For research purposes it has been found desirable to make ordinary thinning even heavier than the standard D-grade. It prescribes removal of more of the dominant stems even in class I(a), so that all retained have ample room for further development. It goes as far as possible within the rule for avoiding permanent gaps in the canopy.
- vi.** It is often inadvisable to make a full C-grade or D-grade thinning in a dense crop in which thinning has been unduly delayed. The first thinning in such cases should be lighter than is ultimately intended.



- vii. Crown Thinning:** This method of thinning looks first of all to the dominants and removes such of them, beginning with the least promising individuals, as are hindering the development of the best individuals. Due regards are paid to obtaining as even a distribution of good dominants over the area as possible. It requires special skill and acumen in carrying it out.

Grades of Crown Thinning: Only two grades of crown thinning have been standardized; they are defined as follows:

- **Light Crown Thinning (LC - grade):** This consists in the removal of dead, dying and diseased trees, with such of the defective, after them the better dominants, as are necessary to leave room for the further development of the best available trees evenly distributed over the area, i.e. classes V, IV, I(d), (c), many of I(b) and few of I(a) but not III and II. This is similar to D-grade ordinary thinning, but retains all III and II, and is not quite so heavy on I.
- **Heavy Crown Thinning (HC- grade):** This grade pays even more attention to favouring the selected best stems by removing all the remaining I(b) which can be taken without creating permanent gaps, and more of I(a), i.e. classes V, IV, I(d), (c), most of I(b), some of I(a); but not III and II.
- Crown thinning is well adapted to moderately shade-tolerant species in which the retention of the lower canopy presents no difficulty.

21.6 Roads, Cart Tracks and Culverts:

21.6.01 The forest areas of the Division have a good network of roads and cart tracks. The Public Works Department of the state government or the Zilla Parishad maintains large number of roads passing through the forest area. Some stretches have been permanently transferred to the Department. The Division should compile comprehensive records for all roads passing through the forest area and the roads transferred to the Division for maintenance, on priority basis.

21.6.02 The extent of forestry operations and gravity of forest protection concerns should determine the priority for maintenance of the forest roads.

21.6.03 Unwarranted up-gradation of the forest roads should be discouraged, but required culverts may be constructed in stretches useful for the forest protection

21.7 Harvesting and Disposal:

21.7.01 Agency for Harvesting: The Deputy Conservator of Forests, Bhandara shall decide the agency for harvesting in accordance with the applicable policies and regulations. Present policy prohibits the sale of



standing trees. **Regarding NTFP, the disposal should be according to the Acts and Rules, defining the NTFPs and right of ownership over them.**

21.7.02 Disposal at Timber Depots: Harvested timber and firewood are prescribed to be transported to the established forest depots for sale by auction or allocation according to the prevailing policies and guidelines. The National Forest Policy, 1988 acknowledges the first charge on the forest produce in the local tribal and village community living in and around the forest areas. Hence, decision for the disposal of the forest produce should be guided by the philosophy of the first right of the local village communities, which is also recognised in the Nistar-Patraks. For facilitating *Nistar distribution*, temporary depots can be created at the Range Headquarters, in addition to beat and round headquarters.

21.7.03 Stacking for the Nistar Supply: Each established or temporary depots is prescribed to have designated areas for stacking small timber, poles, firewood and Bamboo for the Nistar supply at the sanctioned rates to local people including agriculturists and artisans. The Deputy Conservator of Forests can approve additional Nistar depots at suitable places in the Division, so that villagers may not be required to traverse large distance to procure the Nistar materials. The Deputy Conservator of Forests in consultation with the District Collector fixes the Nistar rate. Supplies of small timber, firewood etc. as well as the forest produce required for occupational Nistar will be governed by Nistar Patrak of each village (also refer to Para 1.9 of chapter I in this regard). Availability of the Nistar material will to be informed to the Taluka Panchayats and the material left unused for three months will be sold through open auction.

