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Government of Maharashtra

**The
Working Plan
for
Bhandara Forest Division
(Nagpur Circle)**

**Plan Period
2009-10 to 2018-19**

Volume - I

**Revised and Extended for
2020-21 to 2029-30**

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PREFACE

This Working Plan of Bhandara Forest Division replaces the Working Plan of Shri. Dr.F.S.Jafary IFS for the period 2009-10 to 2018-19. The PWPR-I was prepared by Shri. Sanjeev Gaur, IFS and was approved by the State level Committee on 18.3.2019. On the basis of the recommendations made by the SCC, the Draft Working Plan has been prepared and submitted by Shri Chandrasekaran Bala N IFS, then DCF Working Plan, Nagpur.

The State Consultative Committee has given its approval subject to many improvements in its meeting held on 22.09.2020. As the Working Plan is to be approved as per the New Code of 2014, many chapters like Maintenance of Forest Health and Vitality, Maintenance of Soil and Water Resources, Tree Cover Outside Forest Area and other chapters were added to the Volume -I, Part II of the Plan as per the requirement of the Code. This was made known at the time of presentation before the SCC by the undersigned. No new Working Circles were added except those already approved at the State Consultative Committee except recasting of the write-up as per the paragraphs numbers specified in the Code.

Enumeration of forest crop was done by the SOFR unit, Amravati & field staff Bhandara. The analysis of the tree enumeration data was done with the help of staff of Working Plan division. Stock mapping was done by the staff of Bhandara Division. Data on remote sensing was obtained from Forest Survey of India.

During the preparation of this plan, the inputs from the field staff of Bhandara Forest Division (Forest Guard to DCF) have been duly considered. The stock maps and enumeration results were sample verified on ground by field visits in all the ranges of the division.

I express my deep sense of gratitude for the valuable inputs given by Dr. S.H. Patil, Shri Praveen Srivastav, Shri. P. Kalyan Kumar, IFS, PCCF (P & M) while preparing this plan. I am also thankful to Shri. S.S.Shrivastav, Shri. Sanjeev Gaur, Shri. P. Kalyan Kumar, Shri.Mahip Gupta, IFS CCF (Working Plan-East) and Shri.sanjay Mali, (Dr.Vinita Vyas),

Shri. S. Ramesh Kumar IFS CF (Working Plan-East), Nagpur for their valuable guidance from time to time. My thanks are also due to Shri. T.S.K. Ready, Shri. Sanjeev Gaur, Shri. P. Kalyan Kumar, IFS and Shri, IFS CCF (T) Nagpur for the cooperation extended to W.P. staff from time to time.

My words of appreciation to my team of Officers, Surveyors and support staff who relentlessly worked and extended their wholehearted support for timely completion of this Plan. I am thankful to Late Shri. R.H. Kotrange, RFO, Shri. S. S. Mohite, RFO & Shri. B.D Koli RFO, Late Shri. S.S.Rewalkar Ranger Surveyor, Shri.V.J.Khude Ranger Surveyor, and Shri. Bhange, Shri. Manapure & Shri. A. P. Kulmate, Surveyor, all belonging to the Working Plan Dn. Nagpur for their untiring work in compilation & analysis of Data, allotment of coupes, felling series, tabulation and Digitization of maps with the help of GIS software.

My thanks are due to Shri. Umesh Verma, IFS and Shri.Vivek Hoshing, IFS, DCFs, Bhandara Forest Division for providing information required for preparation of this Plan and Shri. P.G.Kodape & Shri. Chopkar, ACF, Bhandara Forest Division for liaising with this Office. I am also thankful to the field units of Bhandara Forest Division for the cooperation extended to the W.P. staff from time to time.

The team led by Shri. Peshne, DFO, SoFR unit completed the task of enumeration of forest resources as per the procedure laid down in the National Working Plan Code, 2014. Hence, my compliments to the SoFR unit for their timely efforts.

My words of appreciation are due to Smt. Kalyani Pusdekar, Smt. Savita Meshram, Sau.R.S. Gadlinge, Smt. M.V. Bhosle & Ku. K.B.Tagde Forest Guards of this office for their efforts in assisting the officers and surveyors in preparation of this Plan.

The following support staff of my office extended their full cooperation during preparation of this Plan and deserves appreciation; these are Smt. U.D.Jugne, & Shri. Rajesh Karne Chief Acct, Smt. Varsha Chaware, Smt. P.C. Kapate, Shri. R.R.Pathade, Acct, Shri. Mukesh-Jaiswal Clerk, Shri. S. D. Choudhari Clerk, Smt. M.A.Jambale, Peon, Shri. A.S.Mokhare, Driver. Shri. K.M.Bhagwate Vanmajoor

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Dated,

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WORKING PLAN OF BHANDARA FOREST DIVISION
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EXECUTIVE SUMMARY

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 disss

Maintenance/ increase in the extent of forest and tree cover

The total Forest area of the division excluding FDCM, Navegaon and Nagzira Tiger Reserve extends over to 925.78 Sq. Km.

Sr. No.	Range	RF	PF	Zudpi Jungle	Unclassed Forest	Total Area
1	2	3	6	7	8	9
1	Bhandara	4021.407	5266.377	0.280	0	9288.064
2	Tumsar	6284.100	2065.31	1034.065	0	9383.475
3	Jamkandri	9063.243	435.509	141.98	0	9640.732
4	Sakoli	5011.672	3762.787	467.200	0	9241.659
5	Pauni	9732.047	2316.643	184.690	0	12233.380
6	Adyal	3521.902	2778.148	1154.650	0	7454.700
7	Lakhani	1349.397	4643.957	790.580	0	6783.934
8	Nakadongri	6349.344	2554.785	376.79	0	9280.919
9	Lendezari	9212.494	306.793	59.89	0	9579.177
10	Lakhandur	7139.380	2263.517	289.280	0	9692.177
Grand Total		61684.986	26393.826	4499.405	0	92578.217

Administrative Units: For administrative convenience the ranges, rounds and beats were reorganized in Bhandara division and the entire division has been divided into 10 ranges, 39 rounds and 162 beats.

Land Use, Land Use Change and Forestry (LULUCF)

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The total geographical area of the District is 3588 Sq.km. The condition of the forests and forest cover over the last decade during the implementation of the plan based on the FSI satellite data is as follows.

ISFR Year	Geographical area (Sq. Km)	VDF	MDF	OF	Total	% of GA	Scrub
2011	3588	130	544	215	889	24.78	21
2015	3588	129	536	219	884	24.64	21
2017	3588	171	567	268	1006	24.61	16
2019	3588	170.86	563.13	264.93	998.92	24.44	18.57

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.

Tree Cover Outside Forest Area

The Tree Outside Forests (TOF) / Plantation for State of Maharashtra, according to the India State of Forest Report 2017, is 9,831 sq. km. This area adds 3.19% to the tree cover of the State. However, no specific figure for the Bhandara District is available.

Status of Biodiversity Conservation in forests

The forests of Bhandara division belong to miscellaneous forest and few compact forest blocks of Tumsar, Jamkandri, Lendezari and Sakoli ranges are rich in Biodiversity and these areas are overlapping with the Nagzira Wildlife Sanctuary and the Navegaon National Park. As a part of in-situ conservation these Wildlife Sanctuary and National Park were set up.

In the recent years the awareness regarding conservation of flora and fauna among the local community and in people residing in the forest has helped in a large extent in protecting the forest of this area. These communities have a vast knowledge about local flora and fauna which is very important for biodiversity conservation. The Forest Department with the help of local communities have set up Biodiversity Management Committees (BMC) in 541 Gram Panchayat in order to

record the indigenous knowledge systems existing among the local community to have access sharing benefits for the active conservation efforts made by the forest dependent communities.

Conservation and Maintenance of Soil and Water Resource

The exact area treated under soil conservation cannot be assessed as no special work for soil conservation alone is carried out but SMC works form part of the plantations works. In the Division, plantations are taken up every year and can safely be presumed that this area is treated for soil conservation. However, in the last two years, in view of the Jalayukta Shivar project, large areas are being treated specifically for soil and water conservation.

Optimization of Forest Resource Utilization

During the plan period from 2009-10 to 2018-19 the division has harvested coupe annually as per prescriptions mention in the plan. The following table shows the actual yield of timber, firewood, poles and bamboo.

Working Circle	Total area of the coupe in Ha.	Area Felled in Ha.	Expected Yield		Actual Yield			
			Timber (Cum.)	Fire Wood Stacks (2x1.2x1 M.)	Timber (Cum.)	Poles (Cum.)	Fuel Wood (Cum.)	Actual Timber Production Per ha.
SCI	11543.377	4060.467	3344.00	1115	8180.881	0.00	41940.80	0.708
IWC	10923.21	1443.113	3128.00	1048	1931.576	0.00	16236.40	0.176
AWC	8179.908	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P&CAM WC	10335.424	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F&P WC	6277.468	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bamboo (OL) WC	5161.974	1382.00	13 Lakh	0.00	1203251 (LB)	13748 (BB)	0.00	0.00
Old Teak Plantation	5272.70	0.00	25.3	0.00	0.00	0.00	0.00	0.00
Total		6885.58	6497.3 cum.	2163	10112.46 cum.	13748 (BB)	5817.2	0.00
			13 Lakh Bamboo		1203251 (LB)			

(LB: Long Bamboo; BB: Bamboo bundles)

Forest Resource Accounting **PDF Compressor Free Version**

The forests of Bhandara come under the Eco Class III and the value attached to this Class area as given below as per the canopy density. The average value of the forests stands at Rs. 7,72,000/- and varies with the type of forest and its attributes. Below is given the value of the forests of Bhandara as per the current and proposed NPV value which takes into account the tangible and some components of the intangible benefits. The value of the forests of Bhandara comes to 7747.46 crores as per the current NPV rates which has taken in to account all the ecosystem services and functions of the forests.

Forest Carbon Stock of Tropical Dry Deciduous Forests in Bhandara:

The Forests of Bhandara Division mainly falls in Tropical Dry Deciduous Forests. On the basis of data from FSI Carbon stock assessment for Tropical Dry Deciduous Forests the carbon stock is calculated. Thus, the Bhandara Forest Division holds 116049.5 tonnes of Carbon in its forests at an average of 115.36 tonnes/Ha. This data can be used a base line for the future monitoring of the Carbon stock in the Division.

Maintenance and Enhancement of Social, Economic, Cultural and Spiritual Benefits

State's JFM is guided by the Govt. of Maharashtra Resolution dated 16th March 1992, 5th October 2011 and 10th July 2012. The number of villages adjoining to forests is 386. Out of 386 villages 210 villages are covered under JFMC. The total number of members in the Committee are minimum 12 and a maximum of 24 and one-third of the members are to be from the Gram Panchayat. 50% of the members should be women and 2 members should be from SC/ST and OBC. The performance of the Committee in the Division has been adequate. The Forest Development Agency is well established and it's working is satisfactory. Efforts to make the functioning and transaction of funds more and more transparent are going on in the FDA.

Status of Implementation of FRA 2006 in Bhandara Forest Division:

Under Section 3(2) of FRA, 5629.54 Ha has been diverted for Non-forestry purposes. The status of Implementation of FRA 2006 in Bhandara Forest Division (up to July, 2019) is given below. This diversion of forest land to the traditional forest dwellers has further fragmented the area of the Division.

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Sr. No.	Type of Claim	No. of Cases	Diverted Area (in Ha)
1	Individual Rights	2850	1303.72
2	Community Rights	110	4325.82
Total		2960	5629.54

Adequacy of Policy, Legal and Institutional Framework

The existing policy and laws in the country and the State are invoked for the management of the forests of the Division. The National Forest Policy of 1988 is the basic guide for the management strategy of this Plan. The Indian Forest Act 1927 and its Amendment is the Principal Law governing the administration of the forests in the Division.

Past Systems 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.

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:

Sr. 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
8	Dr.F.S.Jafry, IFS Working Plan	2009-10 -2018-19

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.

Forest area under different Working Circle

Working Circle	Reserved Forests	Protected Forests	Unclassified Forests	Zudpi Jungle	Total Area	% of area under different WC	Area handed over to Wildlife during the previous Plan period
SCI WC	20622.69	5059.394	0.00	0.00	25682.084	27.74	945.288
IWC	21661.477	3250.576	0.00	0.00	24912.163	26.91	1931.917
AWC	9676.533	11753.412	0.00	4499.405	25929.35	28.01	428.324
F & P WC	862.705	5363.064	0.00	0.00	6225.769	6.72	114.206
P & CAM WC	8861.581	967.38	0.00	0.00	9828.961	10.62	951.611
Total Area	61684.986	26393.826	0.00	4499.405	92578.217	100.00	4371.346
Overlapping Working Circle							
Wildlife(OL) WC					Entire Area		
Bamboo (OL) WC					20670.316		
Old Teak Plantation (OL) WC					5018.90		
NTPF (OL) WC					Entire Area		

Selection-cum Improvement Working Circle

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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 pole and sound trees of both seedling and coppice origin. It includes 25682.084 Ha of total areas comprising of 20622.69 Ha of Reserved Forests and 5059.394 Ha of Protected Forests. It constitutes an area of 27.74 % of the total forest area of the division.

Improvement 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 24912.053 Ha, comprising 21661.477 Ha of Reserved Forests and 3250.576 Ha of Protected Forests. It constitutes 26.91 % of the total forest area of the division.

Afforestation Working Circle

The open forest areas having density less than 0.4 and with root stock and shrubby growth as well as open forests without root stock, 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 (AWC) forms about 28.01 % of the forest areas of the division. It includes 25929.35 Ha. of the forest areas comprising of Reserved Forests to the extent of 9676.533 Ha., Protected Forests 11753.412 Ha, Zudpi Jungle 4499.405 Ha.

Protection and Catchment Area Management 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 9828.961 Ha of forest areas, comprising 8861.581 Ha of the Reserved Forests and 967.38 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. It constitutes 10.62 % of the total forest area of the division.

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.

Fodder and Pasture 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 cannot 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 6225.769 Ha comprising 862.705 Ha of Reserved Forests and 5363.064 Ha of Protected Forests. It is extending over an area of 6.72 % of the total forests area of the division.

Wildlife (Overlapping) Working Circle

The location of Bhandara Division's Forest is very important from the Wildlife 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 Protected Areas like Tadoba, Navegaon, 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. The adjoining PAs, like Navegaon and Nagzira, provides an additional space for wild animals. Under the present circumstances when most of the PAs are facing the problem of management of corridor, the forests of Bhandara Division can provide the solution to this problem, if managed properly with a futuristic approach.

Bamboo (Overlapping) Working Circle

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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 20670.316 Ha and is spread over 50 Compartments in all the ranges except Lakhandur range. Actual area under Bamboo is 4551.27 Ha.

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.

Old Teak Plantation (Overlapping) 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, '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

Non-Timber Forest Produce (Overlapping) Working Circle

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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. 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.

Joint Forest Management (Overlapping) Working Circle

Degradation of forests is a continuing process, besides, very heavy pressure of human and livestock, 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 Government control and consequent, reservation of forests permitting only specified usufructuary 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 neighbourhood 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 Department 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.

This Overlapping Working Circle extends to the entire area of the Bhandara forest Division which is co-terminus with the area of Bhandara District. Villages that are adjoining to the forest areas are the focal areas for practicing Joint Forest Management.

Management of The Spiritual, Cultural Aspect of Forests and Ecotourism

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Bhandara Forest Division has its varied flora and fauna ranging from the grasslands, the wetland to the thick forests and has quite few ecotourism sites of potential. They are not properly developed and require immediate attention.

The social aspect of forests in the context of ecotourism is very important as it provides the people with employment. The other important social contribution of ecotourism is the exposure to the other cultures and the chance to educate others about one's own culture. It is generally observed that small projects in JFM villages and ecotourism sites not only provides employment to the youths but also gives a boost to their self-confidence.

The eco-sites identified also have lot of spiritual significance and religious sentiments attached to them.

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I. INTRODUCTION

A) Vision Statement:

Globally as well as nationally, Forest Conservation is increasingly being viewed as a powerful instrument in sequestering carbon and thereby offset adverse climate change. Maharashtra Forest Department, being custodian of the State's rich and diverse bio-diversity, is committed to a conservation-centric management and protection strategy. Wild-life focused eco-tourism management hinges on sustainability. Production: be it timber or non-timber forest produce is managed with sustainability at its core. Joint Forestry Management to secure natural resources as well as livelihood security remains the major people-centric activity. Attempts are on to hone local artisans' skill in making value-added articles out of non-timber forest produce like bamboo and cane. Augmenting green cover on non-forest areas to achieve national targets of 33% of land area under green cover remains a forefront agenda. Intensive use of Information and Communication Technology supplemented by e-governance is under effective use to monitor ongoing forestry activities. Extensive use of digital platform to project a true picture of forest conservation forms the central theme.(The following vision statement is the vision statement of the Maharashtra Forest Department www.mahaforest.nic.in)

B) Goals and Objectives of Management:

- i. Transformation of forestry into an important sector in the states economy
- ii. Ensuring stability of Eco-system.
- iii. Ensuring equity of the various stakeholders in using the forest resource (especially needs of local community)
- iv. Enhancing productivity of resources.
- v. Increasing forest cover.
- vi. Conservation of Gene pool and Bio-diversity.
- vii. Becoming a responsive and transparent organisation.

Primary Objectives

Sectoral:

- i. To recommend to the State and Central government, policies which will provide an enabling environment for various non-governmental players to play an active role in this sector.

- ii. To generate and disseminate knowledge and information relevant to the sector to various stakeholders and provide Research & Development support to the sector.
- iii. To regulate the activities of various players involved in forestry sector development.
- iv. To undertake co-ordinated planning along with the other government departments and agencies.
- v. To develop a pro-active interface with political and executive arm of the government and public
- vi. To act as a nodal agency at the grass-root levels in the forest lands.

Institutional

- i. To develop skilled manpower base for the sector.
- ii. To ensure technology upgradation.
- iii. To promote a strong research base and build up an effective institution for effective knowledge management.

Operational

- i. To maintain accurate and reliable data and information on forest resources and undertake periodic resource monitoring.
- ii. To ensure effective and efficient management of forest estates under its control.
- iii. Upgrade quality of land by soil and water conservation measures.
- iv. To identify, map and conserve bio-diversity rich areas.
- v. To promote efficient utilization and value addition of forest produce including promotion of substitutes.

C) SWAT Analysis for Prescription of Strategies for Achieving the Goals and Objectives:

The analysis of the Strengths, Weakness, Opportunities and Threats for the whole gamut of prescriptions for the Division is not an easy task. Each of the Working Circle's prescriptions has enough reasons to justify for the SWOT analysis. However, for this analysis, we have taken the internal and external factors that would have the impact on the achievement of the goal of the Plan and also the whole gamut of factors that would play their role in the success of the Plan like, Human and capital resources, Climatic factors, Human interference,

STRENGTHS	WEAKNESSES
PDF Compressor Free Version 1. Well-regimented administration 2. Ability to maintain forest cover 3. Well intended course of action in place 4. Trained staff and well-manned 5. Finance improved over the last three years 6. A strong legislation and policy in place 7. Area with the forest department is well-spread 8. Overall infrastructure of nurseries, depots, quarters in place. 9. Greater awareness of conservation than before 10. People involved in all forests village through Joint Forest Management. 11. Rich flora and fauna 12. Well documented Working Plan	1. High red-tapism and resistance to change 2. Inability to create/maintain dense forests 3. Over-prevalence of degraded Teak forests 4. Inability to create good Plantations 5. Lack of motivation and innovation 6. Lack of working knowledge on Working Plan prescriptions. 7. Funds deficient & not released in time 8. Lack of legal awareness and implementation 9. Area under zudpi jungle are honeycombed 10. Inadequate wireless communication, Wi-Fi / internet 11. Inability to tap local population Goodwill, most Joint Forest management are not up to the mark.
OPPORTUNITIES	THREATS
1. Cooperation from Social Forestry Department, Distt Admin, other Deptt. 2. Real time reporting and monitoring using latest technology. 3. New zudpi jungle offer new work sites 4. Funding for plantations from PSUs, Private Parties 5. Training in new tech and exposure visits for staff. 6. Funding from outside department 7. Creation of legal cell 8. Creation of assets and infrastructure from CAMPA 9. Involvement of informed public and NGOs in conservation 10. Documentation and Biodiversity 11. Studies involving educational Institutions, research on pathological problems in forests	1. High number of vacancies 2. Lack of technology transfer on silvicultural improvements 3. Drought conditions 4. Forest fire from fields, villages, out of vengeance 5. Staff over-burdened with unproductive non-forestry works 6. Lack of control over encroachment, Grazing, Illicit felling 7. Joint Forest Management villages are divided socially, politically 8. Lack of funding 9. Spread of disease, epidemics and teak hollowness 10. Pressure from influential persons for works outside WP 11. Late felling permission

D) Expected Outcome:
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Of the many prescriptions that have been set for the treatment of the forests of the Division, the following are some of the outcomes that are expected to be achieved during the period of the plan.

a) Forest:

- (i) **Extent of Forest Cover:** While it is our National policy to have least 33% of the geographical area under forest (in the plans), in the case of Bhandara it is seen that out of the geographical area of 3,588sq.km. only 998.92 sq.km. (SFR of FSI 2019) is covered under forests. This works out to be meagre 24.64 % of the geographical area, in order to achieve 33 % forest cover, there is a need to cover the whole area of forests which is 927.79sq.kms. is required to be regenerated (may except identified grasslands)

The Social Forestry Department needs to gear up for additional forest cover of 5 % in the District which seems an impossible task in the next ten years. Proper planning is required for 5 % increase in forest cover as envisaged in the 12th Plan.