21.8 Irregular Harvesting:

21.8.01 Restriction on Irregular Harvesting: Irregular harvesting of timber, firewood, Bamboo and other NTFPs is prohibited, except in the following cases:

21.8.02 Harvesting for the Fire Lines and the Transmission Lines: The Deputy Conservator of Forests may permit felling of herbs, shrubs, thorny bushes, within the prescribed width of the established fire lines and the approved power transmission line. The prescribed width in the guidelines for the Forest (Conservation) Act, 1980 and rules, there under, will be applicable to the transmission lines.

21.8.03 Harvesting in Forest Areas Diverted for Non-Forestry Purposes: Felling of trees on forest land required by the other departments such as Irrigation, PWD, etc., will only be undertaken after the proposals for the use of forest land for non-forest purposes are finally approved by the Government of India under the provisions of the Forest (Conservation) Act, 1980. The Deputy Conservator of Forests, after preparation and sanction of estimate by competent authority, may permit felling of trees on forestland diverted for the



non-forestry purposes as approved under the provisions of the Forest (Conservation) Act, 1980. The material obtained from such harvesting will be brought to the depots and will be disposed off as regular coupe material.

21.8.04 Harvesting of Dead, Damaged, Fallen and Uprooted Trees in a Storm: Removal of dead fallen firewood and trees uprooted by wind or storm from all parts of the forests, except the coupes due for working, will be done in the following manner. Every year in the month of October each beat guard will report the availability of dead fallen firewood and trees uprooted by wind or storm to the concerned Range office. The Range Forest Officer will estimate availability for such material in each compartment and ACF concerned will verify the same and mark accordingly. At least two dead and fallen trees are required for retention from wildlife conservation. Wood removal will be carried out from the compartment after approval of the Deputy Conservator of Forests. The details of material obtained from each compartment and revenue realised from it will be entered in the respective Compartment History Form. Harvesting of dead and fallen firewood is governed by the Nistar rights and privileges as admitted in the *Nistar-Patrak* or directed by the government from time to time.

21.8.05 No irregular harvesting for the purpose of undertaking plantations/afforestation works under schemes outside the scope of this working plan will be taken up in any of the areas under the working plan.

21.9 Maintenance of Forest Land Records:

21.9.01 Maintenance of the Land Records and Forest Maps: The forestland records and the forest maps will be brought up to date, and maintained as such. A certificate to this effect will be recorded annually in the Form No 1- Register during the month of June.

21.9.02 Forest Notification: Unclassified Forests and Non-Forest areas transferred for the compensatory afforestation shall be immediately proposed for notification as the Reserved Forests and the reservation process shall be initiated with the section 4 notification under the provisions of Indian Forest Act 1927.

21.9.03 Reconciliation of the Revenue Records: The revenue records will be reconciled on the basis of the Forest Notifications. The Collector and the Deputy Conservator of Forests will jointly ensure that the Revenue Records are brought up to date according to the Forest Notifications. Since the Divisional Commissioner issues the Forest Notifications, there is no apparent need to issue separate orders for the mutation entries. The Revenue Department will provide a certified copy of the Records of Rights to the Bhandara Division to mark completion of the process.

21.10 Digital Database: Working Plan Division, Nagpur is preparing digital management maps of forest of different scale and is stored in CDs. These CDs



are available at Conservator of Forests, Working Plan Division, Nagpur to supply to the territorial Divisions subject to procurement of relevant software to open these CDs, at their cost. This will be helpful for Division to generate; compartment map, beat map, round and Range map. This map also provide several information about the area like information regarding soil, geology, drainage, mini watersheds, stock maps etc., which cannot be seen in one single hard copy of map

21.11 Permanent Nursery and Central Depot :

2. The central nurseries will be used for producing Bamboo rhizomes and Teak stumps; and non-Teak seedlings in poly-pots or root-trainers as required for the plantations. A proper Nursery Registers should be maintained in al nurseries where entries regarding all infra structure and machines & tools, stock, fertilizers, insecticide etc. should be made with their quantity, the date of procurement and amount.

A separate seed register should be maintained, mentioning the species of seed, quantity, source, date of procurement, percentage of germination and finally name of the site where the seedlings of these seed are planted. If a seed needs treatment then the period of treatment should be mentioned.

2. The central depots will be used for sale of timber, fire wood and Bamboo by public auctions. All prescribed registers and documents shall be maintained and the ACFs and D.C.F will do the physical verifications as per the guidelines and standing orders. These areas will be strictly protected from fire and theft.



Chapter XXII

THE ESTABLISHMENT AND LABOUR

22.1 The Establishment

22.1.01 The range, round and beat reorganisation during 2000-2001 was based on the policy of separating protection and development functions at the range-level. However, it was found that the system was not very effective and the Govt. decided to discontinue with this system a new proposal for reorganisation of Bhandara and Gondia Divisions, coinciding with the newly created districts of Gondia and Bhandara distt. In the process a proposal was moved to the Govt for 10 ranges, 39 rounds and 163 beats in the newly reorganised division. The Govt. vide letter No. R&F/L.No.FDM-2003/Case No.168/F-2.Dated 13/04/2007 granted the approval to the reorganisation proposal.

22.1.02 The division has a cadre of 232 'Van Mazdoors', whose nature of duties changes quite frequently. Hence, it is recommended that the Deputy Conservator of Forests should identify and assign their services to different schemes for efficient utilisation of their services. Major proportions of the Forest Labourers are engaged in execution of plantation, fire protection.

22.1.03 Adequate education and health facilities are usually not available at the beat and round headquarters in the interior areas and majority of the field staff keep their families at different stations. These conditions demand special efforts for the staff welfare programme. Sufficient facilities should be provided for quality education to the minor children of the field staff.

22.1.04 Skill up-gradation training or exposures on various aspects of forest management such as nursery management, plantations management and organising and managing coupe operations like marking, felling, logging, etc. are proposed for the staff to improve their efficiency as well as keep them fully toned and abreast.

22.1.05 Training in GIS/GPS is necessary for field staff up to RFO level and to capable Foresters and Guards, so that GIS maps and data which are generated by the working plan office can be properly used and updated/modified as per requirements by the field staff for preparation of round, beat, coupe maps and even treatment maps. This sort of training can be imparted by working plan office, provided, necessary funds given by territorial division and territorial staff be sent to working plan division regularly for this purpose.



22.1.06 Training of field staff and village communities, in collaboration with NGOs, is essential and is proposed for NTFPs collection, grading and value addition mechanisms to upgrade their skill in NTFPs management.

22.2 Labour Requirement:

22.2.01 Most of the schemes have provision on labour welfare. As per provision the expenditure shall be incurred on labour welfare programme in concerned villages by involving local communities.

22.2.02 Different forestry operations require about 5,00,000 man days each year. Temporary manpower shortage may be experienced in Bhandara division during the paddy transplanting and harvesting seasons. However requirement of labourers can be met from Tahsil offices.

22.2.03 Sometimes labours from adjoining districts come to the area for Tendu collection and other forestry works. Care should be taken to ensure adequate employment availability to the local people. The Forest Labourer Co-operative Societies (FLCS) often engage large manpower of non-members in coupe working allotted to the Societies.

22.3 Buildings: The problem of accommodation is acute, as the existing buildings are not sufficient to house all the staff, especially the field staff. Many residential quarters for the Forest Guards and the Foresters working in the field are in poor conditions, and many beat and round headquarters do not have residential facilities. The field staffs are forced to occupy private accommodation. Although a number of buildings were constructed under the Maharashtra Forestry Project, substantial number of residential buildings is required in the field, especially, in the interior locations. Sufficient funds should be made available for the maintenance and construction of buildings in the field. Funds will also be required for developing eco-centres and camping facilities for eco-tourists as prescribed in the chapter of Wildlife Management (Overlapping) Working Circle.

22.4 Water Supply: The availability of water for drinking as well as for agriculture depends mainly on the pattern of monsoon. Whenever the rainfall is scanty, water scarcity is experienced throughout the division. Adequate arrangements shall be made to supply drinking water to staff, especially, at the interior places. The existing nursery sites are near the perennial water sources. The new nursery sites, if required, shall be selected near the perennial water sources.

22.5 Meteorological Observations: Since meteorological observatories are in existence in all the Talukas and the district headquarters, there is no need for a separate observatory for the department. However, record of the rainy days will be maintained in each plantation register.