- (ii) **Plantations:** It is expected that plantations will be carried out in Afforestation Working Circles as well as in other Working Circles, in this plan. This will add to the forest cover of the District particularly in the Zudpi Jungle area in the future.
- (iii) **Regeneration:** Because of implementation of the plan, the forests are expected to be healthier and have better regeneration from opening of the canopy in SCIcoupes followed by intensive Aided Natural Regeneration works in IWC. Also due to better protection from fire and grazing, the area will be revitalised.
- (iv) **Health and vitality:** At the end of the plan period it is expected that the forests of the Division are more vivacious and revitalized with better regeneration, better composition of the crop, lesser disturbance of fire, grazing, illicit felling etc. resulting in better healthy forests.

- b) Wildlife:** It is expected that at the end of the plan period the whole area of forests will be covered with at least one waterhole in every 10sq.kms. The documentation and study of the faunal and floral diversity of the Division/District will have been done by then.

- c) Biodiversity:** Because of the implementation of this Plan, Biodiversity appreciation and conservation will get a fillip in the Division. It is envisaged to have documentation and status study of medicinal plants, the lower life-forms

(fungus, algae, ferns, moss & lichens), entomological study, herpetological study, etc. during the course of the plan through projects to be designed by the Division. At the end of the plan, Biodiversity Committee in all JFM-implemented village in the Division through the PRIs, which the Forest Department will catalyse, are expected to be formed.

- d) Soil and Water Conservation:** Throughout the plan period it is expected to treat the plantations and other working areas for soil and moisture conservation. All major dams/wetlands identified in the plan will have been treated on watershed management principles by the end of the plan period.

E) Abstract of Plan Prescriptions in following format:

Chapter No. (Vol-I, Part-II)	Para No/ Sub para No.	Prescribed Activity
A	B	C
2-SCI	2.6.10.2	Coupe Demarcation & Treatment Map: * Demarcation and Marking: One year in advance * Treatment Map to be prepared * A type: Protection area (A1: Steep slopes, A2: 20 M wide buffer along streams, A3: excessively erosion prone & Seasonal Flooded areas.) * B-type: Under stocked and Blank areas (density <0.4) (a) B1-Open Forest with natural regeneration (600 or more sapling per ha.) (b) B2-Open Forest without natural regeneration sapling less than 600 per ha. * C-type: congested Pole crop. * D-type: Well stocked areas (density >0.4)
	2.6.10.2	Marking: * A type area: No Tree shall be marked for felling. * B type: All dead and malformed trees, retaining 2 dead tress/ha. assnages and dens for nesting and resting of wildlife, shall be marked, all live high stumps shall be marked. * All multiple coppice poles; retaining only one, the most promising / stool, shall be marked. * C type: Congested pole crop shall be marked for thinning. * All high stumps, dead and malformed poles shall be marked for harvesting. * Unwanted undergrowth interfering or likely to interfere, the seed-based NR of Teak and other

PDF Compressor Free Version		valuable species, shall be removed. * D type: 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. *All dead and malformed trees, retaining 2 dead trees per hectare, shall be marked for felling. * All live high stumps and all but one vigorously growing coppice pole per stool shall be marked for felling. * All trees useful for wildlife shall be reserved against felling. * Trees of seed origin shall be preferred for retention.
	2.6.2	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, * 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. *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.
	2.6.12	Regeneration: Tending of Natural Regeneration of valuable species in the B-type will be carried out. * Natural Regeneration, including root stock management, is prescribed to be given preference over plantations. * 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.

PDF Compressor Free Version		* Stump planting of Teak should only be taken in the areas with well drained soil and crown density less than 0.2.
	2.6.10.2	SMC Works: * 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.
	2.6.11	Subsidiary Operation: * Cutback Operations: * Cutback operations shall be carried out, in the next year of coupe working in the annual coupes. * All the left-over marked trees during the main coupe operations shall be removed. * 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 6 th year from the main felling will be done. * 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. Thinning * Thinning is prescribed in the 11 th 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. * 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.
3-IWC	3.6.10.1	Coupe Demarcation & Treatment Map: * Demarcation and Marking: One year in advance * Treatment Map to be prepared * A type: Protection area (A1: Steep slopes, A2: 20 M wide strips along streams, A3: excessively erosion

		prone areas) * B-type: 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.) * C-type: Group of young Pole crop * D-type: Well stocked areas having density of 0.4 or over,
	3.6.10.1	Marking: * A type area: No tree shall be marked for felling. * B type: All dead and malformed, over mature trees, retaining 2 dead trees / ha, as snags and dens, for nesting and resting of wildlife. * All multiple coppice poles; retaining only one, the most promising / stool, shall be marked. * C type: The congested pole crop shall be marked for thinning. * Unwanted undergrowth interfering or likely to interfere the seed-based NR of Teak and other valuable species shall be removed. * D type: All over-matured <i>Teak</i>, <i>Ain</i>, <i>Bija</i> and <i>Dhaoda</i> trees if any, are to be enumerated in 15 cm girth-classes, before marking. * All healthy edible fruit bearing species and NTFP yielding species shall be reserved. * All dead and malformed trees, retaining 2 dead trees per hectare and all live high stumps shall be marked for felling. * Mature trees that have developed hollowness and show visual sign of decay will be marked for felling if, silviculturally, available. * All, but one, vigorously, growing coppice pole per stool shall be marked for felling.
	3.6.2	Silvicultural System: * Hygienic operations of improvement felling are carried out and adequate growing space. * The species whose population in the 'stand' dynamics is less than 1% shall be retained till they reach the rotation age. * The best suited system of treatment is improvement felling supplemented by tending of naturally regenerated crop and root stock.
	3.6.12	Regeneration:

		* Natural Regeneration shall be given preference over the plantations. * The existing NR, including root stock, 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. * Tending operations for natural regeneration in the D-type and in the B1-type shall be taken up along with the coupe operations. * 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. * Stump planting of Teak shall only be considered in well drained areas with crown density less than 0.2.
	3.6.10.1	SMC Works: * Soil and moisture conservation work/measures will be carried out in B-Type areas, as prescribed in the Chapter of Miscellaneous Regulations.
	3.6.11	Subsidiary Operations: Cutback Operation: * The cutback operations will be carried out in the next year of coupe working. * 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. Cleaning in the Sixth Year: * Cleaning shall be carried out in the sixth year of the coupe working. * 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. Thinning in 11th Year: * Thinning is prescribed to be carried in the worked coupe in the 11th year of coupe working as per

PDF Compressor Free Version		thinning guidelines. * 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.
4-AWC	4.6.10.1	Coupe Demarcation & Treatment Map: * Demarcation and treatment map will be prepared one year in advance. * Treatment map would show A, B, C, D areas * A type: Protection area (A1: Steep slopes, A2: 20 M wide strips on both side of streams. A3-seasonally flooded areas.) * B-type: Under stocked areas (B1-Type - Areas with sufficient Natural Regeneration. B2-Type - Degraded lands without sufficient Natural Regeneration.) * C-type: Group of naturally grown Poles and old plantations. * D-type: Areas have dense vegetation.
	4.6.2	Silvicultural System: *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. * If the NR is absent, it will be supplemented by plantations.
	4.6.12	Regeneration: * Natural Regeneration shall be given preference over plantation. * The existing NR and root stock 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 root stock 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. * Plantations shall be taken only in the B2-Type and A-Type areas. * 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

PDF Compressor Free Version		species.
	4.6.10.1	SMC Works: * 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.
5-P & CAM	5.6.11	Coupe Demarcation & Treatment Map: * After proper demarcation, prepare the Treatment Map of the coupe, showing the various Treatment Type areas, on the compartment maps. * A type: Protection area (A1: Steep slopes, A2: 20 M wide strips on both side of streams. A3-seasonally flooded areas.) * B-type: Under stocked areas (B1-Type - Areas with sufficient Natural Regeneration. B2-Type - Degraded lands without sufficient Natural Regeneration.) * C-type: Group of naturally grown Poles and old plantations. * D-type: Areas have dense vegetation.
	5.6.11.2	Treatment: A -Type Areas: * No harvesting of trees is recommended in these areas except wind fallen trees of valuable species. * Soil and moisture conservation works, as prescribed in the chapter of Miscellaneous Regulations shall be taken in A3 type areas. * Bush sowing of Khair, Neem, Maharukh, Sandal, Babool, Ber and other local seeds is to be carried out in the areas. * Stakes of <i>Ficus</i> spp., Pangara, Salai or other suitable species will be planted at six-meter interval in the areas with sufficient moisture for these stakes. B- Type Areas: * All seedlings and saplings of desirable species, more than 60 cm. in height, will be nursed as future crop. * Operations like Singling of coppice shoots and Management of damaged and malformed saplings will be carried out as prescribed in the SCI Working Circle.

		* No harvesting is recommended in these areas. * Required Soil & Moisture Conservation Works, like nalabunding, gully plugging, grass plantation etc. will be carried out. * 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: * 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. * No Plantation in this area will be taken. D- Type Areas: * No harvesting, except of dead trees, will be done. * Suitable soil and moisture conservation works, if required, will be taken in the erosion prone areas. * No plantation is recommended.
	5.6.2	Silvicultural System: * Silvicultural system is proposed on the pattern of Ridge to Valley Watershed Management System. * 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.
	5.6.12	Regeneration: A type area- * Bush sowing of <i>Khair, Neem, Maharukh, Sandal, Babool, Ber and other local seeds</i> is to be carried out in the areas. Any one species should not constitute more than 25% of the total species. * Stakes of <i>Ficus spp., Pangara, Salai</i> or other suitable species will be planted at six-meter interval in the areas with sufficient moisture for these stakes. * 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 area- * Regeneration of Seed Origin: All seedlings and saplings of desirable species, more than 60 cm. in height, will be nursed as future crop.

PDF Compressor Free Version		* 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.
	5.6.11.2	SMC Works: A type area- * Soil and moisture conservation works, as prescribed in the chapter of Miscellaneous Regulations shall be taken in A3 type areas. B type area- * Required Soil & Moisture Conservation Works, like nalabunding, gully plugging, grass plantation etc. will be carried out. D type area- * Suitable soil and moisture conservation works, if required, will be taken in the erosion prone areas.
6-FP	6.6.11	Coupe Demarcation: * The coupe due for closure to grazing will be demarcated one year in advance. *The treatment map will be prepared showing A, B, C, D type area.
	6.6.11	Treatment: A-Type Area: *Soil and Moisture Conservation works. *Seed Sowing and Stake Planting of Fodder Tree spp.(like Babul, Khair etc.) and seed broadcasting of superior grasses in open areas is recommended. B-Type Area: *Soil and moisture conservation works as per Miscellaneous Regulations. C & D-Type Areas: * All 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. * Works shall preferably be carried out under JFM programme. * No fencing is advised as the social fencing is expected under the JFM programme.
7-Wildlife (Overlapping)	7.6.14 to 7.6.14.8	Prescription: * Standing Order of PCCF (WL) to be scrupulously implemented. * Habitat improvement works like waterhole development, meadow development to be taken up in suitable areas. * Creation of database w.r.t. riparian zones, saltlicks,

PDF Compressor Free Version		natural wallows, resting places etc to be created. * Vaccination of livestock to be monitored * Intelligence gathering to check wildlife trade * Secret service fund to be effectively used. * Regular Sensitization of staff * During marking, at least 2 dead trees per ha is to be kept as snags. * No fruit tree to be marked. * Tendu Phadis / labour camps should not be close to waterholes. * Compensation as per Govt. orders to be dispersed immediately and transparently. * Effective control on forest fires. * Eco-development works to be started either through EDCs or JFMCs in wildlife rich areas * Massive awareness creation in village communities, schools, colleges, civil society, public representatives etc.
8 -Bamboo (Overlapping)	8.6.10.2 8.6.10	Demarcation: *The coupe due for working will be demarcated before the onset of monsoon, in the year in which they become due for harvesting. Method of Working: * Present practice of working Bamboo forest areas on three years felling cycle shall continue. * No harvesting works should be permitted from 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 year old included). *No culms below the age of two years will be felled. * 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. * 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, which ever is more. (c) The remaining culms will be considered available for harvesting. * The cutting height of culms will be between 15 cms. to 45 cms. above ground level i.e. above the

PDF Compressor Free Version		first internode above the ground. The cut shall be made with a sharp instrument. *In case of any flowering, no Culm from flowered clumps shall be felled in the year of flowering. *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. *Following acts will be strictly prohibited. - Digging of rhizome. - Lopping of Bamboo culms for fodder. - Use of tender Bamboo culms for bundling. *Climbers affecting the growth of Bamboo clumps shall be cut. *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. *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. *Very often soft and flexible, current year culms are demanded by Burads for basket weaving, this practice is much against the silvicultural norms.
9 –Old Teak Plantation (Overlapping)	9.6.11	Prescriptions for Silvicultural Thinnings: Following order of marking, regarding silvicultural availability of trees in thinning, shall be maintained. *Non-Teak coppice trees (except any rare tree) are first to be marked. *Teak coppice trees all are marked. *Non-Teak trees of seed origin 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. *Sound Teak trees of seed origin to be marked for felling only in the last. *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 a) the dead, dying, diseased and suppressed trees b) defective, dominated stems and whips c) trees having

PDF Compressor Free Version		defective stems of crowns, those trees whose crown space is cramped by neighbouring trees d) branchy and badly shaped advance growth, which cannot be or is undesirable to pruned
10-NTFP (Overlapping)	10.6.13.3	METHODS OF TREATMENT: * Modifications According to the Legal Provisions * Fire Protection Measures * Training Programme for NTFP Collection * Documentation of NTFP Collection * Non-destructive Removal of NTFP
11-JFM (Overlapping)	11.6.13.5	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. * 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. * In carrying out the developmental activities, the expertise of NGOs has to be fully utilized. * Integrated Tribal Development Project can be implemented in the tribal areas with the involvement of tribal people by adopting JFM approach.
17-Miscellaneous Regulation	17	Miscellaneous Regulation: * Collect all relevant Notifications, Maps and other records * Identify and carry out the survey and demarcation work of all un- demarcated forest lands. * Maintain boundaries of forest lands in the Division by permanent pillar marks, to act as psychological barriers. * Ensure effective protection of the forest resources against adverse influences. * The boundary of all the lands, Reserved Forest, Protected Forest, Un-classed Forest, Zudpi 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.

19-Control and Records:	19	*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
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F) WORKS PRESCRIBED DURING THE PLAN PERIOD MUST BE GIVEN IN A TABULAR FORM ALONG WITH ANNUAL TARGET

Chapter No. (Vol-I Part-II)	Para No./Sub para No.	Sr. No.	Prescribed activity	Yearwise Physical Target (Ha.)									
				Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
		1	Demarcation and marking	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287
		2	Coupe working										
	2a		Timber harvesting	3344 Cum.	3344 Cum.	3344 Cum.	3344 Cum.	3344 Cum.	3344 Cum.	3344 Cum.	3344 Cum.	3344 Cum.	3344 Cum.
	2b		Firewood extraction	1115 Stack s	1115 Stack s	1115 Stack s	1115 Stack s	1115 Stack s	1115 Stack s	1115 Stack s	1115 Stack s	1115 Stack s	1115 Stack s
		3	Natural Regeneration										
			Nursing of naturally occurring seedling and coppice management etc. in understicked patches	1087	1087	1087	1087	1087	1087	1087	1087	1087	1087
		4	Soil and moisture conservation works	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287
	5		Cutback operation	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287
		6	Plantation (Teak)										
	6a		PPO/PYO (Pre-planting works)	100	100	100	100	100	100	100	100	100	100
	6b		FYO (First year operations)	100	100	100	100	100	100	100	100	100	100
	6c		SYO (Second year operations)	100	100	100	100	100	100	100	100	100	100

	6d	TYO(Third year operations)	100	100	100	100	100	100	100	100	100	100
	6e	4th YO(Forth year operations)	100	100	100	100	100	100	100	100	100	100
	6f	5th YO(Fifth year operations)	100	100	100	100	100	100	100	100	100	100
	7	Plantation(Mix)										
	7a	PPO/PYO(Pre-planting works)	100	100	100	100	100	100	100	100	100	100
	7b	FYO(First year operations)	100	100	100	100	100	100	100	100	100	100
	7c	SYO(Second year operations)	100	100	100	100	100	100	100	100	100	100
	7d	TYO(Third year operations)	100	100	100	100	100	100	100	100	100	100
	7e	4th YO(Forth year operations)	100	100	100	100	100	100	100	100	100	100
	7f	5th YO(Fifth year operations)	100	100	100	100	100	100	100	100	100	100
		Total										
	8	Cleaning	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287
	9	Fire protection	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287
Improvement WC												
IWC	1	Demarcation and marking	1204	1204	1204	1204	1204	1204	1204	1204	1204	1204
	2	Coupe working										
	2a	Timber harvasting	3128 Cum	3128 Cum	3128 Cum	3128 Cum	3128 Cum	3128 Cum	3128 Cum	3128 Cum	3128 Cum	3128 Cum
	2b	Firewood extraction	1042 Stacks	1042 Stacks	1042 Stacks	1042 Stacks	1042 Stacks	1042 Stacks	1042 Stacks	1042 Stacks	1042 Stacks	1042 Stacks
	3	Natural Regeneration										
		Nursing of naturally occuring seedling and coppice management etc. in understicked patches	904	904	904	904	904	904	904	904	904	904
	4	Soil and moisture consercationworks	1204	1204	1204	1204	1204	1204	1204	1204	1204	1204
	5	Cutback operation	1204	1204	1204	1204	1204	1204	1204	1204	1204	1204
	6	Plantation(Teak)	100	100	100	100	100	100	100	100	100	100
	6a	PPO/PYO(Pre-planting works)	100	100	100	100	100	100	100	100	100	100
	6b	FYO(First year operations)	100	100	100	100	100	100	100	100	100	100
	6c	SYO(Second year operations)	100	100	100	100	100	100	100	100	100	100
	6d	TYO(Third year operations)	100	100	100	100	100	100	100	100	100	100

	6e	4th YO(Forth year operations)	100	100	100	100	100	100	100	100	100	100
	6f	5th YO(Fifth year operations)	100	100	100	100	100	100	100	100	100	100
		Total										
	7	Plantation(Mix)	200	200	200	200	200	200	200	200	200	200
	7a	PPO/PYO(Pre-planting works)	200	200	200	200	200	200	200	200	200	200
	7b	FYO(First year operations)	200	200	200	200	200	200	200	200	200	200
	7c	SYO(Second year operations)	200	200	200	200	200	200	200	200	200	200
	7d	TYO(Third year operations)	200	200	200	200	200	200	200	200	200	200
	7e	4th YO(Forth year operations)	200	200	200	200	200	200	200	200	200	200
	7f	5th YO(Fifth year operations)	200	200	200	200	200	200	200	200	200	200
		Total										
	8	Cleaning	1204	1204	1204	1204	1204	1204	1204	1204	1204	1204
	9	Fire protection	1204	1204	1204	1204	1204	1204	1204	1204	1204	1204
	Afforestation WC											
AWC	1	Demarcation and marking	792	792	792	792	792	792	792	792	792	792
	2	Coupe working										
	2a	Timber harvesting	2058 cum	2058 cum	2058 cum	2058 cum	2058 cum	2058 cum	2058 cum	2058 cum	2058 cum	2058 cum
	2b	Firewood extraction	686 stacks	686 stacks	686 stacks	686 stacks	686 stacks	686 stacks	686 stacks	686 stacks	686 stacks	686 stacks
	3	Natural Regeneration										
		Nursing of naturally occuring seedling and coppice management etc. in understicked patches	392	392	392	392	392	392	392	392	392	392
	4	Soil and moisture conservation works	792	792	792	792	792	792	792	792	792	792
	5	Plantation(Teak)										
	6a	PPO/PYO (Pre-planting works)	100	100	100	100	100	100	100	100	100	100
	6b	FYO(First year operations)	100	100	100	100	100	100	100	100	100	100
	6c	SYO(Second year operations)	100	100	100	100	100	100	100	100	100	100
	6d	TYO(Third year operations)	100	100	100	100	100	100	100	100	100	100
	6e	4th YO(Forth year operations)	100	100	100	100	100	100	100	100	100	100
	6f	5th YO(Fifth year operations)	100	100	100	100	100	100	100	100	100	100
	7	Plantation(Mix)										