Chapter XXIII

FINANCIAL FORECAST

Cost of the Plan: The cost of preparing this plan is worked out by summing the expenditure incurred from 2005-06 to 2007-08 that amounts to 103.08 Lakhs including the cost of enumeration works carried out by SOFR unit, Amravati. The cost of plan per hectare worked out is about 111.10 Rs. only. The cost of the plan increase by 26.61 lakhs to include the expenditure incurred from March 2008 to November 2008. Thus the total cost of the Plan is 129.69 lakhs.

23.1 Cost & Benefit Ratio of the Plan:

23.1.01 Intangible Benefits: It is an acknowledged fact that forests ecosystems have both the tangible and the intangible benefits to the mankind. They contribute to a great extent in term of intangible benefits. However, it is not easy to assign economic value to the intangible effects of the forests ecosystems. Professor T M Das (1980) has quantified the environmental services, provided by a medium sized tree of 50 tons over a period of 50 years, by assigning notional values by using surrogate market techniques, as given in the **Table 23.1** (Proceedings of the Indian Science Congress, 1980).

Table No. 23.1 Environmental Benefits Derived From a Medium Sized Tree of 50 Tons during its 50 Years Life Span

(Excluding the Value of Timber, Fruits and Flowers)

Sl. No.	Environmental Benefits	Single tree (Lakh Rs.)	Forest Type	
			Tropical (Lakh Rs/ha)	Sub-tropical (Lakh Rs./ha)
1	Oxygen Production	2.50	22.50	20.50
2	Conversion to Animal protein	0.20	1.80	1.64
3	Control of Soil Erosion	2.50	22.50	20.50
4	Recycling of Water & control of humidity	3.00	27.00	24.60
5	Shelter for Birds, Squirrels, Insects etc.	2.50	22.50	20.50
6	Control of Air Pollution	5.00	45.00	41.00
	Total	15.70	141.30	128.74



23.1.02 Thus, according to Das, one hectare of subtropical forests accrues environmental benefits of worth Rs.128.74 Lakhs over a period of 50 years i.e. benefits of worth 2.60 Lakhs per hectare per year.

23.1.03 Intangible Benefits: The forest of Bhandara Division having average density 0.5 extend over an area 92779 Ha. Therefore Its intangible benefits are worth **Rs.1,20,613 Lakh per year.**

23.1.04 Tangible Benefits: The tangible benefits accruing from forests are, however, computed in economic terms from various goods and services ensuing from forests. The estimation/forecast of timber, poles, fuel wood, Bamboos, Tendu, gum and other non-wood forest produce accruing from forests is made with reasonable accuracy with the help of yield regulating formulae. In this Plan, major yield of wood will be obtained from the SCI Working Circle. Improvement Working Circle may contribute in form of small timber, fuel and teak beats, to some extent.

23.1.05 The estimated future annual yield and revenue, as part of the tangible benefits derived from the forests, has been given in Table 23.3 (b). The abstract of tangible benefits and costs as a result of this plan is given as follows:

*Annual estimated expenditure for the prescribed operations = Rs.736 Lakhs**

Annual estimated Revenue from the forest, = Rs.1230 Lakhs

Annual intangible benefits = Rs.120613 Lakhs

Total benefits accrue from the forests of Bhandara Division

= Rs.121843 Lakhs per annum

**This amount is excluding Rs. 1500 Lakh of establishment expenditure.*

Cost- Benefit Ratio is 736 Lakhs : 121843 Lakhs Or 1 : 166

Thus, the above Cost-Benefit Ratio favours the scientific management of forests, as prescribed, in this Working Plan.

23.2 Revenue:

23.2.01 Scientific management of forest permits removal of some trees from some of the working circle as per the prescription of the plan. The major yield obtained from Selection-cum-Improvement working circle. Improvement working circle also contributes to yield. The yield from Afforestation and Rootstock Management working circle, Grass and Fodder Resource Management and Protection and catchments Area Management working circle will be negligible. Yield from thinning has been included under total yield. Among the MFP Tendu will be major produce.



23.2.02 Natural Bamboo is found in the area as well as in the plantations of the Bamboo taken in the past. Hence Rs.38.04 Lakh revenue is obtained from the Bamboo during the operation of the plan. The accurate forecast of revenue is not possible as the prices of timber, fuel wood and other forest produce are increasing day by day.

23.2.03 The comparison between revenue estimated in previous plan, actual receipts in privies plan and expected per annum revenue from the sale of various forest produce in current plan is given in **Table 23.2**.

Table No. 23.2 Forest Produce Wise Annual Revenue:

Sr. No	Forest Produce	Average Revenue in Lakh Rs. per Annum		
		Estimated in Dr Nand Kishores plan	Received During The Period	Estimated in Present Plan
1	Timber including poles	277	244.6	650
2	Fuel wood	236	280.42	300
3	Bamboo	25	38.04	78
4	Tendu leaves	209	182.04	200
5	Other MFPs	2	2.01	2
Total		749	747.11	1230

23.3 Financial Forecast:

23.3.01 The norms used for the financial forecasting are given in **Table 23.3**. Estimated annual work and area to be regenerated during the plan is given in the **Table 23.4** and estimated annual expenditure has been given in the **Appendices**. Scheduled operations are prescribed in the **Appendices-XXXIV, XXXVII, XL, XLIII & XLV**.

Table No. 23.3 Table Showing Man day/unit for All the Prescribed Works

(2008-09 Daily Wage Rate, Rs.92.76/day ,Rounded to Rs.93 is Used for the Calculations)

Sl. No.	Particulars of work	Unit of work	Mandays/ unit	Labour component (in %)	Amount/ unit (Rupees)
1	Demarcation and marking	Hectare	4.5	90%	460.35
2	Singling of coppice shoots, etc.	Hectare	1	96%	96.72
3	Soil and Moisture Conservation				
	Continuous Contour Trenches	meter	0.085	96%	8.23
	Gully plugging (nala bunding)	Cubic meter	0.92	96%	88.98
4	Coupe Working				



	Timber harvesting	Cubic meter	9.5	75%	1104.38
	Firewood extraction	Stacks(2x 1x1.20)	3.5	80%	390.60
	Long Bamboo	No.	0.06	80%	6.70
	Bamboo bundles	No.	0.12	80%	13.40
5	Removal of Wind Fallen Wood				
	Timber	Cubic meter	9.5	75%	1104.38
	Fuel	Stacks(2x 1x1.20)	4.5	80%	502.20
	Thinning	Cubic meter	9.5	75%	1104.38
7	Cutback Operations	Hectare	6	96%	580.32
8	Cleaning	Hectare	8	96%	744.00
9	Natural Regeneration				
	Nursing of seedling and coppice management	Hectare	10	96%	967.20
10	Mixed Plantation				
	Live hedge fencing	Hectare	43	85%	4598.85
	Planting & sowing on live hedge fencing	Hectare	2	75%	232.50
	PPO/PYO (excluding fencing)	Hectare	88	96%	8511.36
	PPO/PYO (including TCM)	Hectare	129.81	96%	12555.22
	FYO (First year operations)	Hectare	114.47	77%	13094.22
	SYO (Second year operations)	Hectare	55	97%	5268.45
	TYO (Third year operations)	Hectare	41.29	100%	3839.97
	4th Yr (Fourth year operations)	Hectare	15.6	100%	1450.80
	5th Yr (Fifth year operations)	Hectare	15.6	100%	1450.80
	Bamboo Plantation				
	PPO/PYO (including fencing)	Hectare	64.5	90%	6598.35
	FYO (First year operations)	Hectare	34.65	90%	3544.70
	SYO (Second year operations)	Hectare	20.77	93%	2066.82
	TYO (Third year operations)	Hectare	16.53	93%	1644.90
12	Plantation (Teak)				
	PPO/PYO (including fencing)	Hectare	77.88	96%	7532.55
	FYO (First year operations)	Hectare	77.17	78%	8755.72
	SYO (Second year operations)	Hectare	42.2	98%	4003.09
	TYO (Third year operations)	Hectare	17.6	100%	1636.80
	4th Yr (Fourth year operations)	Hectare	15.6	100%	1450.80