	7a	PPO/PYO(Pre-planting works)	300	300	300	300	300	300	300	300	300	300	300
	7b	FYO(First year operations)	300	300	300	300	300	300	300	300	300	300	300
	7c	SYO(Second year operations)	300	300	300	300	300	300	300	300	300	300	300
	7d	TYO(Third year operations)	300	300	300	300	300	300	300	300	300	300	300
	7e	4th YO(Forth year operations)	300	300	300	300	300	300	300	300	300	300	300
	7f	5th YO(Fifth year operations)	300	300	300	300	300	300	300	300	300	300	300
		Total											
	8	Cleaning	792	792	792	792	792	792	792	792	792	792	792
	9	Fire protection	792	792	792	792	792	792	792	792	792	792	792
Protection & Catchment Area Management WC													
P&CAM	1	Demarcation and marking	517	517	517	517	517	517	517	517	517	517	517
	2	Coupe working											
	2a	Timber harvasting	1342 cum	1342 cum	1342 cum	1342 cum	1342 cum	1342 cum	1342 cum	1342 cum	1342 cum	1342 cum	1342 cum
	2b	Firewood extraction	447 stacks	447 stacks	447 stacks	447 stacks	447 stacks	447 stacks	447 stacks	447 stacks	447 stacks	447 stacks	447 stacks
	3	Natural Regeneration											
		Nursing of naturally occuring seedling and coppice management etc. in understickee d patches	417	417	417	417	417	417	417	417	417	417	417
	4	Soil and moisture conservation	517	517	517	517	517	517	517	517	517	517	517
	6	Plantation(Miscincluding Bamboo depending upon suitability of site)											
	6c	PPO/PYO(Pre-planting works)	100	100	100	100	100	100	100	100	100	100	100
	6d	FYO(First year operations)	100	100	100	100	100	100	100	100	100	100	100
	6e	SYO(Second year operations)	100	100	100	100	100	100	100	100	100	100	100
	6f	TYO(Third year	100	100	100	100	100	100	100	100	100	100	100

			operations)										
		6g	4 th YO(Forth year operations)	100	100	100	100	100	100	100	100	100	100
		6h	5 th YO(Fifth year operations)	100	100	100	100	100	100	100	100	100	100
			Total										
		8	Cleaning	517	517	517	517	517	517	517	517	517	517
		10	Fire protection	517	517	517	517	517	517	517	517	517	517
Fodder & Pasture WC													
F&P WC		1	Demarcation	314	314	314	314	314	314	314	314	314	314
			Total										
		2	Natural Regeneration										
			Protection, Weed extraction and Removal of woody growth to encourage growth of natural grasses	114	114	114	114	114	114	114	114	114	114
			Total										
		3	Soil and Moisture Conservation	314	314	314	314	314	314	314	314	314	314
		3	Grass & Fodder Plantation										
		3a	PPO/PYO (Pre-planting works)	200	200	200	200	200	200	200	200	200	200
		3b	FYO (First year operations)	200	200	200	200	200	200	200	200	200	200
		3c	SYO (Second year operations)	200	200	200	200	200	200	200	200	200	200
		3d	TYO (Third year operations)	200	200	200	200	200	200	200	200	200	200
		3e	4th year operation	200	200	200	200	200	200	200	200	200	200
		3e	5th year operation	200	200	200	200	200	200	200	200	200	200
			Total										
		4	Fire Protection	314	314	314	314	314	314	314	314	314	314

NTFP (Overlapping)													
NTFP (Overlapping)		1	Training for collection method	39 Round	39 Round	39 Round	39 Round	39 Round	39 Round	39 Round	39 Round	39 Round	39 Round
Wildlife (Overlapping)													
Wildlife (Overlapping)		1	Habitat improvement	39 Round	39 Round	39 Round	39 Round	39 Round	39 Round	39 Round	39 Round	39 Round	39 Round
		2	Regulatory compensation	50 Cases	50 Cases	50 Cases	50 Cases	50 Cases	50 Cases	50 Cases	50 Cases	50 Cases	50 Cases
		3	Compensation for Human Casualty	25 cases	25 cases	25 cases	25 cases	25 cases	25 cases	25 cases	25 cases	25 cases	25 cases
			Compensation for Cattle Killed	50 cases	50 cases	50 cases	50 cases	50 cases	50 cases	50 cases	50 cases	50 cases	50 cases
			Compensation for Crop Damage	10 cases	10 cases	10 cases	10 cases	10 cases	10 cases	10 cases	10 cases	10 cases	10 cases
Demarcation and Protection													
Demarcation and Protection		1	Fixing boundary pillars	1193 km	1193 km	1193 km	1193 km	1193 km	1193 km	1193 km.	1193 km.	1193 km.	1193 km.
		2	Intelligence network & court case	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.
		3	Collection of wind-fallen and illegally-cut material	50 cum	50 cum	50 cum	50 cum	50 cum	50 cum	50 cum	50 cum	50 cum	50 cum
		4	Reaward to informants and staff	25	25	25	25	25	25	25	25	25	25
		5	Fire protection	2526 km.	2526 km.	2526 km.	2526 Km.	2526 km.	2526 Km.	2526 km.	2526 km.	2526 km.	2526 km.
Staff and Manpower													
Staff and Manpower		1	Salary, travel, diesel and other office expenses	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.
		2	Roads, bridges, buildings & other maintenance	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.
		3	Thematic training to staff	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.	Dvn.
Bamboo (Overlapping)													
boo (Overlapping)		1	Demarcation and marking	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974

		2	Bamboo harvesting	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974
		3	Cleaning	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974
		4	Fire protection	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974	5161.974
Joint Forest Management													
JFM		1	Awareness generation 1st year	210 Village	210 Village	210 Village	210 Village	210 Village	210 Village	210 Village	210 Village	210 Village	210 Village
		2	Microplan preparation 2nd year	210 Village	210 Village	210 Village	210 Village	210 Village	210 Village	210 Village	210 Village	210 Village	210 Village
Old Teak Plantation													
Old Teak Plantation			Cleaning	5272.7	5272.7	5272.7	5272.7	5272.7	5272.7	5272.7	5272.7	5272.7	5272.7
			Thinning	5272.7	5272.7	5272.7	5272.7	5272.7	5272.7	5272.7	5272.7	5272.7	5272.7

II. GLOSSARY OF TERMS

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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 (Sorghum vulgare).
Kacha (roads)	Temporary (roads).
Kankar	Lime nodules.
Katha	Catechu.
Kharif	Monsoon crop.
Khasara No.	Serial number given to any portion of land entered in land
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 courses.
Nistar	Forest produce required for bona-fide agricultural or domestic
NistarPatrak	Record of rights on Government Land.
Occupational...	The Nistar granted to village Craftman i.e., Mahars,
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 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
Z.J.	Zudpi Jungle

ABBREVIATIONS USED IN THE PLAN
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A.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.

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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

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

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

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

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

B. Shrubs

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

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

C. Herbs

Aghada/Apamarg	<i>Achyranthes aspera</i>	Amaranthaceae
Ambuti/Tipani	<i>Oxalis corniculata</i>	Oxalidaceae
Anantmul	<i>Hemidesmus indicus</i>	Periplocaceae
Bhui Aonla	<i>Phyllanthus niruri</i>	Euphorbiaceae
Dudhivel/Govrrdhan	<i>Euphorbia hirta</i>	Euphorbiaceae
Divali	<i>Tephrosia hamiltonii</i> , (Drumm)	Fabaceae
Gajargawat	<i>Parthenium hysterophorus</i> (Linn)	Asteraceae
Gokru	<i>Tribulus terrestris</i> (Linn)	Zygophyllaceae
Gokukata/Talimkhana	<i>Hygrophilla auriculata</i>	Acanthaceae
Hamata	<i>Stylosanthes hamata</i> (L.)	Caesalpinaceae
Kamarmodi	<i>Tridax procumbens</i> (Linn)	Asteraceae
Pivla dhotra	<i>Argemone mexicana</i> (L.)	Papaveraceae
Pivili tilwan	<i>Cleome viscosa</i> (Linn)	Cleomaceae
Rantulasi/Bantulasi	<i>Hyptis suaveolens</i> (Linn)	Lamiaceae
Rantur	<i>Atylosia scarabaeoides</i> , (L.)	Fabaceae
Isapghol/Aspghol	<i>Plantago ovata</i>	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)	Caesalpinaceae
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>x 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
Kanjhuri	<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.	Periplocacea
Kukudranji	<u><i>Calycopteris</i></u> <u><i> floribunda</i></u> , (Land)	Combretaceae
Mahulbel	<u><i>Bauhinia</i></u> <u><i> vahlii</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>	Leguminoceae
Bandha/ Bandh	<u><i>Vanda</i></u> <u><i> tessellata</i></u> , (Roxb)	Orchidaceae

**IV. 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>

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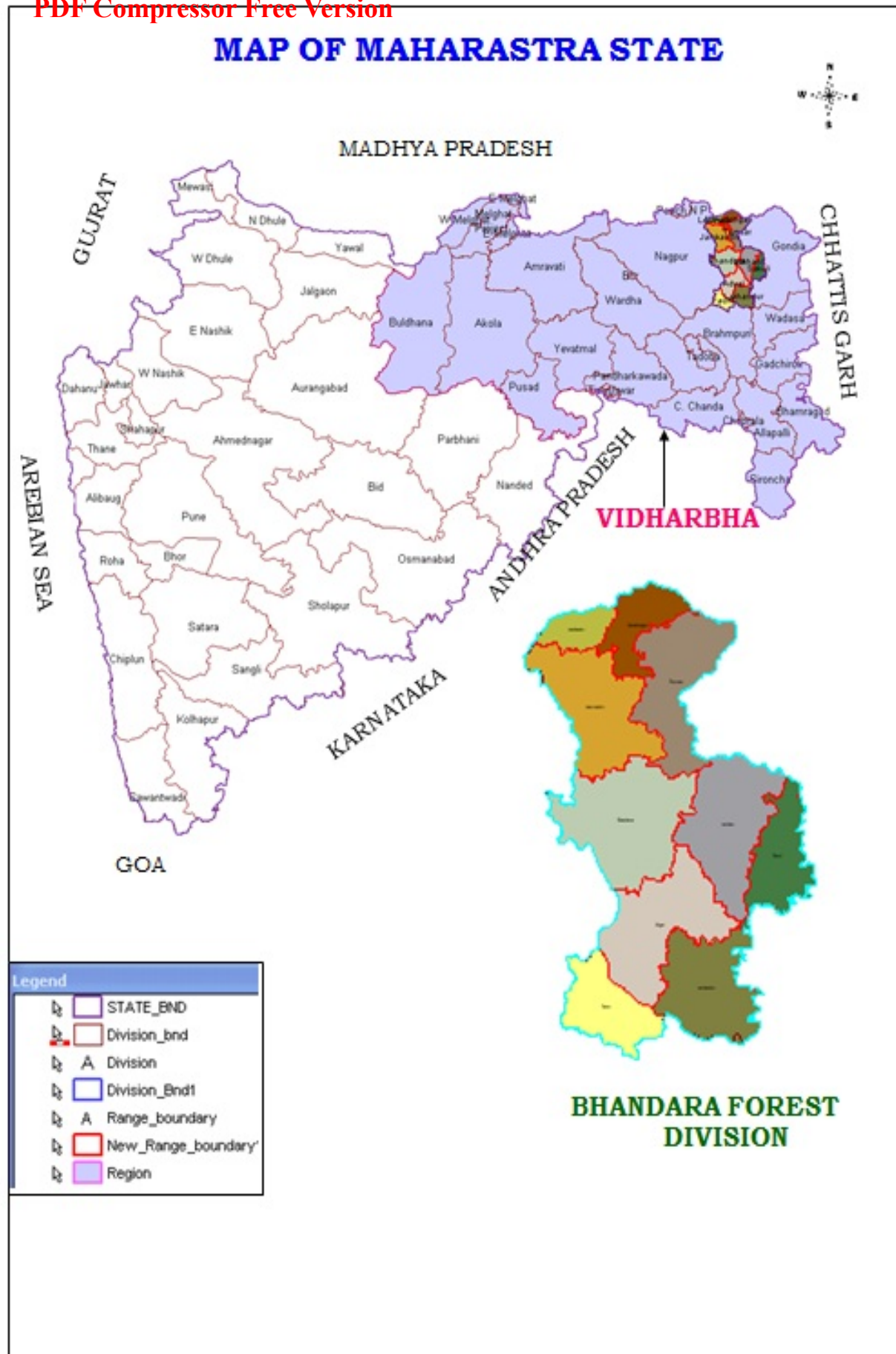
Common Name	Zoological Name
Purple wood pigeon	<u>Columba punices</u>
Common Crane	<u>Grus grus</u>
Sarus crane	<u>Grus antigone</u>
Dove (spotted)	<u>Streptopelia chinensis</u>
Ring (Collared) dove	<u>Streptopelia decaocto</u>
Cotton teal	<u>Nettapus coromandelianus</u>
Lesser Whistling teal	<u>Dendrocygna 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 zeilonensis</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>

PDF Compressor Free Version **V. Others**

List of Lichens, algae, fungi etc. found in Bhandara Forest Division

Sr. No.	Fungi
1.	<i>Cantharellus infundibuliformis</i>
2.	<i>Clathrus cancellatus</i>
3.	<i>Clavaria stricta</i>
4.	<i>Clavulina cristata</i>
5.	<i>Clitocybe ectypoides</i>
6.	<i>Collybia butyracea</i>
7.	<i>Coltricia perennis</i>
8.	<i>Conocybe tenera</i>
9.	<i>Coprinus comatus</i>
10.	<i>Daldinia concentric</i>
11.	<i>Dictyophora duplicata</i>
12.	<i>Geaster fimbriatus</i>
13.	<i>Inocybe fraudans</i>
14.	<i>Lacterius offinis</i>
15.	<i>Lepiota Americana</i>
16.	<i>Marasmius delectans</i>
17.	<i>Marasmius rotula</i>
18.	<i>Mutinus ravenelii</i>
19.	<i>Mycena sp.</i>
20.	<i>Panaeolus ephincitrinus</i>
21.	<i>Peziza badia</i>
22.	<i>Polyporus albellus</i>
23.	<i>Polyporus arcularius</i>
24.	<i>Polyporus elegans</i>
25.	<i>Polyporus lucidus</i>
26.	<i>Polyporus offinis</i>
27.	<i>Polyporus versicolor</i>
28.	<i>Schizophyllum commune</i>
29.	<i>Scutellinia scutellata</i>
30.	<i>Xylaria polymorpha</i>
	Algae
1.	<i>Spirogyra</i>
2.	<i>Oedogonium</i>
3.	<i>Nostoc</i>
4.	<i>Oscillatoria</i>

(Ref: Tagade WY and Kawale MV, Intl. J. of Life Sciences, 2014)



THE TRACT DEALT WITH

1.1 NAME AND SITUATION

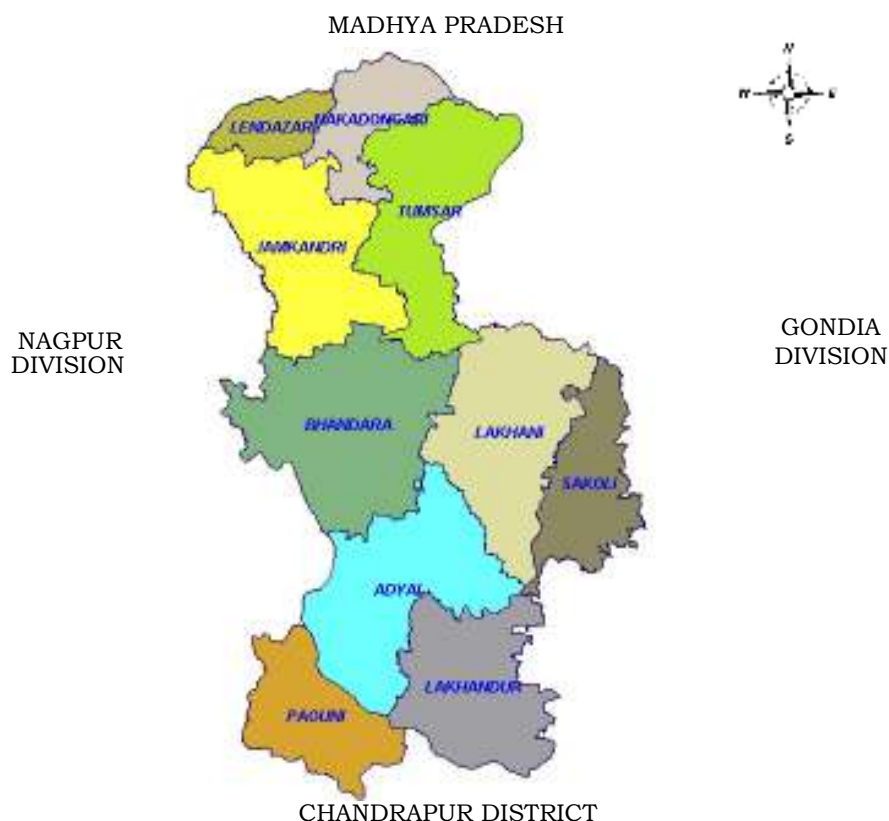
1.1.1 Bhandara district lies entirely within the Wainganga basin. Three major tributaries of the Wainganga, the Bagh, the Bawanthadi and the Chulband drain the district. The district is traversed West to East in the middle by the Nagpur-Calcutta (South-Eastern) broad gauge railway line and the Nagpur-Raipur 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.

1.1.2 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 Division) in the West, Chandrapur District (Bramhapuri Division) in the South and artificial boundary line between Bhandara and Gondia districts (Gondia Division) in the East.

Table No. 1.1 Boundary of the Bhandara Division:

Sr. 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

PDF Compression Version OF BHANDARA FOREST DIVISION



1.1.3 The forests in charge of this division, excluding areas transferred to FDCM, Navegaon National Park and Nagzira Sanctuary, is 969.49 sq km. This comprises of 647.52 sq km. of Reserved Forest, 276.95 sq km. of Protected Forest which includes 52.56 sq.km of compensatory lands given against Gosekhurd project and subsequently declared as Protected Forest, 44.99 sq km of Jhudpi Jungle. The forest land of Bhandara constitutes 40.14% 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.

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

- i. Adyal** - A large village in Bhandara district situated about 22 km 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 fair, lasting for 7 days popularly known as Ghodyachi Jatra on Chaitra Sudha Navmi is arranged in the month of March – April.
- ii. 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, Malti-Madhav and Uttara-Rama-Charita Manas. Today an Arts and Commerce college at Amgaon perpetuates the memory of Bhavabhuti.
- iii. 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.
- iv. 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.
- v. 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 sometimes 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.
- vi. 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.

vii. 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.

viii. 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 small-scale bidis are also manufactured.

ix. 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.

x. 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 dessiminate the essence of Buddhism in the area among people.

1.2 CONFIGURATION OF THE GROUND:

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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.

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 GEOLOGY, ROCK AND SOIL:

1.3.1 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

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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 scale-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 cover, mainly, Tiroda, Bhandara, Pimpalgaon, Adyal, Pauni, Sakoli, Jamkandri and Tumsar range. In the areas having softer Basalt, rapid decomposition taken 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 as 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 fare and does not seem influencing the vegetation.

1.3.2 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 No. - 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, Sitasaongi 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.

1.3.3 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 clayey-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 bardhi and khardi soils are very inferior types of sihar-morand and are used for the cultivation of inferior rice and minor millets.

1.4 CLIMATIC PARAMETERS:

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.

1.4.1 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°C. In the forest clad hills, more conditions are favorable to plant growth.

1.4.2 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. **(Appendix No.-II)**

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

Sr. No.	Rain-Gauge Stations	Annual Rainfall in mm	Average number of Rainy days in a year
1	Bhandara	1359.30	64
2	Mohadi	1121.16	61
3	Pauni	1289.84	64
4	Tumsar	1132.00	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.

Sr. No.	Rain Gauge Station	Year	Highest Rainfall in mm	Year	Lowest Rainfall in mm
1	Bhandara	2003	2195.50	2004	774.00
2	Mohadi	1999	1470.90	2004	754.90
3	Tumsar	1999	1602.40	2004	584.10
4	Sakoli	1999	1711.20	2004	1108.70
5	Lakhani	2007	1569.30	2004	671.80
6	Lakhandur	2000	2796.80	2004	1023.80
7	Pauni	2000	1807.60	2004	961.10

1.4.3 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.

1.4.4 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.

1.4.5 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.

CHAPTER 2
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MAINTENANCE/ INCREASE IN THE EXTENT OF FOREST AND TREE COVER

2.1 AREA OF FORESTS UNDER DIFFERENT LEGAL CLASSES (RF, PF, UF AND OTHERS):

The total Forest area of the division excluding FDCM, Navegaon, Nagzira, Koka and Umred Karandla extends over to 969.49 Sq. Km.

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 and newly Zudpi Jungle area declared as RF. compartments having nos. 28 to 356. Koda Mendki (39) and Devangatta (55) blocks comprising compartments 284 and 356 were disforested during 1943 and 1970 respectively.

Table No.2.1 Range wise Area Statement of Bhandara Division. (Area in Ha.)

Sr. No.	Range	RF	PF	Zudpi Jungle	Unclassed Forest	Total Area
1	2	3	6	7	8	9
1	Bhandara	4021.407	5266.377	0.280	0	9288.064
2	Tumsar	6284.100	2065.31	1034.065	0	9383.475
3	Jamkandri	9063.243	435.509	141.98	0	9640.732
4	Sakoli	5011.672	3762.787	467.200	0	9241.659
5	Pauni	9732.047	2316.643	184.690	0	12233.380
6	Adyal	3521.902	2778.148	1154.650	0	7454.700
7	Lakhani	1349.397	4643.957	790.580	0	6783.934
8	Nakadongri	6349.344	2554.785	376.79	0	9280.919
9	Lendezari	9212.494	306.793	59.89	0	9579.177
10	Lakhandur	7139.380	2263.517	289.280	0	9692.177
Grand Total		61684.986	26393.826	4499.405	0	92578.217

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 compartment 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 compartments 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 Wildlife 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 compartment 202 and 203 from Bhandara Division besides other compartment of Gondia division. These 2 compartments belong to block no. 34. In the year 2007, reorganization 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 compartments (8016.098 ha.) of Protected forests and 105 villages (3559.689 ha.) of Zudpi jungle were transferred to the Gondia division. In the same way 5 compartments (2009.078 ha.) of Reserved Forest, 21 compartments (2286.241 ha.) of Protected forests, and 885.13 ha. Of Zudpi 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.

Protected Forests: The Protected Forests measuring an area of 26393.826 ha. Which includes 191 compartments with area of 21615.125 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 26393.826 Ha remain with the Bhandara Division for Silvicultural Management.

Un-classed Forests and Zudpi Jungle: Zudpi Jungle extends over an area of 4499.405 Ha.