	5th Yr (Fifth year operations)	Hectare	15.6	100%	1450.80
13	Maintenance				
	Road	Kilometer	38	95%	3710.70
	1/5th boundary demarcation	Kilometer	7	80%	781.20
14	Fire protection	Kilometer	6.5	96%	628.68
15	Training for NWFP collection	Round	30	50%	4185.00
16	Wildlife habitat improvement	Round	20	75%	2325.00
17	Fixing boundary pillars	Kilometer	70	30%	11067.00
18	Grass & Fodder				
19	Plantation				
20	Weed extraction and woody growth removal	Hectare	20	93%	1990.20

Note : The man-days for various works, proposed in the plan is on the basis of average. In case of any particular work, the man-days prescribed is not found sufficient, then in the interest of the forest, the Dy.C.F should take permission of the CCF, territorial and conduct a work study under the supervision of an ACF. On the basis of the Work study the CCF may revise the rate of Man-days for that particular site specific Work.

Table No.23.4 Estimated Annual Work Area and Area to be Regenerated During the Plan:

Sr. No.	Working Circle	Area Proposed for Working Per Annum (ha)	Area Proposed for Regeneration Per Annum (ha)		
			Natural Regeneration	Artificial Regeneration	
				Teak	Mixed
1	SCI WC	1287	1087	100	100
2	IWC WC	1204	904	100	200
3	AFF. WC.	792	392	100	300
4	P& C.A.M WC	517	417	0	100
5	F.F.P	314	114	0	200 (Fodder&Grasses)
	Total	4114	2914	300	900

CHAPTER – XXIV

CONTROL AND RECORDS

24.1: Control and Records:

The following records will be maintained in the Bhandara Forest Division Office:

- i. Control Forms.
- ii. Compartment History.
- iii. Plantation and Natural Regeneration Registers.
- iv. Seed and Nursery Register
- v. Divisional Note Book
- vi. Boundary Registers

24.1.01: Control Forms : All control forms and records shall be maintained as per the guidelines given in chapter No IX of working plan code of Maharashtra State and the Standing Order No 24, Chapter I prescribed by the office of the Principal Chief Conservator of Forests, Maharashtra State, Nagpur (then CCF, MS Pune, dtd. 30.11.1967).

24.1.02 The records of all harvesting, subsidiary cultural operations, regeneration works and soil and moisture conservation works carried out as per this working plan prescriptions, will be maintained in the control forms. The prescribed proforma of the control forms have been given in the Volume II in **Appendix - LXXXVI**.

24.1.03 Two sets of control forms will be prepared. One set will be kept in the divisional office and the other set will be flying for the use of the Conservator of Forests Working Plan Nagpur. The flying set will be sent annually by the Deputy Conservator of Forests Bhandara Division to the Conservator of Forests Working Plan Nagpur not later than October, 1st. every year taking the necessary entries. All entries showing the deviations from the prescriptions will be underlined in red. The Conservator of Forests, Working Plan, Nagpur will scrutinise it and will send it to the Chief Conservator of Forests, Nagpur Circle at Nagpur. Chief Conservator of Forests, Nagpur, will in turn send it to Chief Conservator of Forests Working Plan Nagpur with his remarks not later than February, 1st. of the following year. The Chief Conservator of Forests Working Plan Nagpur in turn will forward them to the Additional Principal Chief Conservator of Forests (Production and



Management) Maharashtra State, Nagpur for perusal and orders where required.

24.2 Compartment History:

24.2.01 Compartment histories i.e. the records of various forestry activities and observations made in the past year will be maintained in form No. I to V as given in the **Appendix - LXXXVII** of this plan.

Form No I: Description of the Compartment.

Form No II: Records of plantations and changes in growing stocks.

Form No III: Records of operations and out-turns.

Form No IV: Records of observations.

Form No V: Records of injuries.

24.2.02 Each Compartment must have a separate file for its records. Compartment history must be maintained in the office of Bhandara Forest Division at Bhandara since they keep the record of past management practices and their effects on the growing stocks.