2.1.1 Administrative Units: For administrative convenience the ranges, rounds and beats were reorganized in Bhandara Dn. and the entire division has been divided into 10 ranges, 39 rounds and 162 beats. Range wise distribution of forests is given in **Appendix No.-XIII.**

2.1.2 Legal Position:

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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 The total ZudpiJungal5618.42 Ha is notified under Section 20 of Indian Forest Act 1927.

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.

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.

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.

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-F2dated 07.09.1977 and FLD-3570-68426-F2, dated 14.04.1978.

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.

4499.405Ha of Zudpi jungle owned by Revenue department was handed over to the Forest department, the proposal for notification sent to Commissioner, Nagpur, to convert these lands into Reserved Forest.

Table No. 2.2 Zudpi Jungle Range-wise distributions:

Range	No. of village	Total area (ha)
Bhandara	01	0.28
Adyal	24	1154.65
Pauni	11	184.69
Sakoli	15	467.2
Tumsar	54	1034.065
Jamkandri	10	141.98
Lakhani	34	790.58
Nakadongri	21	376.79
Lendezari	02	59.89
Lakhandur	10	289.280
Total	182	4499.405

2.1.3 Rights and Concessions:

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), Act2006” 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.

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 NistarPatrak and Wajib-ul-Arz for every village. The NistarPatrak deals exclusively with community and customs over private land.

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.

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.

2.2 FOREST AREA UNDER DIFFERENT WORKING CIRCLE

This working plan is prepared for an area of 92,578.217 Ha. Table no. 2.3 shows the Working Circle wise area. During executing the prescriptions of Working plan necessary care should be taken to exclude these areas. The information regarding Range wise compartments are given in **Appendix No.-XII-A**.

The Information, technology and Policy Wing of Forest Department carried out an exercise for estimating the blank area based on satellite imageries in the Bhandara forest Division. The information regarding Range, compartment wise area is given in **Appendix No.-XCII**. The ground truthing of these areas should be carried out by the field staff under the guidance of DCF. The detail regarding year wise ground truthing schedule is given in **Appendix No.-XCII**.

Area statement as per Dr. F. S. Jafry's plan comes to 92,779.157 Ha and during this plan period an area of 4,371.346 Ha was transferred to Wildlife wing.

69.10 Ha. Area was transferred to Gondia forest division, 4422.41 Ha area was received from Gondia forest Division. And final reconciliation of 182.904 Ha. Area was done. Therefore as per A to O form the net forest area of Bhandara forest division is 92578.217 Ha.

In the Standing Consultative Committee meeting held on 18/03/2019, the Preliminary Working Plan Report (PWPR) of Bhandara Forest Division was approved for an extension of ten years and the extension plan shall be submitted as per National Working Plan Code 2014. With these instructions, the present plan was prepared. So, this plan includes a total area of 92,578.217 Ha. which is allotted to different Working Circles.

Table No.2.2.1 Distribution of Forest Areas in Various Working Circles(Area inHa) (2009-10 to 2018-19)

Working Circle	Reserved Forests	Protected Forests	Unclassed Forests	Zudpi Jungle	Total Area	% of area under different WC	Area handed over to Wildlife during the previous Plan period
SCI WC	20120.80	5622.05	0.00	0.00	25742.85	27.74	946.55
IWC	20652.35	3431.11	0.00	0.00	24083.45	25.95	1931.86
AWC	4101.57	11740.59	476.00	10022.10	26339.86	28.39	428.32
F & P WC	976.87	5300.60	0.00	0.00	6277.577	6.77	114.20
P & CAM WC	8861.63	1473.79	0.00	0.00	10335.42	11.14	951.53
Total Area	54713.20	27568.10	476.00	10022.10	92779.157	100.00	4372.47
Overlapping Working Circles							
Wildlife(OL) WC					Entire Area		
Bamboo (OL) WC					22626.22		
Old Teak Plantation (OL) WC					5272.70		
NTFP (OL) WC					Entire Area		

Table No.2.3 Distribution of Forest Areas in Various Working Circles(Area in Ha) (2020-21 to 2029-30)

Working Circle	Reserved Forests	Protected Forests	Unclassed Forests	Zudpi Jungle	Total Area	% of area under different WC	Area handed over to Wildlife during the previous Plan period
SCI WC	20622.69	5059.394	0.00	0.00	25682.084	27.74	945.288
IWC	21661.477	3250.576	0.00	0.00	24912.053	26.91	1931.917
AWC	9676.533	11753.412	0.00	4499.405	25929.35	28.01	428.324
F & P WC	862.705	5363.064	0.00	0.00	6225.769	6.72	114.206
P & CAM WC	8861.581	967.38	0.00	0.00	9828.961	10.62	951.611
Total Area	61684.986	26393.826	0.00	4499.405	92578.217	100.00	4371.346
Overlapping Working Circles							
Wildlife(OL) WC					Entire Area		
Bamboo (OL) WC					20670.316		
Old Teak Plantation (OL) WC					5018.90		
NTFP (OL) WC					Entire Area		

2.3 PERCENTAGE OF FOREST WITH SECURED BOUNDARIES

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State of Boundary: 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 adjoins the other areas.

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 Zudpi 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.

2.4 LAND USE, LAND USE CHANGE AND FORESTRY (LULUCF)

The total geographical area of the district is 3588 Sq.km. The condition of the forest s and forest cover over the last decade during the implementation of the plan based on the FSI satellite data is as follows.

Table 2.4 Forest cover over the last decade during the implementation of the Plan

ISFR Year	Geographical area (Sq. Km)	VDF	MDF	OF	Total	%of GA	Scrub
2011	3588	130	544	215	889	24.78	21
2015	3588	129	536	219	884	24.64	21
2017	3588	171	567	268	1006	24.61	16
2019	3588	171.86	563.13	264.93	998.92	24.44	18.57

2.4.1 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 No.—XIV**). Thus total area disforested in Reserved Forest is 2857.963 ha and total area disforested in Protected Forest is 19585.715 ha. (**Appendix NO. -XVIII**).

2.4.2 Area Diverted for Non-forestry, Purposes under Forest Conservation act 1980: Forest areas as given in Table 2.5 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 2492.25 ha. under 44 projects. In lieu of this 4454.82 ha Zudpi Jungle has been made available to the division from project authorities and revenue department. Out of 4454.82 ha land, surplus land shall be made available for Compensatory Afforestation against the projects other than Bhandara district (**Appendix – XXIV**).

Table 2.5 Projects of Bhandara District

No. of Forest Projects	land under various projects	Compensatory lands for various projects	Remarks		
	projects (Ha)	Zudpi Jungle	NFL	Total	
44	2492.255	7173.983	2448.1	9622.083	10 proposal in principle approved by GoI

2.4.3 The status of implementation of Forest Rights Act, 2006 in Bhandara Forest Division.

The status of Implementation of FRA 2006 in Bhandara Forest Division (up to July, 2019) is given in table 2.6. Therecognition of forest rights to the traditional forest dwellers has further fragmented the area of the Division. The details are given in **Appendix No.-LXIII-A**

Table 2.6 Status of Implementation of FRA 2006 in Bhandara Forest Division

Sr. No.	Type of Claim	No. of Cases	Area (in H)
1	Individual Rights	2850	1303.72
2	Community Rights	110	4325.82
	Total	2960	5629.54

As per FRA 2006, section 6 (4), 6(5) and 6(6), the decision of District Level Committee on the record of forest rights shall be final and binding. Accordingly, the district level committee has finalized the individual and community forest rights. As per section 3(1) and 3(2) of FRA, 2006; total 2850 cases of individual right claims were finalized for area 1303.72 hectares as well as total 110 cases of community right claims were finalized for area 4325.82 ha.

Individual Rights under Section 3 (1), the claims have been given for the following:

- a) Such as right to hold and live in the forest land.
- b) Community rights such as nistar, by whatever name called, including those used in erstwhile Princely State, Zamindari or such intermediary regimes.
- c) Right of ownership, access to collect, use, and dispose of minor forest produce.
- d) Other community rights of uses or entitle 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 including community tenures of habitat and habitation for primitive tribal groups and preagricultural community.
- f) Rights in or over dispute lands under any nomenclature in any State where claims are disputed
- g) Right for conversion of Pattas or lease or grants issued by any local authority or any State Governments on Forest lands to titles
- h) Rights of settlement and conversion of all forest village, old habitation, unsurveyed villages and other villages in forest, whether recorded, notified or not into revenue villages.

i) Right to protect, regenerate or conserve or manage any community forest resource.

j) Rights which are recognised under any State law or laws of any Autonomous District Council or Autonomous Regional Council.

k) Right of access to biodiversity and community right to intellectual property and traditional knowledge related to biodiversity and cultural diversity.

l) Right to in situ rehabilitation

Under section 3(2), the claims have been given for the following facilities:

a) Schools

b) Dispensary or hospital

c) Anganwadis

d) Fair price shops

e) Electric and telecommunication lines

f) Tanks and other minor water bodies

g) Drinking water supply and water pipelines

h) Water or rain water harvesting structures

i) Minor irrigation canals

j) Non- conventional source of energy

k) Skill up- gradation or vocational training centers

l) Roads and

m) Community centers.

The database of IFR and CFR should be updated as per the guidelines issued by Government of Maharashtra on 1st August 2019 (**Appendix No. XCV**)

2.5 THREATS TO THE FOREST

The main threat to the maintenance of forest cover/area in the Division is encroachment. The forest area is prone to encroachment as the consolidation of boundary is not done yet. Hence consolidation of boundary has been given highest priority and specially for Zudpi Jungle. The threat to the Zudpi Jungle area is also from the fact that at times each survey number being small and scattered rendering the whole area prone to all forms of human interference and exploitation.

2.6 DISTRIBUTION OF DIFFERENT FOREST TYPES

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

Table No.2.6 Forest types found in the Bhandara Division:

Type	Notation	Type Description
Sub-group	5 A	Southern Tropical Dry Deciduous Forests.
I. Climax types	5A/C1	Dry Teak bearing forests
	5A/C ₃	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)

2.7 TREE COVER OUTSIDE FOREST AREA

The Tree Outside Forests (TOF) / Plantation for State of Maharashtra, according to the India State of Forest Report 2017, is 9,831 sq. km. This area adds 3.19% to the tree cover of the State. However, no specific figure for the Bhandara District is available. **Trees Outside Forests planted under Social Forestry Bhandara Division during the period 2009-10 to 2018-19**

A) Block Plantation	
Total Beneficiaries	1689
Total Area in ha.	628.7
B) Road - Side Plantation	
Total Sites	211
Total Length in Km.	459.14

As per the assessment made by Social Forestry Division, Bhandara, on an average of 62.87 Ha Block Plantation and 46 km of road side plantation shall be carried out annually for the extension of forestry outside the forest.

2.8 SHIFTING CULTIVATION (JHUMMING)

Shifting cultivation is not practiced in this Forest Division

2.9 LAND BANK FOR COMPENSATORY AFFORESTATION

A committee for identification of land bank for CA was constituted as per para 2.7 of Ministry's guideline. Based on this the committee had identified an area of 4499.405 Ha for Compensatory Afforestation. This area is allotted in Afforestation Working Circle for plantation activities.

Table No.2.7 Range wise land suitable to carry out Compensatory Afforestation

Sr.No.	Range	Zudpi Jungle
1	Bhandara	0.28
2	Tumsar	1034.065
3	Jamkandri	141.98
4	Sakoli	467.2
5	Pauni	184.69
6	Adyal	1154.65
7	Lakhani	790.58
8	Nakhadongri	376.79
9	Lendezari	59.89
10	Lakhandur	289.280
Total		4499.405

MAINTENANCE, CONSERVATION AND ENHANCEMENT OF BIODIVERSITY

3.1 FOREST COMPOSITION AND DISTRIBUTION

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.

3.1.1 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.

3.1.2 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*, *Xylocarpus*,
Boswellia serrata, *Chloroxylon swietenia*, *Madhuca longifolia*,

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Lanneacoromandelica, *Terminalia bellerica*, *Schleichera oleosa*, *Adina cordifolia*, *Albizia odoratissima*, *Mitragyna parvifolia*, *Bombax ceiba*, *Sterculia urens*, *Manilkara hexandra*, (in comp. 307 and 308 of Pauni range), *Soymida febrifuga*.

II. *Cleistanthes collinus*, *Buchanania lanzan*, *Butea monosperma*, *Grewia tiliaefolia*, *Acacia catechu*, *Cochlospermum religiosum*, *Cassia fistula*, *Bauhinia racemosa*, *Casuarina tomentosa*, *Gardenia latifolia*, *Ixora arborea*, *Kydia calycina*.

IIa. *Dendrocalamus strictus*.

III. *Holarrhenapubescens*, *Nyctanthes arbor-tristis*, *Maytenus emarginata*, *Gardenia resinifera*, *Woodfordia fruticosa*, *Wrightia tinctoria*, *Helicteres isora*, *Indigofera tinctoria*, *Gardenia turgida*, *Dodonaea viscosa*, *Vitex negundo*.

IVa. *Cassia tora*, *Tephrosia hamiltonii*, *Parthenium hysterophorus*.

IVb. *Heteropogon contortus*, *Themeda quadrivalvis*, *Iseilema laxum*, *Eragrostis tenella*, *Imperata cylindrica*, *Vetiveria zizanioides*, *Setaria nervosa*, *Apluda mutica*.

V. *Oxalis scandens*, *Mimosa hamata*, *Zizyphus oenoplia*, *Calyptocarpus floribunda*, *Bauhinia vahlii*, *Butea superba*, *Cryptolepis buehneri*, *Abrus precatorius*.

Parasite: *Loranthus longiflorus*.

3.1.3 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*, *Lanneacoromandelica*, *Buchanania lanzan*, *Soymida febrifuga*, *Zizyphus* spp., *Gardenia* spp., *Butea monosperma*, *Chloroxylon swietenia*.

III. *Holarrhena pubescens*, *Nyctanthes arbor-tristis*, *Dodonaea viscosa*.

IVa. *Cassia tora*, *Tephrosia hamiltonii*.

IVb. *Heteropogon contortus*, *Eragrostis tenella*, *Apludamutica*.
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V. *Mimosa hamata*, *Zizyphus oenoplia*.

3.1.4 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. *Helecteresisora*, *Ficus hispida*, *Vitex negundo*.

IVa. *Parthenium hysterophorus*.

IVb. Very little grass.

V. Very few climbers.

3.2 PLANT SPECIES DIVERSITY

The floral diversity of the Division is given in the page xiii to xxi of Introduction. The list consists of 76 trees, 26 shrubs, 26 herbs, 20 bamboo and grass 19 climbers and 3 parasites and saprophytes. The list is evidently not exhaustive and inadequate for the purpose of identifying the expanse of species diversity of the plant kingdom existing in the Division. It is therefore necessary that the Division carries out a detailed Biodiversity study, which will include both the Flora and the Fauna. In dealing with the flora, it is proposed to have detailed study of the tree spp, the shrubs and herbs species with their frequency, total basal cover, dominance and IVI. The study should also include, among others, documentation of the species that are found in the forests including lichens, algae fungi, assessment of the sensitive/ Rare-Endangered-Threatened species/ IUCN Red List Species, assessment of the traditional and lesser known NTFPs including Medicinal and Aromatic Plants, identification of unique and specific vegetation that might be present in an area, etc.

3.3 STATUS OF BIODIVERSITY CONSERVATION IN FORESTS

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The forests of Bhandara division belong to miscellaneous forest and few compact forest blocks of Tumsar, Jamkandri, Lendezari and Sakoli ranges are rich in Biodiversity and these areas are overlapping with the Nagzira Wildlife Sanctuary and the Navegaon National Park. As a part of in-situ conservation these Wildlife Sanctuary and National Park were set up.

In the recent years the awareness regarding conservation of flora and fauna among the local community and in people residing in the forest has helped in a large extend in protecting the forest of this area. These communities have a vast knowledge about local flora and fauna which is very important for biodiversity conservation. The Forest Department with the help of local communities have set up Biodiversity Management Committees (BMC) in order record the indigenous knowledge systems existing among the local community to have access sharing benefits for the active conservation efforts made by the forest dependent communities.

3.4 STATUS OF SPECIES PRONE TO OVER EXPLOITATION

The status of species prone to over exploitation in the Bhandara forest area needs to be studied with the help of scientific organisation like ICFRE, IIFM, Bhopal and TFRI, Jabalpur etc. However, from the information derived through discussion in the field with the forest officers and field staffs few species like Mahua for flowers, Kulu, Dhaoda and Saja for gums are over exploited from the forest area.

3.5 CONSERVATION OF GENETIC RESOURCES

The genetic resource of the forests is an invaluable asset that needs to be studied in detail. The documentation of the flora and the fauna of the Division should be taken at the earliest with the help of experts in the field. The Research Wing of the Department needs to identify areas of high biodiversity in collaboration with the Territorial Wing and to carry out research and documentation of the species available.

- i. There is no identified Medicinal Plant Conservation Area in the Bhandara Forest Division.
- ii. Preservation plots where valuable species are found, where local bio-climate has brought about different crop composition and any area of

3.6 FAUNA AND THEIR HABITATS

The habitat for wildlife shows a wide variation in the forest. The wild animals are unevenly distributed though out the forest of Bhandara. 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, Lendezari 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 population density varies with the availability of habitat conditions like food, water and shelter. Representative Central Indian fauna is found in the division and the category wise list of the animals usually found is as shown below:

Carnivores:(i) Tiger (*Pantheratigris*) (ii) Panther (*Pantherapardus*) (iii) Wolf (*Canislupus*). (iii) Striped Hyena (*Hyaenahyaena*) (iv) Wild dog (*Cuonalpinus*) (v) Jackal (*Canisaureus*) (vi) Indian Fox (*Vulpesbengalensis*) (viii) Leopard Cat (*Felisbengalensis*) (ix) Jungle Cat (*Felischaus*) (x) Common Mongoose (*Herpestresedwardsi*).

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.

Herbivores (i) Gava (*Bibosgaurus*) (ii) Nilgai (*Boselaphustragocamelus*) (iii) Sambhar (*Cervusunicolor*) (iv) Cheetal (*Axisaxis*) (v) Barking Deer (*Muntiacusmuntjak*) (vi) Wild boar (*Susscrofa*) (vii) Sloth bear (*Melursus ursinus*) (viii) Four horned antelope (*Tetracerosquadricornis*) (ix) Common Langurs (*Presbytisentellus*), (x) Rhesus Macaque (*Macacamulatta*), (xi) Bonnet Macaque (*Macacaradita*).

Rodents:(i) Three striped palm squirrel (*Funambuluspalmarun*) (ii) Jungle striped squirrel (*Funambulussublineatus*) (iii) Porcupine (*Hystrixindica*) (iv) Hare (*Lepus ruficaudatus*) and (v) Jungle Rats and Moles.

Snakes: Kadu (*Typhlopsbraminus*), Kawda (*Lycodonauilicus*), Gavtya snake (*Macropisthodnplumbicolor*), Dhondya (*Natrixpiscator*), Dhaman or Common Rat-snake (*Ptyasmucosus*), Indian Rock Python-Ajgar (*Pythonmolurus.*), India Cobra or Nag (*Najanaja*), Dandekas (*Bugaruscaerulues*), Russel's Viper or Ghunus (*Viperarusselli*). Checkered keel back (*Xenochrophis piscator*)

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 (*Labeofimbriatus*), Waghur (*Clariasbatrachus*), Bodth (*Bagriusbagarius*) and Tambu (*Anquillabengalensis*). Prawn rearing mainly of *Macro-brachiummalcolmsonii*, 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 (*Catlacatla*), Mrigal (*Cirrhinamrigala*), Botri (*Channapurctatus*), Dookkarmachhi (*Nsndusnandus*), Bam (*Mastocembluspencalus*).

Birds: (i) Painted sand grouse (*Pteroclesindicus*) (ii) Common sand grouse (*Pteroclesexustus*) (iii) Pea fowl (*Pavocristatus*) (iv) Grey jungle fowl (*Gallus sonneratil*) (v) Red junglefowl (*Gallus gallus*) (vi) Red spur fowl (*Gallus spadicea*) (vii) Painted partridges (*Francolinuspictus*) (viii) Grey partridges (*Francolinuspondicerianus*) (ix) Jungle bush quail (*Perdiculaasiatica*) (x) Black breasted quail (*Cturnixcoronandelicus*) (xi) Indian Bustard quill (*Turnixsuscitator*) (xii) Common or grey quail (*Coturnix*), (xiii) Pigeon (*Treronphoonicoptera*) (xiv) Crane (*Grusantigone*) (xv) Dove (*Streptopotiaspps*) (xvi) Cotton teal (*Nettapuscoromandelianus*) (xvii) Whistling teal (*Dendrocugnajavanica*) (xviii) Comb duck (*Sarkidiornismelanotus*). (xxix) Little Grebe (*Podicepsruficollis*) (xxx) Cormorant (*Phalacrocoraxcarbo*) (xxxii) Grey Heron (*Ardeacinera*) (xxxiii) Large Egret (*Ardeaalba*) (xxxiv) Black ibis (*Pseudibispapillos*) (xxxv) Pariah Kite (*Milvusmigrunsgovinda*) (xxxvi) Shikra (*Accipiterbadiues*) (xxxvii) India Whitebacked Vulture (*Typs bengalensis*). (xxxviii) Parakeets (xxxix) Moorhen (*Gallinulachloropus*), (xL) yellow Legged Green pigeon (*Ternophoenicoptera*).

3.7 THREATS AND CHALLENGES TO WILDLIFE

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 choking 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.