24.2.03 Every year, in July, the Range Forest Officer should fill in the necessary information and will send it to Dy.C.F. Bhandara Forest Division for scrutinizing, editing through ACF in charge, who after doing so will get them typed and sign them. One copy of the forms will be filed in the divisional compartment history file while one copy each will be sent to the RFO and CF Working Plan in the month of August in the following year.

24.3 Plantation and Nursery Registers: Plantation registers will be maintained for all the areas regenerated artificially in the Form No 1 to Form No 9 as given below. **Appendices - LXXXVIII & LXXXIX**

24.4: Divisional Note Book: At divisional level all important matters will be recorded by the DCF every year with his explicit opinions about the working plan operations. A brief note about the plantation will also be recorded by the DCF under appropriate heads. The division note book proforma have been given as below. **Appendix - LXL**

24.5 Fire Records: They should be maintained as per the latest orders from State Government from time to time.

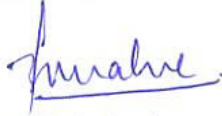
24.6 Other Records: List of amendments to the working plan and list of area changes will be maintained in prescribed forms.



State Level Committee Meeting held on 27th. and 28th. February 2009

Ref: 1) Govt. G.R. Revenue and Forest Department MSC 2004/CR-102/F2,
dated 25.06.2004

With reference to the above mentioned Govt. Resolution, the Draft Working Plan of Bhandara Forests Division was discussed and approved by the Committee under the Chairmanship of The Principal Chief Conservator of Forests, M.S. Nagpur.



(B.S.Thakre)
Deputy Conservator of Forests,
Bhandara Forest Division,
Bhandara.

Collector,
Bhandara.



(Dr.F.S.Jafry)
Conservator of Forests,(Author of the Plan)
Working Plan Division, Nagpur.



(Krishnamohan)
Chief Conservator of Forests
(Working Plan), Nagpur.



(Dr.S.K.Khetarpal)
Chief Conservator of Forests,
(Territorial), Nagpur.

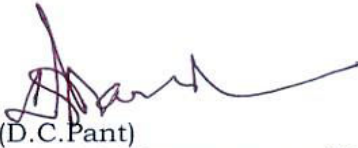
Chief Conservator of Forests (Conservation)
Maharashtra State, Nagpur.



(R.R.Sahay)
Chief Conservator of Forests
(P.T&S.P.)
Maharashtra State, Nagpur.



(A.K.Joshi)
Addl. Principal Chief Conservator of Forests
(Production & Management),
Maharashtra State, Nagpur.



(D.C.Pant)
Addl. Principal Chief Conservator of Forests,
(Budget, Planning & Development)
Maharashtra State, Nagpur.



(B.Majumdar)
Principal Chief Conservator of Forests
(Wildlife)
Maharashtra State, Nagpur.



(B.Majumdar)
Principal Chief Conservator of Forests
Maharashtra State,
Nagpur.

(A.K.Rana)

Chief Conservator of Forests (Central),
Representative of G.O.I.
Bhopal.