Disease: The livestock from the villages enter inside the forests regularly and frequently share space and resources. Water borne (contagious diseases) disease 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 (Haemorrhagic Septicaemia) (4) Canine distemper. FMD has a potential to wipe out large populations, while rinderpest, anthrax and Rabies are highly infectious and lead to certain death.

Sharing the forest areas with disease-affected domestic animals often compromises health of the herbivore population. Outbreaks of contagious diseases like Foot and Mouth Disease drastically reduce the herbivore population.

Fire and habitat damage: 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, which live on ground and cannot, escape the fire and its heat. In case if they survive their food, grasses, herbs and shrubs are destroyed this 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.

3.8 PROTECTION AND MANAGEMENT OF FAUNA

For the protection and management of the wildlife of the Division, a series of steps are taken and proposed to be taken based on the threats as identified in the plan. Since the forest area is adjoining to National Park and Wildlife Sanctuary interaction and coordination with the Wildlife wing is essential.

3.8.1 History of the Wild Life Management.

Hunting in the Reserved Forests was regulated according to the hunting licenses issued for specific shooting blocks. The Zamindars used to regulate hunting in the ex-proprietary forests prior to the abolition of their rights, which was followed by the shooting block system and the licenses similar to the Reserved Forests. Presently, the law does not permit sport hunting of wild animals. The wildlife is threatened by habitat damaged caused by factors like increasing human and cattle population, encroachment for cultivation, poaching facilitated by the improved road network and efficient weapons. Poaching problem has attained a menacing proportion as evident from large seizures all over the country. Greater attention to the wildlife management, however, is a heartening trend. The wildlife and the territorial divisions at Bhandara are coordinating their efforts including the eco-development programmes to ensure success of their protection measures.

A number of cattle kill by wild carnivores is reported in the division. Such cattle kills and occasional injuries to the villagers are promptly attended, and the loss is compensated in accordance with the prevailing policies.

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 tribal's 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.

Prior to the abolition of the proprietary rights, hunting in the malgajari forests was done with the permission of the malgajars. 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.

However, after the enactment of the Wildlife (Protection) Act, 1972 and subsequent amendments in this act particularly those in 1991 and 2002, no permission for hunting of wild animals, as game or sport, can be granted. 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 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.

3.8.2 Legal Position

The first step towards the protection of wildlife was taken by including certain provisions, in this regard, in the Berar Forest Act of 1886. Under Section (3) sub section 7, the definition of forest produce incorporated the 'skins, tusks, bones and horns' and as per Section 10, sub section 4, 'The residency by orders may regulate any part of the State Forests for hunting, shooting, fishing, poisoning water and setting up traps or snares.'

The Berar Forest Act, 1886 amended in 1891 provided under section 7(b) that Forest Produce includes the following when found in or brought from a forest:

"Wild animals, skins, tusks, horns, bones, silk cocoons, honey and wax and all other parts or produce of animal." Section 7 (2)(b) of this act after this amendment provided that anyone who hunts, shoots, fishes, poisons water or sets traps or snares, shall be punishable with the fine which may extend up to fifty rupees or, when the damage resulting from the offence amounts to more than twenty five rupees, to double the amount of such damage. Section 10(4)(iii) of this act empowered the resident to frame the rules regarding regulation of hunting, shooting, fishing, poisoning water and setting traps and snares.

Vide Notification G.L.F.D. No. 2197-1-B, dated 13th October 1911, the Indian Forest Act, 1878 was also made applicable. The section 2(b)(iii) included wildlife in its definition of the forest produce. Section 25 (i) provided that any person in contravention of any rules, which the local Government may from time to time prescribe, kills or catches elephants, hunts or shoots fishes, poisons water or sets traps or snares shall be punishable with imprisonment for a term which may extend to six months or with fine not exceeding five hundred rupees or with both in addition to compensation for damage done to the forests.

After the promulgation of the Indian Forest Act 1927, rules relating to wildlife regulations were framed under section 26(I) and 76(d). These were essentially to regulate hunting of wild animals. Wild Birds and Animal Protection Act 1912 as amended in 1935 also ensured protection to certain animals and a check on hunting of others. Shooting block system of hunting was started from 1927. Under the provisions of the two acts, the Conservator of Forests in consultation with the DCF concerned used to declare areas having abundant game as open to hunting. The DCF accordingly used to issue shooting permits, wherein the type of game and their number allowed to be hunted together with other relevant conditions were used to be mentioned.

The Bombay Wild Animals and Wild Birds Protection Act, 1951 was extended to Vidarbha region from 1.6.1961. Though this act did not propose a significant change in the management of game in the Reserved and the Protected Forests, yet it incorporated following significant provisions:

- i. Its provisions were also applicable outside the Reserve and the Protected Forests.
- ii. Arms license holders for sports were to register themselves with the Wildlife Preservation Officer.
- iii. This Act prescribed a closed season for hunting and classified game into four categories, viz. Small game, big game, special big game, and pet animals.
- iv. It also sought to control transaction in trophies and other wildlife products.
- v. Wildlife Advisory Board was constituted under this act to advise the government on various important matters concerning wildlife.

3.8.3 Developments after 1972

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At the national level, the Indian Board for wildlife was constituted in 1952. Its main object was to devise ways and means for conservation of wildlife through co-ordinated legislative and practical measures and sponsoring setting up of National Parks and Wildlife Sanctuaries. A comprehensive and unified National and State Park Act, 1971 was passed which provided for appointment of an Advisory Committee to advise in regard to the constitution and declaration of National Parks and Sanctuaries and formulation of policy for their administration and management. The Parliament then enacted the Wildlife (Protection) Act, 1972, which came into force in the State of Maharashtra with effect from 1st June 1973. With this, other acts relating to any matter contained in this Act and in force in the State stood repealed. This act as amended from time to time as well as the various regulations made under this act and guidelines issued by the central and the state govt. provide for establishment of a network of national parks and sanctuaries representing various habitats and for giving protection to all type of wildlife in the state. These provisions also address issues relating to the management of wildlife outside the protected areas. Following rules have so far been enacted under the relevant sections of this act.

- i. The Wildlife (Stock Declaration) Rules, 1973 (came to effect in Maharashtra from 1.6.1973)
- ii. The Wildlife (Transactions and Taxidermy) Rules, 1973 (came to effect in Maharashtra from 16.1973).
- iii. Wildlife (Protection) (Maharashtra) Rules, 1975 (came to effect from 6.3.1975).
- iv. The Wildlife (Protection) Rules and Licensing (Additional matters for consideration) Rules, 1983 (came to effect from 13.4.1983).
- v. Wildlife (Protection) Rules, 1995
- vi. Wildlife (Specified Plants-Condition for Possession by License) Rules, 1995
- vii. Recognition of Zoos Rules, 1992.
- viii. Declaration of Wildlife Stock Rules, 2003.

Besides the above specific legal framework available for wildlife management, provisions contained in Indian Forest Act, 1927, Forest Conservation Act, 1980 and The Environment (Protection) Act, 1986 may go a long way in protecting and

conserving the biodiversity of this division. Clearance under the Environment Protection Act, 1986 from environmental angle is required from the govt. of India for any project (other than those relating to improvement of forests and particularly the projects relating to industrial activities damaging the environment of these Protected Areas) including an industry located within 10 km from these PAs.

3.8.4 Management of Wildlife:

Wildlife and its management in Bhandara Forest division have been discussed in detailed in the part II of Volume I of this Working Plan, under Wildlife (Overlapping) Working Circle. The detail prescription for Special objectives of management for development and conservation of wildlife and its habitat, recommendations for future management, habitat development works, water hole development, protection measures for wildlife, other protection measures and eco-development, awareness generation and eco-tourism etc. has been discussed in detail.

MAINTENANCE AND ENHANCEMENT OF FOREST HEALTH AND VITALITY

4.1 STATUS OF 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 4.1. 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. 4.1 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
Lakhani	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
Lendezari	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

4.2 AREA AFFECTED BY 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.



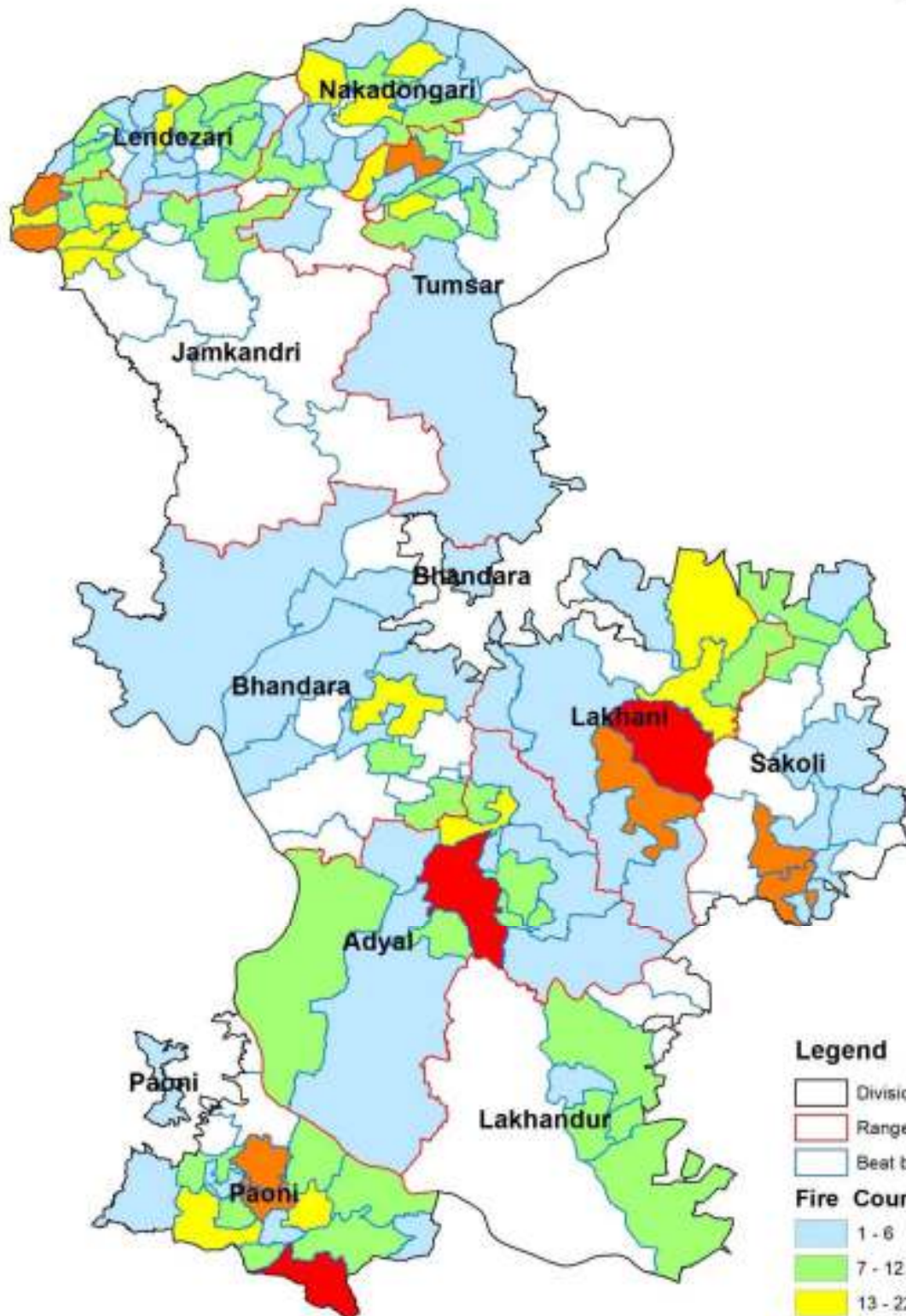
Bamboo clumps and ground flora devastated due to forest fire



Bamboo clumps and ground flora devastated due to forest fire.

Fire also indirectly causes soil erosion by destroying the soil cover as well as the organic matter.

Forest Fire (2010-2018)



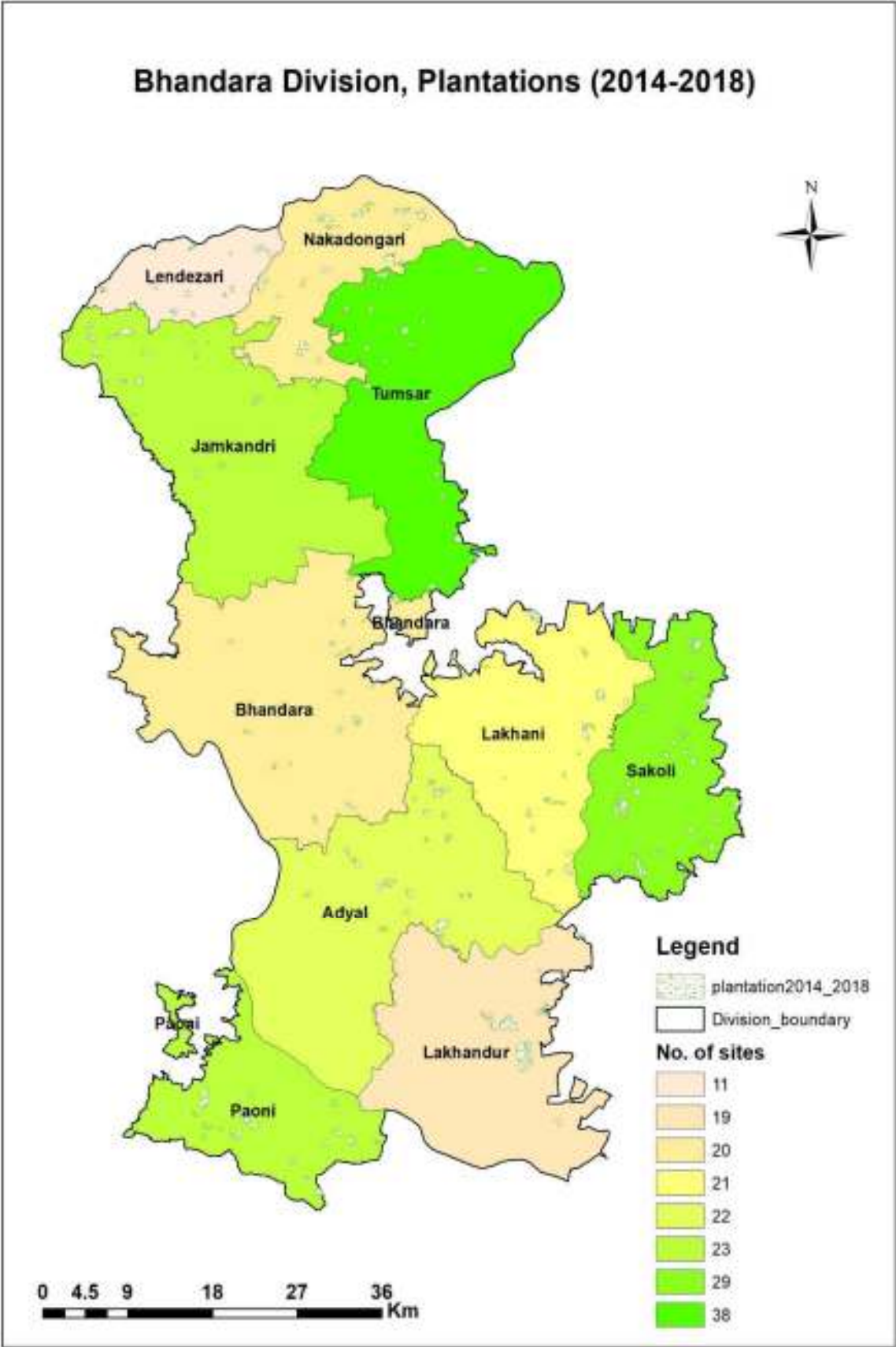
0 2.5 5 10 15 20 Miles

Legend

- Division boundary
- Range boundary
- Beat boundary

Fire Count

- 1 - 6
- 7 - 12
- 13 - 22
- 23 - 33
- 34 - 65



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In Bhandara Division, 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.

4.3 AREA DAMAGED BY NATURAL CALAMITIES

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.

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.

4.4 AREA PROTECTED FROM GRAZING

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.

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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.

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.

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.

4.5 LOPPING PRACTICES

Lopping practices are not much practiced in the Bhandara Forest Division. *Hardwickiabinata* is the most sought-after species for fodder in the peak summer season and is often lopped to a certain extent.

4.6 AREA INFESTED BY INVASIVE WEED SPECIES IN FORESTS

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

4.6.2 By Climbers and Obnoxious Weeds: The common climbers in the division are Eruni (*Zizyphusoenoplia*), Chilhati (*Mimosa hamata*), Palasbel (*Buteasuperba*), and Kukutranji (*Calycopterisfloribunda*). 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 (*Partheniumhysterophorus*), has also started invading the forest areas.

4.7 INCIDENCE OF PEST AND DISEASES

4.7.1 By Insects and Fungi: Teak trees are attacked by defoliator (*Hyblaeapuera*) and skeletonizer (*Hapaliamachaeralis*) 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.

4.8 FOREST DEGRADATION AND ITS DRIVERS

These forests are liable to, the following, injuries.

4.8.1 By Man: The damage by man can be classified into, the following categories.

(i) 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, Lendezari, 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 faraway 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 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 head loaders are more severe than the illicit cutting of big trees by the timber smuggler, as the head loaders carry away several future trees in one headload thus inflicting a very serious blow to the future crop.



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.4.2 Hypersensitive, Sensitive and Normal Beats for Illicit Felling.
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Sr. No.	Range	Hypersensitive Beats	Sensitive Beats	Normal Beats	Total
1	Adyal	0	0	13	13
2	Bhandara	0	6	11	17
3	Jamkandri	0	4	14	18
4	Pauni	0	3	12	15
5	Sakoli	0	1	15	16
6	Lendezari	1	6	13	20
7	Tumsar	0	3	16	19
8	Nakadongri	0	0	16	16
9	Lakhandur	0	0	15	15
10	Lakhani	2	3	8	13
Total		3	26	133	162

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.

(ii) 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 No.-LXVIII.**) The encroachment on forest land prior to April 1978 is given below:

Table No. 4.3 Number of Encroachments and Area Encroached:
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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	313.33
97-98	385	312.328	16	13.344	401	326.672	3	4.15	398	322.52
98-99	398	322.522	19	13.76	417	336.282	7	2.09	410	334.19
99-00	410	334.192	1	0.34.	411	334.532	12	0.84	399	333.69
2000-01	399	333.692	288	114.296	687	447.988	19	11.28	668	436.71
2001-02	668	436.707	134	23.853	802	460.56	50	10.47	752	450.09
2002-03	752	450.086	100	47.551	852	497.637	28	22.8	824	474.84
2003-04	824	474.839	33	0.837	857	475.676	94	49.15	763	426.53
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	432.62
2006-07	766	432.622	3	0.808	769	433.43	2	0.16	767	433.27

Table No. 4.4 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	Jamkandri	66	48.3	0
3	Pauni	72	44.2	0
4	Tiroda	36	10.617	0
5	Tumsar	175	173.07	0
6	Bhandara	32	32.31	0
7	Pimpalgaon	0	0	0
8	Sakoli	4	2.61	2.1
	Total	396	322.665	4.15

(iii) 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.
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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.

(iv) 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. **PDF Compressor Free Version** Tendu trees are felled to or heavily lopped to collect Tendu leaves.



Damaged Tendu tree.



Damaged Kullu tree

4.8.2 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.

4.8.3 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.

4.8.4 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

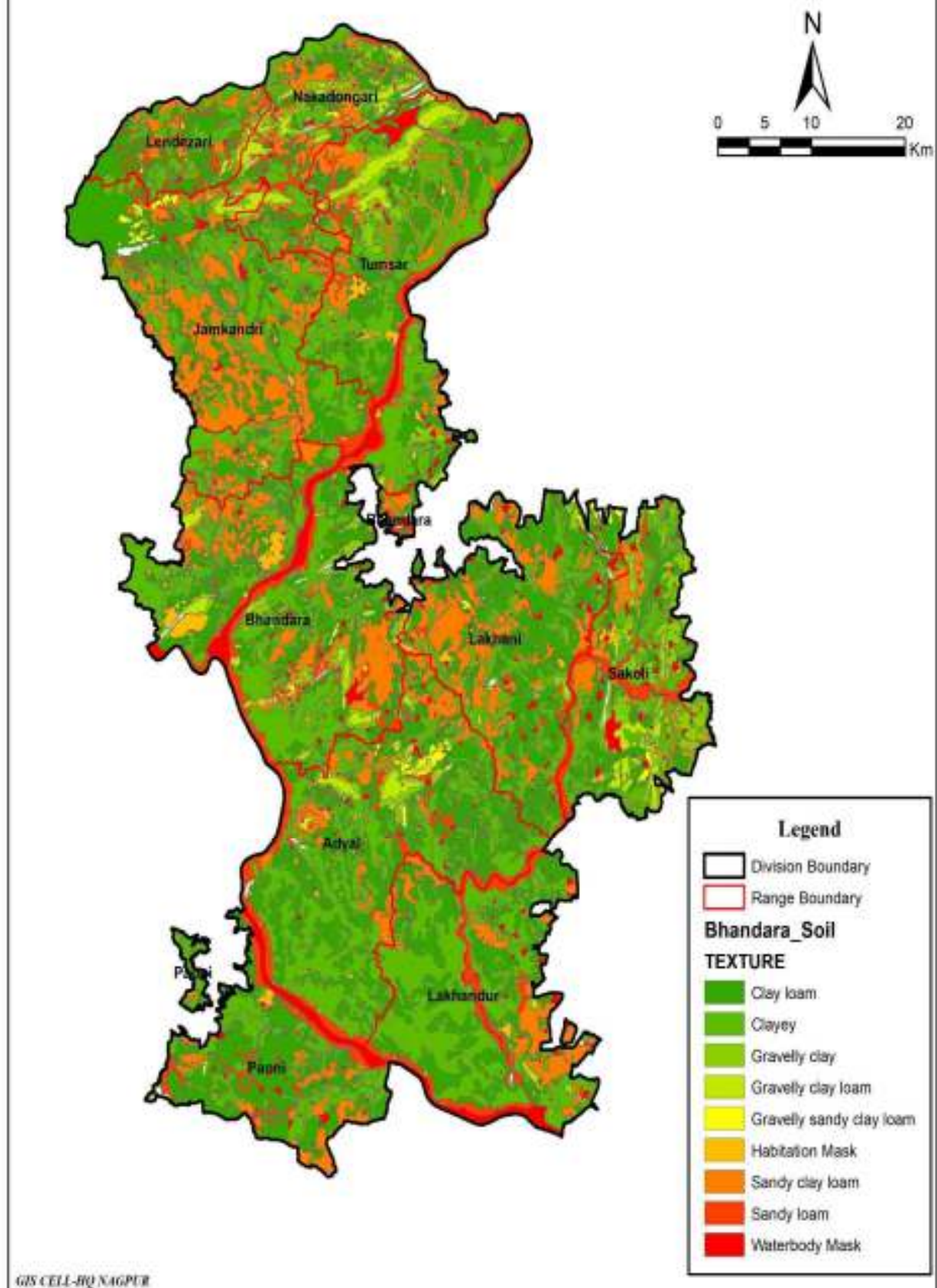
and water holding capacity of the soil.

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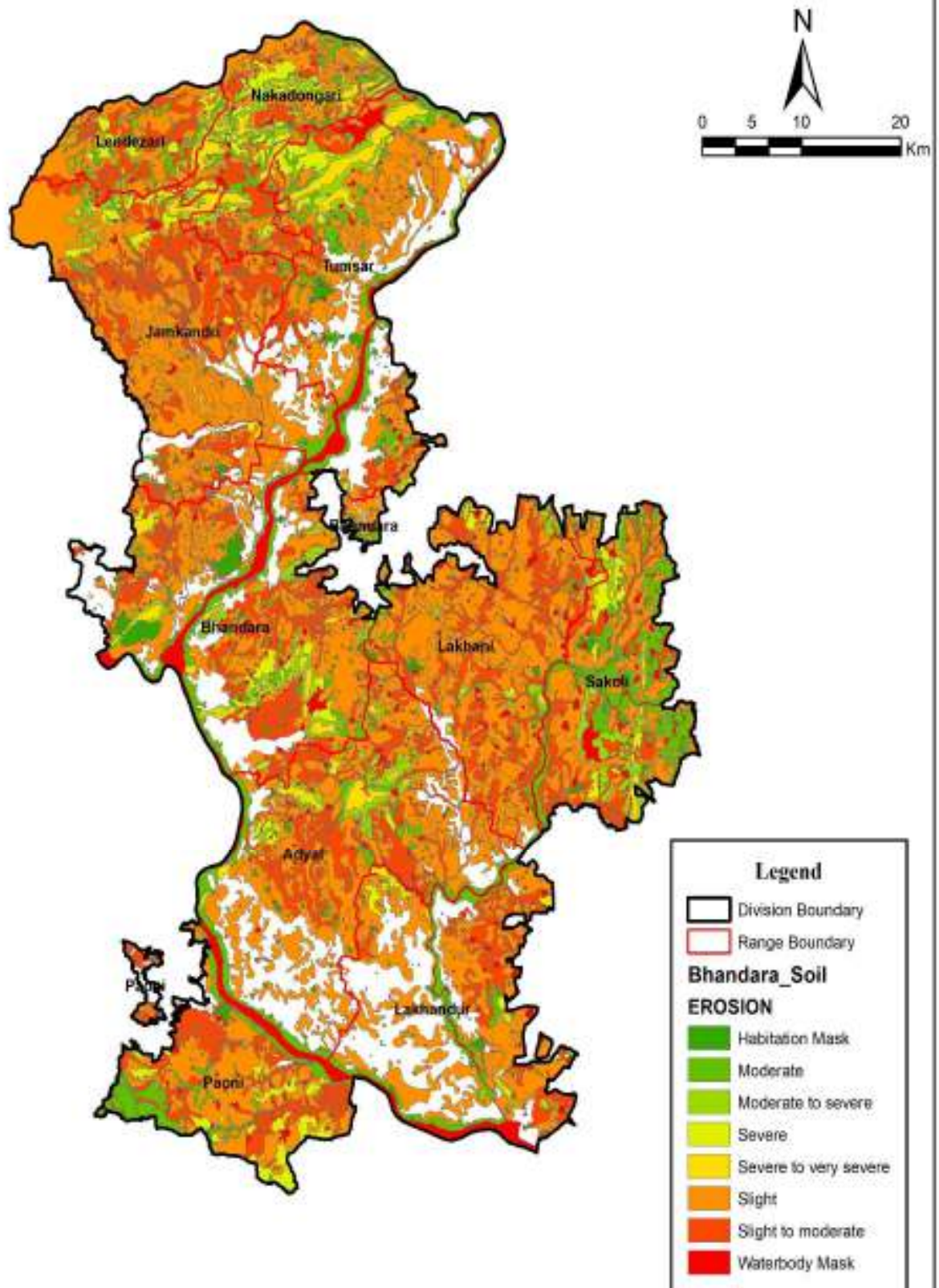
Sheet erosion in plains and gully erosion on slopes is moderate in most of the areas of the forest. But it is increasing at an alarming rate in forest all over the division. The erosion has increased due to excess harvesting of coupes without soil conservation works in the subsequent year of felling, 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.

4.9 POLLUTION CONTROL AND PROTECTION OF ENVIRONMENT: Bhandarais a developing District devoid of major industries. The level of protection is negligible except for a small portion in the area adjoining to mining. The BhandaraForest Division should take all cautions against all pollution & disturbance to the forest areas.

Bhandara Division Soil Texture Map



Bhandara Division Soil Erosion Map



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CONSERVATION AND MAINTENANCE OF SOIL AND WATER RESOURCE

5.1 AREA TREATED UNDER SOIL AND WATER CONSERVATION MEASURES

The exact area treated under soil conservation cannot be assessed as no special work for soil conservation alone is carried out but SMC works form part of the plantations works. In the Division, plantations are taken up every year and can safely be presumed that this area is treated for soil conservation. However, in the last two years, in view of the Jalayukta Shivar project, large areas are being treated specifically for soil and water conservation.

5.2 DURATION OF WATER FLOW IN THE SELECTED SEASONAL STREAMS

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 major and medium irrigation 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.

5.3 WET LANDS IN FOREST AREAS

The status of the wetlands has not been studied by the Division and there is a need for the ecological study and avi-faunal documentation of the areas. It may be mentioned that some of the areas are known to be good habitat of birds which may even qualify for Important Bird Area status. The Division may engage field experts to document and study the habitat and the biodiversity of the wetlands to develop base year data for future monitoring and necessary improvements.

5.4 WATER LEVEL IN THE WELLS IN THE VICINITY (UPTO5KM) OF FOREST AREA

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. There is

a need to collect the data for the whole 5 km radius from the forest vicinity and to monitor the rise and fall of the levels over the seasons and the years

5.5 STATUS OF AQUIFERS

Regarding the status of aquifers, an abstract from the document “Report on the Dynamic Ground Water Resources of Maharashtra 2011-12” brought out by GSDA, Pune & CGWB, Central Region Nagpur is produced below:

An overwhelming population of rural Maharashtra and to some extent urban populations is dependent on groundwater for drinking purposes. It has been observed that prior to the year 1972 the use of groundwater was relatively insignificant in the State. Subsequently due to frequent occurrence of droughts, limitations of the availability of surface water, development of low-cost drilling devices, easy availability of institutional finance, and energization etc. led to proliferation of irrigation wells.

Groundwater is a natural resource with both ecological and economic value and is of vital importance for sustaining life, health and integrity of ecosystems. This resource is increasingly threatened by over-extraction which has insidious long-term effects. Scarcity and misuse of groundwater pose a serious threat to sustainable development and livelihood.

It is a well-known fact that the large number of irrigation borewells/tubewells are the main source of irrigation across the State and a sustentative number of these are not even on record for electricity connections. If actual draft from those borewells/tubewells had been accounted for then the balance position would have certainly emerged as alarming.

Groundwater is one amongst the State’s most important natural resources. It provides drinking water to rural as well as urban community, supports irrigation & industry, sustains the flow of streams & rivers and maintains wetland ecosystem. There is significant freshwater deficit in many areas of the State. Human health, welfare and food security are at risk unless the groundwater resources are managed more effectively and efficiently by the community. It is very much obvious that over extraction of ground water over years without any compensatory replenishment is affecting large tracts of land adversely. The non-replenishment of the shallow aquifers and depletion of the deeper aquifers on account of unregulated sinking of deep borewells/tubewells, almost amounting to “water-mining” unmindful of the adverse ecological effects is one of the contributory causes for recurring droughts. Concerted action, therefore, is needed to reverse the present trend of periodic occurrence of droughts.

It would also be necessary to plan and control the use of groundwater under the prevailing conditions. Publication and distribution of annual reports and related programmes for creating awareness amongst the community and for educating them will have to be undertaken regularly. This will enable avoiding scarcity, as well as the hectic activity and excessive expenditure that has become characteristic of summer months.

Unlike the land resource, groundwater is a dynamic resource. The groundwater flow cannot be measured like the flow through canals or pipe lines. The groundwater flows downward and spreads according to natural gradient and the permeability of the formations. Therefore, management of groundwater in facts, involves management of a dynamic, immeasurable and uncontrollable entity. While managing the groundwater resource, it is necessary to consider it to be a common property resource and is required to be controlled appropriately with the assistance of the community. Concepts like Village level Watershed Water Account, Village level Water Safety and Security, Basin/Sub-basin Water Auditing, Aquifer delineation and its management etc will have to be popularized and made a basis for equitable distribution of ground water.

5.5.1 Groundwater Recharge

Compared to 2008-09 there is decrease in annual groundwater recharge. This is predominantly due to decrease in recharge due to water conservation structures. During the field visit it was observed that the water conservation structures are not being de-silted annually throughout the State. This has directly reflected in reduction of recharge due to water conservation structures. Thus, there is dire need to carry out the de-silting of water conservation structures in programme or movement mode.

Table 5.1 Assessment of Dynamic Ground Water Resources of The Maharashtra Administrative Unit-Wise Categorization 2011-12

Sr. No.	Administrative Unit	Stage of Ground Water Development %	Pre-Monsoon		Post Monsoon		Category
			Water level and Trend	Is there a significant decline	Water level and Trend	Is there a significant decline	
1	Bhandara	20.28	-5.07	No	-5.16	No	Safe
2	Lakhandur	27.63	-0.98	No	-12.9	No	Safe
3	Lakhani	30.82	-3.00	No	1.6	No	Safe
4	Mohadi	37.93	-2.86	No	-0.39	No	Safe
5	Pauni	55.4	-10.45	No	-7.78	No	Safe
6	Sakoli	24.76	-2.27	No	-0.6	No	Safe
7	Tumsar	37.18	-0.67	No	1.62	No	Safe

5.5.2 Effect of Rainfall on Groundwater Availability

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The rainfall is the primary source for the yearly replenishable groundwater in the State and has a direct impact on groundwater recharge. The variability of rainfall is also reflected into the groundwater availability. The rainfall deficit and recharge to groundwater are in inverse proportion.

5.5.3: Ground Water Resources

As per the Ground Water Information Bhandara District of the CGWB Report of 2013, Central Ground Water Board and Groundwater Survey and Development Agency (GSDA) have jointly estimated the ground water resources of Bhandara district based on GEC-97 methodology as on 2009. Taluka wise ground water resources are shown below:

Table No. 5.2: Taluka wise Ground Water Resources of Bhandara District (March 2009)

Taluka	Area Type	Net Annual Ground Water Availability (ham/yr)	Existing Gross Ground water Draft for Irrigation (ham/yr)	Existing Gross Ground Water Draft for Domestic & Industrial water Supply (ham/yr)	Existing Gross Ground Water Draft for All uses (ham/yr)	Allocation for domestic & industrial requirement supply up to next 25 years (ham/yr)	Net Ground Water Availability for future irrigation development (ham/yr)	Stage of Ground Water Development (%)
1	2	3	4	5	6	7	8	9
Bhandara	Command	4349.54	356.28	328.29	684.57	-	-	-
	Non-Command	4880.97	1046.73	140.86	1187.59	-	-	-
	Total	9230.51	1403.01	469.15	1872.16	932.61	6924.31	20.28
Lakhandur	Command	4232.5	112.96	27.74	140.7	-	-	-
	Non-Command	3985.46	1917.67	212.58	2130.25	-	-	-
	Total	8217.96	2030.63	240.32	2270.95	540.16	5666.28	27.63
Lakhani	Command	1501.45	100.67	42.9	143.57			
	Non-Command	4084.55	1451.6	126.48	1578.08			
	Total	5586.00	1552.27	169.38	1721.65	327.42	3664.22	30.82
Mohadi	Command	3271.18	926.59	259.63	1186.22	-	-	-
	Non-Command	2369.74	812.53	140.97	953.50	-	-	-
	Total	5640.92	1739.12	400.6	2139.72	752.37	3010.61	37.93
Pauni	Command	271.00	40.84	123.12	163.96	-	-	-
	Non-Command	7397.44	3859.18	225.19	4084.37	-	-	-
	Total	7668.44	3900.02	348.31	4248.33	647.41	3111.57	55.4
Sakoli	Command	2202.33	246.04	180.75	426.79			
	Non-Command	4742.63	1192.56	100.23	1292.79			
	Total	6944.96	1438.6	280.98	1719.58	569.37	4975.35	24.76
Tumsar	Command	4303.58	1286.24	212.09	1498.33			
	Non-Command	3816.94	1325.37	195.5	1520.87			
	Total	8120.52	2611.61	407.59	3019.2	858.35	4757.03	37.18

5.5.4: Water Conservation and Artificial Recharge

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The artificial recharge structures feasible are check dams, gully plugs, percolation tanks, nalla bunds, etc. Existing dugwells can also be used for artificial recharge, however, the source water should be properly filtered before being put in the wells. The most feasible artificial recharge structure suitable for Alluvial areas restricted along the banks of Rivers and its tributaries, are shallow recharge wells on the river bed of the tributaries. Percolation tanks are also suitable, wherever source water availability is there.

The sites for artificial recharge structures need to be located where the hydrogeological conditions are favourable, i.e., where sufficient thickness of de-saturated/unsaturated aquifer exists and water levels are more than 5 m deep.

5.5.5: Recommendations

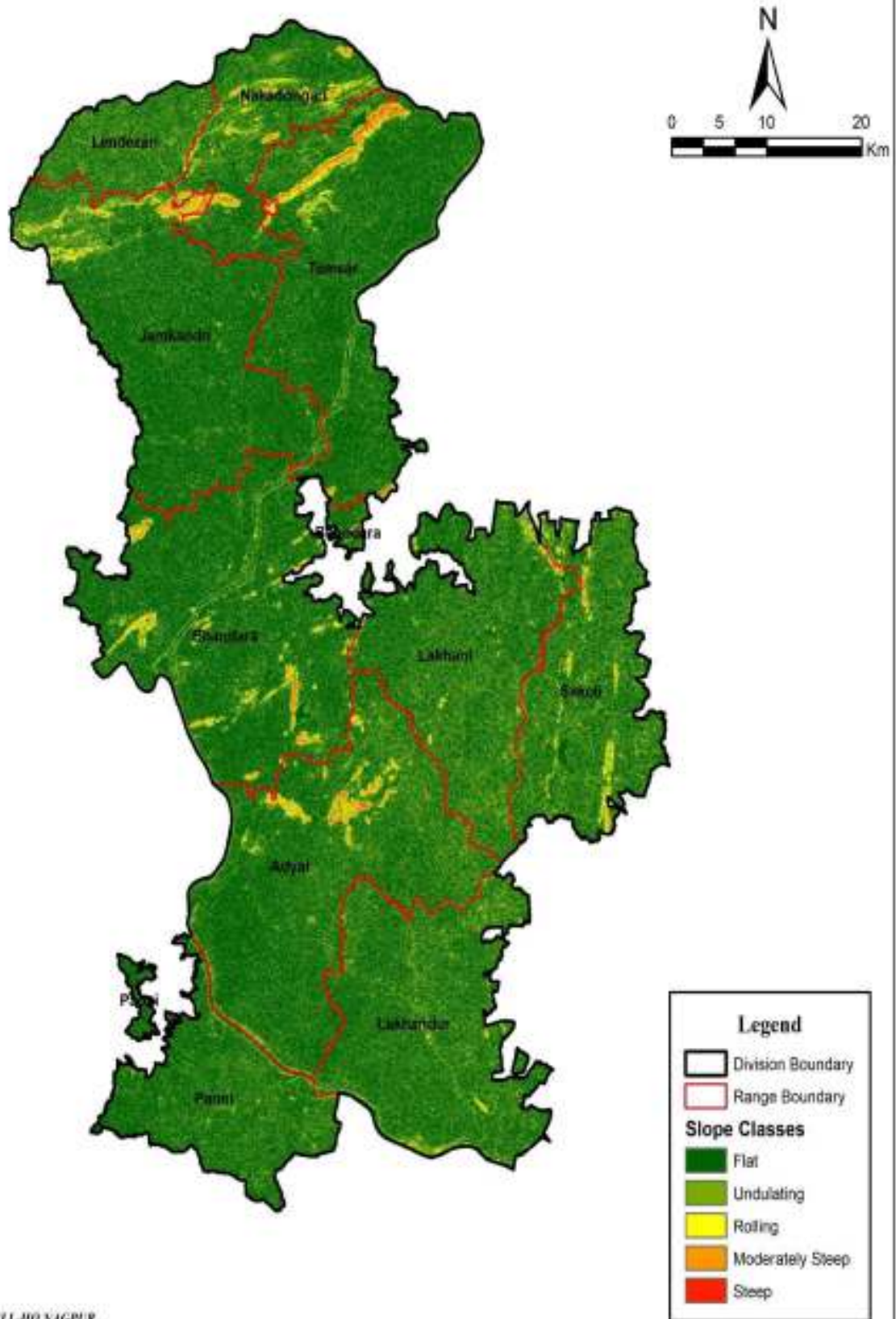
1. The major part of the district dugwells are the most feasible structures for ground water development. The sites for borewells need to be selected only after proper scientific investigation.
2. Borewells generally tap deeper fractures and inter flow zones, which may not be sustainable. Besides, the borewells should only be used for drinking water supply and not for irrigation.
3. Ground water quality is adversely affected by nitrate contamination in 57% of the samples collected in May 2011. Thus all the wells used for water supply should be first analysed for nitrate contents and if the nitrate content is found beyond permissible limit the ground water may be used for other purposes than drinking. Adequate sanitary protection to the wells may be provided to control the nitrate contamination.
4. The overall stage of ground water development for the district is very meagre percent, thus a lot of scope for further development exists.
5. The scope exists for construction of suitable artificial recharge structures in the district. The structures recommended in the northern part are: contour bunds, gully plugs, nala bunds and check dams. For other areas, the nala bunds, check dams and KT weirs are suggested. The existing dugwells may also be used for artificial recharge of ground water provided source water is free of silt and dissolved impurities.

6. The most feasible artificial recharge structure suitable for Alluvial areas restricted along the banks of River and its tributaries, are shallow recharge wells on the river bed of the tributaries. Percolation tanks are also suitable, wherever source water availability is there.
7. The existing village ponds need to be rejuvenated to act both as water conservation and artificial recharge structures.

Conclusion:

Aquifers are an important resource for the District and the forests in particular which need to be recharged and enhanced. The papers/reports from which extract is reproduced above, reveals that Bhandaraaquifers are still safe and not overexploited. Yet given the recommendations above, the DCF shall make all efforts to implement them for the betterment of the water regime in the forest areas and the District as well.

Bhandara Division Slope Map



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CHAPTER 6
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MAINTENANCE AND ENHANCEMENT OF FORST RESOURCE
PRODUCTIVITY

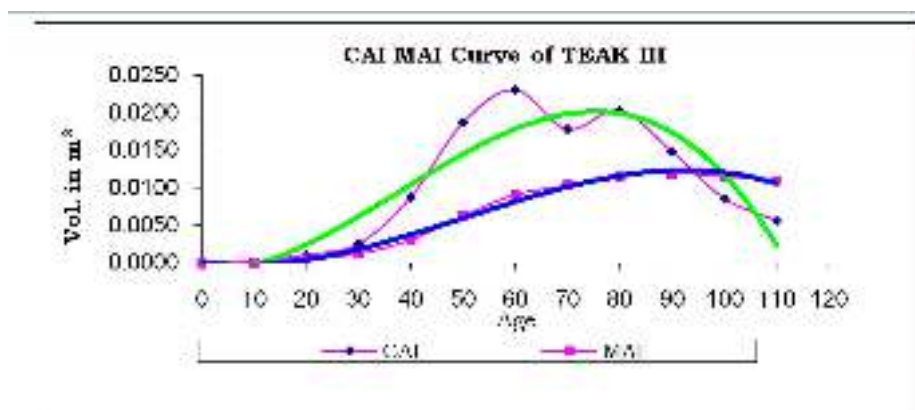
6.1 GROWING STOCK OF WOOD

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.

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 6.1.

Table No. 6.1 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.

6.2 GROWING STOCK OF BAMBOO

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.