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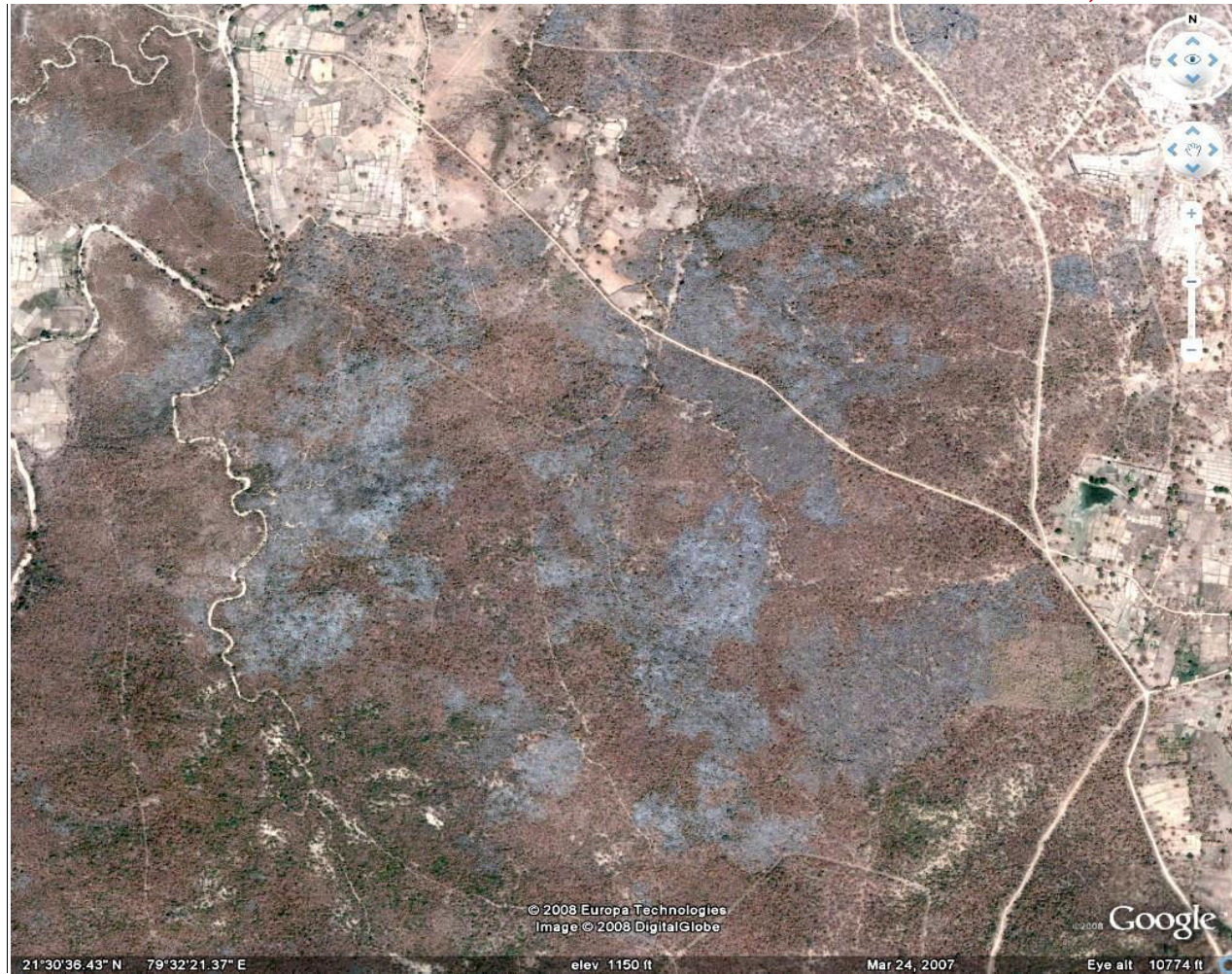
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BURNT AREAS OF LENDEJHARI RANGE OF BHANDARA DN.
RECORDED BY THE GOOGLE SATELLITE ON 24TH. March, 2007.



Regular Annual Forest Fires have devastating effects on the flora and fauna of the area.

Satellite view of Compartment No. 313 and Adjoining Areas



Compartment No 313, of Pauni Range, is a typical example of defragmentation of forest areas due to the under construction Gose Khurd Irrigation Canal. The area has good vegetation and is habitat for many wild animals. This could have been avoided by making suitable passes (Bridges) for wild animals.

SOME MEDICINAL PLANTS FOUND IN BHANDARA FOREST DIVISION



Fruit of Jungli suran (*Amorphophallus sylvaticus*),
Family- Araceae



Ran Halad(*Curcuma aromatica*), Family- Zingiberaceae



Gunj,Raktvel (*Abrus precatorius*), Family- Fabaceae



Kali Musli (*Curculigo orchioidea*), Family -Hypoxidaceae



Kadlawi (*Gloriosa superba*), Family-Liliaceae



Rantambaku (*Lobelia nicotianaefolia*), Family- Lobeliaceae

FAILING TO PLAN IS PLANNING TO FAIL – CHINESE SAYING