The abstract of range wise bamboo area distribution is shown in the following table.

Table No. 6.2 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
Lakhani	4	854.588	53	130	183
Lendezari	8	3607.767	540	190	730
Nakadongri	13	5644.354	916.9	607	1523.9
Pauni	05	2345.024	200.3	0	200.3
Sakoli	3	1279.937	180	50	230
Tumsar	10	3832.065	651.2	330	981.2
Lakhandur	01	523.66	100.00	0	100.00
Total	50	20670.316	4551.27	1307	4551.27

6.3 INCREMENT IN VOLUME OF IDENTIFIED TIMBER SPECIES

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

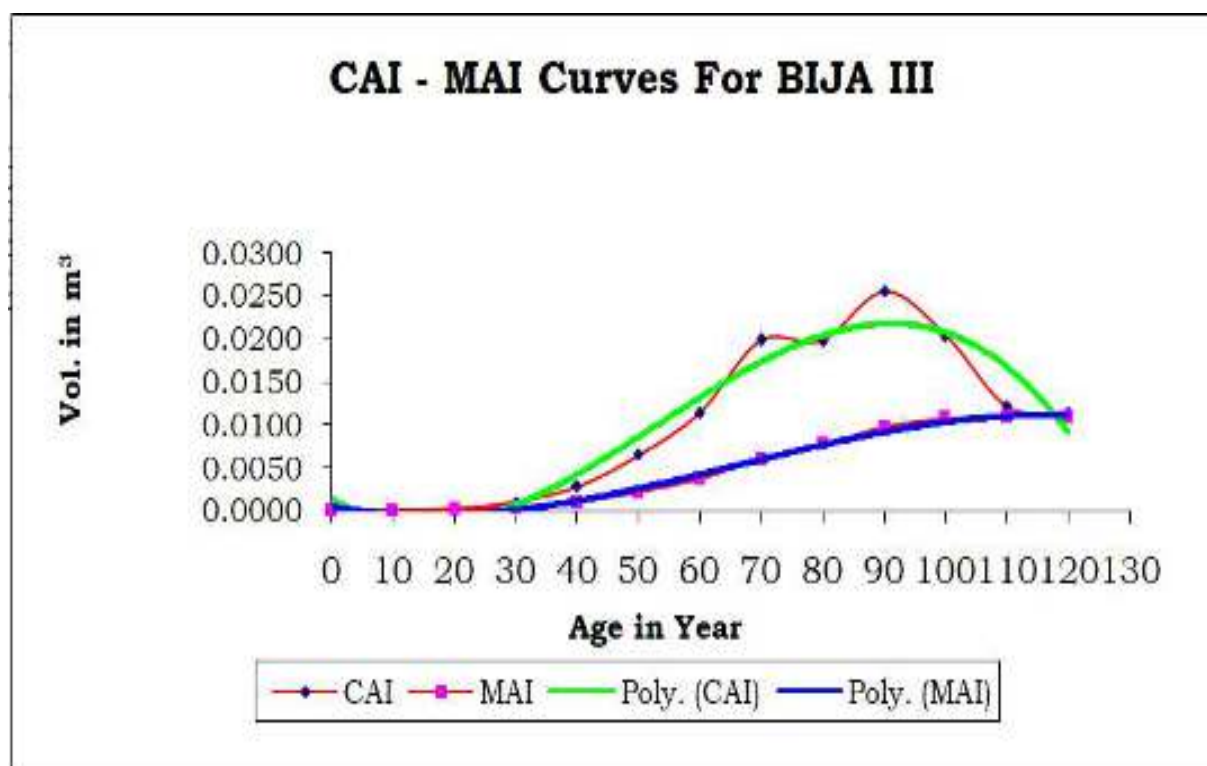
6.3.1 Results of Stem Analysis for Bija Site Quality III.

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Table No. 6.3 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.

6.3.2 Stem analysis of Bija for Site quality IV

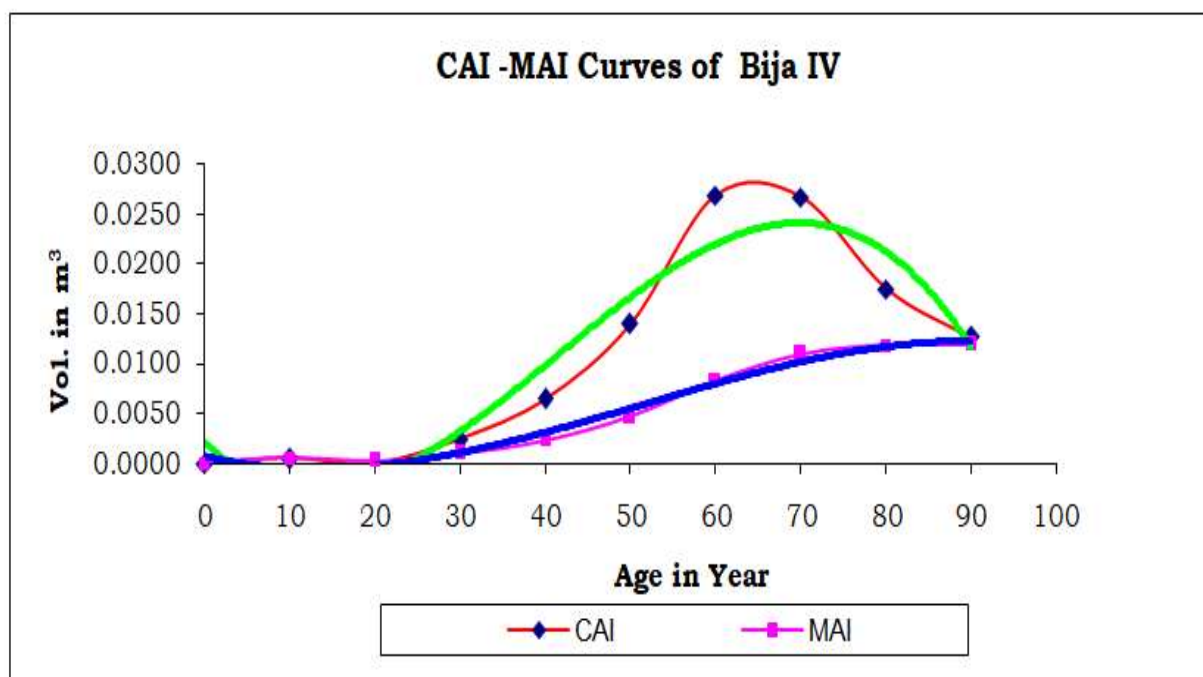
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Table No. 6.4 Results of Stem Analysis for Bija Site Quality IV

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 120 cm.

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



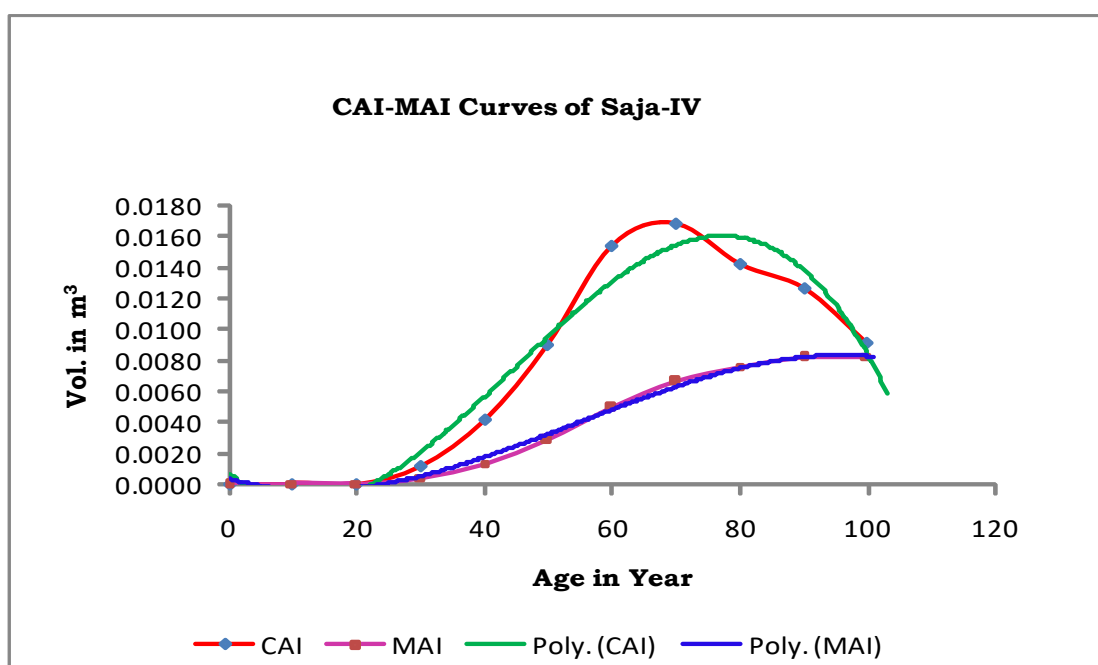
6.3.3 Stem analysis of Saja (Ain) for Site Quality IV

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Table No. 6.5 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.

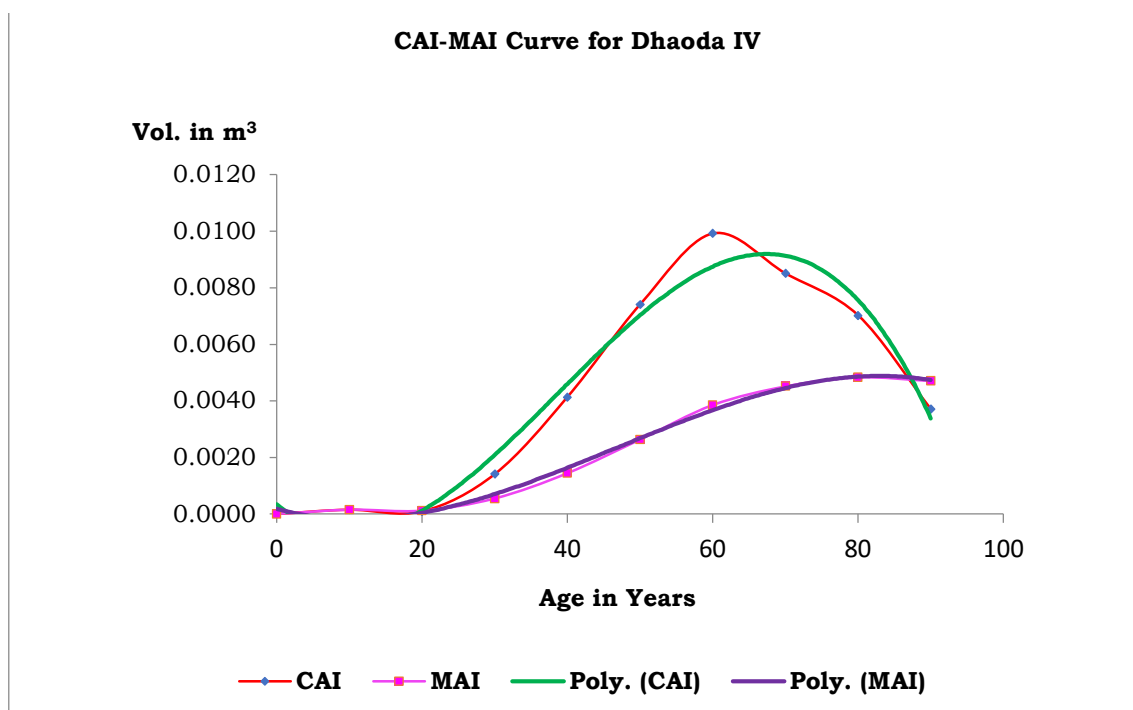
6.3.4 Stem Analysis of Dhaoda for Site quality IV

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Table No. 6.6 Results of Stem Analysis for Dhaoda Site Quality IV

Compartment No. 312 RF of and Pauni 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
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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 & DHOADA, SLICE OF TEAK



SLICE OF TEAK



COUNTING OF RINGS - TEAK

COUNTING OF RINGS - SAJA

6.3.5 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. 6.7 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*

6.3.6 Local Volume Tables:

(i) 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 6.8

Table No.6.8 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
Over 150	158	1.1036	1.214	0.8829

(ii) 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.6. 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

6.3.7 Enumeration:

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- 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 No. – XXX.

6.3.8 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. 6.10: 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. 6.11: All India Teak Site Quality IV.
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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 6.12.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 -

- Teak plantations on an average are of quality III.
- 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:

- Growth of Bija:** Results of stem analysis of Bija by Patil and Sardar are reproduced below:-

Table No. 6.13 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	0.00183	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	0.00642	0.0148
70	17.7	35.2	110.6	0.00854	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 North Khandwa (M.P.) written by Patil and Sardar, Kartar Singh and Nigam respectively, are reproduced in Table No.8.14

Table No. 6.14 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. 6.15 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 .6.16 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. 6.17 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.*

6.3.9 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 has been carried out and data is given in **Appendix No. – LIV.**

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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 cannot be seen on the hard copies, about the division.

6.3.10 Annual Yield: The annual out turn of Forest Produce is given in the

Appendix No. - LXXIV and Appendix No. LXXV. Based on the past workings, the Form Factors will be prescribed for calculating the yield.

6.4 EFFORTS TOWARDS ENHANCEMENT OF FOREST PRODUCTIVITY THROUGH QUALITY PLANTATION ACTIVITIES

During the period of the Plan there has been no special occasion where quality plantation activities other than the usual plantation carried out year on year. Plantations using the latest technology in terms of high-tech nurseries for raising quality planting material, drip irrigation, chain-linked fencing etc. could be tried for specific need-driven plantations in Bhandara forest division.

6.5 CARBON STOCK

Forests play an important role in combating climate change. In addition, it has the potential to provide ecosystem services, such as carbon storage. The Bhandara Forest holds an average of 115.36 tonnes/ Ha carbon. This is explained in detail in chapter 12.1.3 of part I.

6.6 CARBON SEQUESTRATION AND MITIGATION

This plan proposed a separate working circle for Afforestation. The area under Afforestation Working Circle will be treated/regenerated under natural

regeneration. This will add to the forest cover of the District and contribute significantly to the carbon sequestration of the forest & forest plantation. Natural regeneration will add Biomass & carbon in form of the vegetation due to protection. As the Plan prescribes for the controlled opening of the canopy under SCI Working Circle, the growth of young crops because of this opening will boost the Carbon sequestration from the atmosphere as young crop sequester more carbon.

OPTIMIZATION OF FOREST RESOURCE UTILIZATION

7.1 RECORDED REMOVAL OF TIMBER

During the plan period from 2009-10 to 2018-19 the division has harvested coupe annually as per prescriptions mention in the plan. The following table shows the actual yield of timber, firewood, poles and bamboo.

Table 7.1 Working Circle wise estimated and actual yield.

Working Circle	Total area of the coupe in Ha.	Area Felled in Ha.	Expected Yield		Actual Yield			
			Timber (Cum.)	Fire Wood Stacks (2x1.2x1 M.)	Timber (Cum.)	Poles (Cum.)	Fuel Wood (Cum.)	Actual Timber Production Per ha.
SCI	11543.377	4060.467	3344.00	1115	8180.881	0.00	41940.80	0.708
IWC	10923.21	1443.113	3128.00	1048	1931.576	0.00	16236.40	0.176
AWC	8179.908	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P&CAM WC	10335.424	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F&P WC	6277.468	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bamboo (OL) WC	5161.974	1382.00	13 Lakh	0.00	1203251 (LB)	13748 (BB)	0.00	0.00
Old Teak Plantation (OL) WC	5272.70	0.00	25.3	0.00	0.00	0.00	0.00	0.00
Total		6885.58	6497.3 cum.	2163	10112.46 cum.	13748 (BB)	5817.2	0.00
			13 Lakh Bamboo		1203251 (LB)			

(LB: Long Bamboo; BB: Bamboo bundles)

7.2 RECORDED REMOVAL OF FUEL WOOD: The details Working Circle wise is given in table 7.1.

7.3 RECORDED REMOVAL OF BAMBOO: The details Working Circle wise is given in table 7.1.

7.4. RECORDED REMOVAL OF LOCALLY IMPORTANT NTFPS INCLUDING MAP

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

7.4.2 Tendu Leaves: Tendu leave 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 were 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 laborers who deliver the leaves at various collection centers 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).

7.4.3 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.

7.5 DEMAND AND SUPPLY OF TIMBER AND IMPORTANT NON-TIMBER FOREST PRODUCE

7.5.1 Agricultural Customs and Needs of the Population:

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 7.2 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

- (i) 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. 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.

- (ii) 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.
- (iii) 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.
- (iv) 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 Zudpi jungles, in charge of the forest department, forms 23.77% of the total geographic area of the district.
- (v) 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 Bamboos* have been excluded from the purview of this Act and still remains the property of the state Govt.

- (vi) 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.
- (vii) 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 in habitat 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)
- (viii) 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.
- (ix) 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.

7.5.2 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 No. - 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.

7.6 IMPORT AND EXPORT OF WOOD AND WOOD PRODUCTS

There is no record of the import and export of wood and wood products into or from Bhandara. The produce that is produced from Bhandara is generally locally consumed.

7.7 IMPORT AND EXPORT OF NTFPS

Nothing on record is available on the import and export of any of the non-timber forests produce from the District of Bhandara. This is perhaps because the production of NTFPs in the district is not properly channelized.

7.8 REMOVAL OF FODDER

7.8.1 Cost of harvesting

All the coupe operations ranging from coupe marking to the transport of forest produce are carried out at the rates fixed by the Wage Board for each year. While fixing the wage rates for harvesting operations, wages sanctioned by the Government of Maharashtra and cost of living allowance (*Rahnimanbhatta*) are also taken into consideration.

Grass: Grass from grass birs, closed coupes and a plantation is available on cutting basis. As per the existing Govt. orders annual lease of grass birs for removal of grass on cutting basis, is first offered to Gram Panchayats, Co-operative Milk Societies and other Public Bodies at a price fixed by the Forest Department, considering current market trend and availability of grass. The lease of those areas which could not be disposed off in this way is sold by auction. The grass from the areas which remain unsold by any of the above methods is sold on rated passes. In drought years grass from grass birs is kept reserved under the orders of the Collector and is cut and supplied to the drought affected areas.

Lately it has been found that most of the grass birs remain unsold. In the sold areas very little grass is removed. Most of the time the influential people of the village purchase the grass birs and allow grazing in those areas by taking money from the cattle owners. Due to excessive cattle pressure the site conditions of grass birs have been deteriorated severely; and hence are not in position to meet the

demand of the entire division as well as to fulfill objective of producing quality grass in their present shape.

7.9 VALUATION OF THE PRODUCTS

As mentioned earlier, the main Non wood Forest products that the Division produces are tendu, gum and fodder. There is a need to streamline the extraction and auction of the products.

**MAINTENANCE AND ENHANCEMENT OF SOCIAL, ECONOMIC,
CULTURAL AND SPIRITUAL BENEFITS**

8.1 NUMBER OF JFM COMMITTEES AND AREA(S) PROTECTED BY THEM

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.8.1 Range wise Area Distribution under JFM Committees:

Sr. No	Range	No of villages adjoining to forests	No of JFM committee formed	Area Handed over to committee (in Ha)	No. of villages to be dealt with
1	Nakadongri	31	28	2642.153	03
2	Adyal	51	32	3442.037	19
3	Bhandara	60	2	250.000	58
4	Jamkandri	16	16	1497.949	0
5	Pauni	56	37	3806.259	19
6	Lakhandur	24	20	1467.455	04
7	Sakoli	33	20	1725.687	13
8	Lakhani	72	16	2718.101	56
9	Tumsar	32	32	2426.967	0
10	Lendezari	11	7	2637.663	4
Total		386	210	22614.271	176

8.2: STATUS OF EMPOWERMENT OF JFMCS

State's JFM is guided by the Govt. of Maharashtra Resolution dated 16th March 1992, 5th October 2011 and 10th July 2012. The number of villages adjoining to forests is 386 and Out of 386 villages 210 villages are covered under JFMC. The total number of members in the Committee are minimum 12 and a maximum of 24 and one-third of the members are to be from the Gram Panchayat. 50% of the

members should be women and 2 members should be from SC/ST and OBC. The performance of the Committee in the Division has been adequate. The Forest Development Agency is well established and its working is satisfactory. Efforts to make the functioning and transaction of funds more and more transparent are going on in the FDA.

8.3 LABOUR WELFARE

The JFM villagers have priority over others in all the activities of the Department for semi-skilled and unskilled labour. Works of plantations, natural regenerations, boundary pillars repairs, fire line cuttings and all other works of the Department are involved through the JFM members wherever Committee exists.

Maharashtra also has the unique distinction of having Forest Labour Cooperative Societies in every Division. All skilled works related to felling of trees in the forests are auctioned to these societies.

8.4 USE OF INDIGENOUS KNOWLEDGE

The Department has made its effort in documenting the indigenous technical knowledge of the people in and around the forest. The Territorial wing may arrange for a special drive for documenting the information and it may be added up to this working plan.

8.5 EXTENT OF CULTURAL/SACRED GROVES

There are no sacred groves in the District.

8.6 ECOTOURISM AREAS AND ACTIVITIES

The Division have identified important and potential area to be developed for eco-tourism in the District. These site area at 3 locations spread in 3 ranges. There is a need to develop these sites and to document the ecological, cultural, religious significance of each of the area and to formulate a plan by which these sites could become places for forestry extension in the future.

8.7 SOCIAL CUSTOMS

Social customs relevant to the forest or its conservation are not noticed or known to the Department

8.8 STATUS OF COMPLIANCE OF FOREST RIGHT ACT (FRA)

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The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 was passed by the Parliament of India and the assent to this Act was received from the President of India on 29th December, 2006. The said Act was notified in the Gazette of India on 2nd January, 2007. For implementation of the said Act, the Central Government notified the Rules for Recognition of Forest Rights on 1st January, 2008. These Rules were further amended by the Central Government vide notification dated 6th September, 2012.

8.8.1 Salient Provisions of the Forest Rights Act, 2006:

- (I) Section 3 (1): The following rights which secure individual or community tenure or both, shall be the forest rights under the Act. They are:
- (a) Right to hold and live in the forest land under the individual or common occupation for habitation or for self-cultivation for livelihood by a member or members of a forest dwelling Scheduled Tribe or other traditional forest dwellers;
 - (b) Community rights such as *nistar*, by whatever name called, including those used in erstwhile Princely States, Zamindari or such intermediary regimes;
 - (c) Right of ownership, access to collect, use, and dispose of minor forest produce which has been traditionally collected within or outside village boundaries;
 - (d) Other community rights of uses or entitlements such as fish and other products of water bodies, grazing and traditional seasonal resource access of nomadic or pastoralist communities;
 - (e) Rights including community tenures of habitat and habitation for primitive tribal groups and pre-agricultural communities;
 - (f) Rights in or over disputed lands under any nomenclature in any State where claims are disputed;
 - (g) Rights for conversion of *Pattas* or leases or grants issued by any local authority or any State Government on forest lands to titles;
 - (h) Rights of settlement and conversion of all forest villages, old habitation, unsurveyed villages and other villages in forests, whether recorded, notified or not into revenue villages;

- (i) Right to protect, regenerate or conserve or manage any community forest resource which they have been traditionally protecting and conserving for sustainable use;
 - (j) Rights which are recognised under any State law or laws of any Autonomous District Council or Autonomous Regional Council or which are accepted as rights of tribals under any traditional or customary law of the concerned tribes of any State;
 - (k) Right of access to biodiversity and community right to intellectual property and traditional knowledge related to biodiversity and cultural diversity;
 - (l) Any other traditional right customarily enjoyed by the forest dwelling Scheduled Tribes or other traditional forest dwellers, as the case may be, which are not mentioned in clauses (a) to (k) but 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 cases where the Scheduled Tribes and other traditional forest dwellers have been illegally evicted or displaced from forest land of any description without receiving their legal entitlement to rehabilitation prior to the 13th day of December, 2005.
- (II) Section 3(2): Notwithstanding anything contained in the Forest (Conservation) Act, 1980, the Central Government shall provide for diversion of forest land for the following facilities managed by the Government which involve felling of trees not exceeding 75 trees per hectare, namely:-
- (a) Schools;
 - (b) Dispensary or hospital;
 - (c) Anganwadis;
 - (d) Fair price shops;
 - (e) Electric and telecommunication lines;
 - (f) Tanks and other minor water bodies;
 - (g) Drinking water supply and water pipelines;
 - (h) Water or rain water harvesting structures;
 - (i) Minor irrigation canals;
 - (j) Non-conventional source of energy;
 - (k) Skill upgradation or vocational training centres;
 - (l) Roads; and
 - (m) Community centres;

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Provided that such diversion of forest land shall be allowed only if, the forest land to be diverted is less than one hectare in each case; and the clearance of such developmental projects shall be subject to the condition that the same is recommended by the Gram Sabha.

- (III) Section 5: The holders of any forest right, Gram Sabha and village level institutions in areas where there are holders of any forest right under this Act are empowered to (a) protect the wildlife, forest and biodiversity; (b) ensure that adjoining catchment area, water sources and other ecological sensitive areas are adequately protected; (c) ensure that the habitat of forest dwelling Scheduled Tribes and other traditional forest dwellers is preserved from any form of destructive practices affecting their cultural and natural heritage; (d) ensure that the decisions taken in the Gram Sabha to regulate access to community forest resources and stop any activity which adversely affects the wild animals, forest and the biodiversity are complied with.
- (IV) Section 6(1): The Gram Sabha shall be the authority to initiate the process for determining the nature and extent of individual or community forest rights or both that may be given to the forest dwelling Scheduled Tribes and other traditional forest dwellers within the local limits of its jurisdiction under this Act by receiving claims, consolidating and verifying them and preparing a map delineating the area of each recommended claim in such manner as may be prescribed for exercise of such rights and the Gram Sabha shall, the, pass a resolution to that effect and thereafter forward a copy of the same to the Sub-Divisional Level Committee.
- (V) Section 6(3): The State Government shall constitute a Sub-Divisional Level Committee to examine the resolution passed by the Gram Sabha and prepare the record of forest rights and forward it through the Sub-Divisional Officer to the District Level Committee for a final decision.
- (VI) Section 6(5): The State Government shall constitute a District Level Committee to consider and finally approve the record of forest rights prepared by the Sub-Divisional Level Committee.
- (VII) Section 6(6): The decision of the District Level Committee on the record of forest rights shall be final and binding.
- (VIII) Section 11: The Ministry of the Central Government dealing with Tribal Affairs or any officer or authority authorised by the Central Government in

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 this behalf shall be the nodal agency for the implementation of the provisions of this Act.

8.8.2 Status of Implementation of FRA 2006 in Bhandara Forest Division:

The status of Implementation of FRA 2006 in Bhandara Forest Division (up to July, 2019) is given in table 2.6. The recognition of forest rights to the traditional forest dwellers has further fragmented the area of the Division.

Table 8.2 Status of Implementation of FRA, 2006

Sr. No.	Type of Claim	No. of Cases	Diverted Area (in Ha)
1	Individual Rights	2850	1303.72
2	Community Rights	110	4325.82
	Total	2960	5629.54

The database of Individual Forest Rights and Community Forest Rights should be updated as per the guidelines issued in August 2019. The detail guidelines is given in **Appendix No.-XCV**

Prescriptions for management of forest areas on which the Forest Rights are recognized:

1. **Boundary Demarcation:** The forest areas on which the individual forest rights are recognised by District Level Committee are to be properly demarcated on ground with suitable boundary pillars in order to prevent any further encroachment. In case of Community Forest Rights (CFRs), the area shall be properly demarcated so that the Village level institutions and the Forest Department officials can maintain absolute clarity about the boundaries of CFR. As of now, boundary demarcation work of FRA beneficiaries has not been initiated in the division. Therefore, this exercise needs immediate attention of DCF and shall be completed within 2 years from the date of commencement of this Working Plan. The progress of boundary demarcation works shall be monitored on a monthly basis by the DCF and on a Quarterly basis by the CCF. The GPS coordinates of such boundary pillars shall be maintained in the Boundary Pillar Register which shall be specific to FRA implementation. DCF shall ensure checking of pillars from his/her field staff.

2. **PDF Compressor Free Version** Updation of Area Registers: The Divisional Area Register (Form No. 1) shall contain the area vested with rights under FRA in the 'Remarks' column against each Compartment/Survey No./Gat no.
3. Awareness creation among FRA beneficiaries about the responsibilities of forest and wildlife conservation will aid in the long run to prevent further encroachments.
4. In the FRA Rules 2012, there is a provision to heap the holders of forest rights through convergence of various Govt. schemes relating to land improvement, land productivity, basic amenities and other livelihood measures. In this regard, special efforts need to be made to identify areas of livelihood support such as NTFP collection, processing and marketing, need based skill development programmes for self-employment.
5. If the claims under the Act are finally rejected by the competent authority, such encroachments shall be removed immediately by following the due process of law.
6. As per Rule 4(e), the Gram Sabha is duty bound to constitute Committees for the protection of wildlife, forest and biodiversity, from amongst its members, in order to carry out the provisions of section 5 of the Act. Similarly, as per Rule 4 (f), such Committee shall prepare a conservation and management plan for community forest resources in order to sustainably and equitably manage such community forest resources and integrate such plan with the micro plans or working plans or management plans of the forest department. Therefore, the territorial officers shall examine such Conservation and Management Plans for CFR areas and ensure that the prescriptions dovetail with the broad prescriptions of the approved working plan.

8.9 OTHER RIGHTS AND CONCESSIONS

8.9.1 Rights and Concessions

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.

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.

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.

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

iv. Occupied area was considered to be a deficit village.

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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-Arzof* 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 (*Mimusopselengi*), and Kahu/Kullu (*Sterculia urens*) bark on nominal payment from trees marked for felling.

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.

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 Patrahs 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.

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.

8.10 DEPENDENCY OF LOCAL PEOPLE ON NTFPS

There is significant number of people/community dependent on the forests and forest produce. The Burad community are dependent upon the forest department for supply of bamboos. Of about 669 families are dependent on bamboo. 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.

8.11 OTHER ASPECTS

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. **PDF Compressor Free Version** for food and medicinal purposes. Keeping these things in view, the management aspects should focus on enhancement of social, economic, cultural and spiritual benefits.

ADEQUACY OF POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

9.1 EXISTING POLICY AND LEGAL FRAMEWORK AND THEIR COMPLIANCE

The existing policy and laws in the country and the State are invoked for the management of the forests of the Division. The National Forest Policy of 1988 is the basic guide for the management strategy of this Plan. The Indian Forest Act 1927 and its Amendment is the Principal Law governing the administration of the forests in the Division. The Plan is further guided by guidelines like:

9.1.1 National Wildlife Action Plan (2002-2016):

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 include among others.

- i. Restoration of Degraded Habitats outside Protected Areas
- ii. Control of Poaching, Taxidermy and Illegal Trade in Wild Animal and Plant Species
- iii. Monitoring and Research
- iv. Human Resource Development and Personnel Planning
- v. Ensuring People's Participation in Wildlife Conservation
- vi. Conservation Awareness and Education

Which are partly being followed in this Plan.

9.1.2 National Forestry Action Plan:

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.

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

Strategies:-

- i. For sustainability and productivity of forests, the production to be increased at least 3 to 5 m³ per ha per year by promoting appropriate silvicultural treatments.
- 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.

9.1.3 Hon'ble Orders of Supreme Court of India:

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.

Hon'ble Supreme Court passed an order on 22.09.2000 in Inter- Locutory application No 424 saying that regeneration of forest should be 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.

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. As per these Orders, fellings are 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, which is complied with by the Department.

9.1.4 Forest Rights Act, 2006:

After the enactment of this Act, the administration of the forest will be greatly influencing, as this act recognizes 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.

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 was passed by the Parliament of India and the assent to this Act was received from the President of India on 29th December, 2006. The said Act was notified in the Gazette of India on 2nd January, 2007. For implementation of the said Act, the Central Government notified the Rules for Recognition of Forest Rights on 1st January, 2008. These Rules were further amended by the Central Government vide notification dated 6th September, 2012.

9.1.5 Biological Diversity Act, 2002:

This Act aims to provide for Conservation of biological diversity and sustainable use of biological resources. These issues are reflected in various Working Circles and the prescriptions made there under.

India is a party to the United Nations Convention on Biological Diversity signed at Rio de Janeiro on the 5th day of June, 1992. This Convention reaffirms the sovereign rights of the States over their biological resources. Therefore, legislation was enacted by the Indian Parliament in 2002 to give effect to the United Nations Convention.

This Act aims to provide for conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected therewith or incidental thereto. The State Government has established the State Biodiversity Board and this body is looking into the various aspects of biodiversity conservation and benefit sharing, if any, arising out of the biodiversity.

As of now 541 Biodiversity Management Committees have been formed in the District of Bhandara. There is a need to establish Village Biodiversity

Management Committees at least in all the Gram panchayats where JFM is being implemented.

9.1.6 GOI Orders/ GOM Resolutions, Circulars etc.

Joint Forest Management approach was adopted for degraded forest area of the State vide GR dated 16 March 1992. The programme was extended to Good Forest areas vide Govt. Resolution dated 25/4/2003. The latest revision in G.R. has been made on 5th October 2011 and 10th July 2012. All JFM activities should be in consonance with the broad prescriptions of the Working Plan. The Microplans are to be dovetailed with the prescriptions of the Working Plan.

9.2 STATUS OF APPROVED WORKING PLAN AND COMPLIANCE

Working Plan sanctioned is implemented but not fully due to various reasons like lack of funds, unavailability of area due to Eco-Sensitive Zone etc, no deviation proposal received.

9.3 NUMBER OF FOREST OFFENCES: The numbers of forest offences that have been registered under the different categories like Fire, illicit felling and other offences in the various ranges of the Division is given **Appendix No. LVIII.**

9.4 STATUS OF RESEARCH AND DEVELOPMENT

Not much research or development work is being carried out in the Division.

9.5 HUMAN RESOURCE CAPACITY BUILDING EFFORTS

The staff of the Division is trained as per their rank-related training in the respective Forest Schools, Rangers' Colleges etc. Apart from this regular training they are also updated with the new technology and developments in the field particularly in GIS and IT related fields. The status of special training of the staff is as follows:

Status of Trained Staff

1. Training for GIS & GPS -Surveyor 1, Forester 15&Forest Guard 10
2. Facilities of Personal Digital Assistants are given to all guards with application like Offences cases, Fire, encroachment, grazing etc. However, the feedback received from the field is that the PDAs are being used mostly as mobile phones. There are also problems related to the lack of coverage for the use of internet for immediate sending of information as required. There is a need to further train the guards in the use of the PDAs and to ensure full use of the technology.

9.6 FOREST RESOURCE ACCOUNTING

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In this Plan, all efforts have been made to place on record all the tangible benefits received from the forests. The value of the timber and firewood has been fully accounted in the last Plan and also projected for the period of this Plan (**Appendix No. LXXVI**). The quantity and the value of the NTFPs collected in the last ten years have been duly provided in the **Appendix No.LXXV**.

The accounting for the intangible benefits is a task that the Division is not in a position to make, nor is it possible to be done by the WPO with limited resources. However, the Net Present Value of the forests as calculated for the calculation of NPV by the Kanchan Chopra Committee and accepted by the Hon. Supreme Court order dated 28.03.2008 is taken as the basis for the calculation of the tangible and intangible benefits for accounting the forest values in the Division. The factor of benefits that have been taken while accounting forest area is as follows.

For calculating the average Net Present Value per ha. of forest in India the following monetary value of goods and services provided by the forest have been considered.

- (i) Value of timber and fuel wood
- (ii) Value of Non Timber Forest Products (NTFP)
- (iii) Value of fodder
- (iv) Value of Eco-tourism
- (v) Value of bio-prospecting
- (vi) Value of Ecological services of forest
- (vii) Value of Flagship Species
- (vi) Carbon Sequestration Value.

For the purpose of the valuation of the forest, the following Eco-classes of forests have been identified for the purpose of calculation and 16 major groups of forest types of India as classified by the Champion & Seth have been reduced into the following Eco-classes, namely:

- Eco-class I - Consisting of Tropical Wet Evergreen Forests, Tropical Semi Evergreen Forests and Tropical Moist Deciduous Forests
- Eco-class II - Consisting of Littoral and Swamp Forests
- Eco-class III - Consisting of Tropical Dry Deciduous Forests

Eco-class IV - Consisting of Tropical Thorn Forests and Tropical Dry
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 Evergreen Forests

Eco-class V - Consisting of Sub-tropical Broad-Leaved Hill Forests, SubTropical
 Pine Forests and Sub Tropical Dry Evergreen Forests

Eco-class VI - Consisting of Montane Wet Temperate Forests, Himalayan
 MoistTemperate Forests, Himalayan Dry Temperate Forests, Sub
 Alpine Forest, Moist Alpine Scrub and Dry Alpine Scrub.

The forests of Bhandara come under the Eco Class III and the value attached to this Class area as given below as per the canopy density. The average value of the forests stands at Rs. 7,72,000/- and varies with the type of forest and its attributes. Below is given the value of the forests of Bhandara as per the current and proposed NPV value which takes into account the tangible and some components of the intangible benefits.

Table 9.2 Calculation of Forest Worth based on NPV

Sr. No.	Area of Bhandara under different canopy density		Current rate of NPV (Rs Lakh/ha)	Value of Forests as per current rate (Rs Lakhs)
	Category	Area (ha.)		
1	VDF	17100	8.87	151677
2	MDF	56700	8.03	455301
3	OF	26800	6.26	167768
Total		100600		774746

The value of the forests of Bhandara comes to 7747.46 crores as per the current NPV rates which has taken in to account all the ecosystem services and functions of the forests.

Thus, the value of the Forest when computed holistically taking into account its myriad tangible and intangible benefits that it provides, is far more than what can be gained through the traditionally viewed benefits of timber and other forest produce. Forest resource accounting will be more comprehensive, if we are in a position to decide all intangible benefits at the local level which may be taken up as one of the projects in due course of time.

9.7 BUDGET ALLOCATION TO THE FORESTRY SECTOR

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Table 9.3 Statement showing the Expenditure of Bhandara Forest Division

Sr. No.	Scheme/ Fund	Expenditure Statement (in Lakhs)		
		2016-17	2017-18	2018-19
1	Plan	602.77	195.78	236.8
2	Non Plan (Non-Salary)	1997.25	103.383	280.65
3	CAMPA	387.51	213.38	200.34
4	District Plan (DPDC)	313.54	684.6	485.15
5	MNREGA	165.66	223.9	234.23
6	FDA	27.29	21.62	48.45
7	CSS	11.09	8.09	35.79
Total		3505.11	1450.753	1521.41

9.8 EXISTENCE OF MONITORING, ASSESSMENT AND REPORTING MECHANISM

Monitoring & assessment is done at Range Forest Officer, ACF & Dy. C.F. levels, CCF (T) & CF (WP) as per GR No.Sankirna-2011/F.No.289/F-7,dt.29/09/2011 also required to ensure proper implementation of WP.

9.9 PUBLIC AWARENESS AND EDUCATION

Public awareness is carried out by the Division and the Social Forestry Wing of the Department in the District. As per information from the Dy. Director of the SFD, a total of 115 schools in Bhandara have Eco-Clubs as part of the National Green Army Scheme of the Government of India. In each of the Club, there are at least 50 members. In these schools regular yearround programmes are held and all important days related to the Environment and Forests are celebrated enthusiastically. Regular field visits, projects etc are also taken up. Seed Banks are established in each of the Schools.

The Division also celebrates Van Mahotsav and Wildlife Week on a regular basis and various programmes like Essay/ Drawing/ Extempore Speech Competitions are held at all levels upto the State level.

9.10 ADEQUATE MANPOWER IN FOREST DIVISION

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.

Table No. 9.3 Present staff position in the Bhandara Division after Reorganization

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

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.

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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.

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.

The details of the manpower, including, the office and field staff in the Division is given in Table 9.3.

Labour Supply:

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.

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 - 10
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FIVE YEAR PLANS

Since 1947, the Indian economy has been premised on the concept of planning. This has been carried through the Five-Year Plans, developed, executed, and monitored by the Planning Commission (NITI Aayog after 2014). With the Prime Minister as the ex-officio Chairman, the commission has a nominated Deputy Chairman, who holds the rank of a Cabinet Minister. Montek Singh Ahluwalia is the last Deputy Chairman of the Commission (resigned on 26 May 2014). The Eleventh Plan completed its term in March 2012 and the Twelfth Plan is currently underway (1) Prior to the Fourth Plan, the allocation of state resources was based on schematic patterns rather than a transparent and objective mechanism, which led to the adoption of the Gadgil formula in 1969. Revised versions of the formula have been used since then to determine the allocation of central assistance for state plans. (2) The new government led by Narendra Modi, elected in 2014, has announced the dissolution of the Planning Commission, and its replacement by a think tank called NITI Aayog (an acronym for National Institution for Transforming India).

	History	Range-wise Plan	1893 – 1910
		Best's Working Plan	1910 – 1930
		Chadha's Working Plan	1930 – 1940
		Jagdamba Prasad's Working Plan	1940 – 1957
2	First Plan (1951-1956)	Jagdamba Prasad's Working Plan	1940 – 1957
3	Second Plan (1956-1961)	Trivedi's Working Plan	1957 – 1977
4	Third Plan (1961-1966)	Trivedi's Working Plan	1957 – 1977
5	Fourth Plan (1969-1974)	Trivedi's Working Plan	1957 – 1977
6	Fifth Plan (1974-1979)	Trivedi's Working Plan	1957 – 1977
		Patil & Sardar's Working Plan	1977 - 1996
7	Rolling Plan (1978-1980)	Patil & Sardar's Working Plan	1977 - 1996
8	Sixth Plan (1980-1985)	Patil & Sardar's Working Plan	1977 - 1996
9	Seventh Plan (1985-1990)	Patil & Sardar's Working Plan	1977 - 1996
10	Annual Plans (1990-1992)	Patil & Sardar's Working Plan	1977 - 1996
11	Eighth Plan (1992-1997)	Patil & Sardar's Working Plan	1977 - 1996
		Dr. Nandkishore & G.U. Bhaid's Working Plan	1996-97 – 2005-06
12	Ninth Plan (1997-2002)	Dr. Nandkishore & G.U. Bhaid's Working Plan	1996-97 – 2005-06
13	Tenth Plan (2002-2007)	Dr. Nandkishore & G.U. Bhaid's Working Plan	1996-97 – 2005-06
		Dr.F.S. Jafry's Working Plan	2009-10 - 2018-19
14	Eleventh Plan (2007-2012)	Dr.F.S. Jafry's Working Plan	2009-10 - 2018-19
15	Twelfth Plan (2012-2017)	Dr.F.S. Jafry's Working Plan	2009-10 - 2018-19

10.1 AS PER THE TWELFTH PLAN DOCUMENT UNDER ENVIRONMENT, FORESTRY AND WILDLIFE 209 THE FOLLOWING ARE THE MONITORABLE TARGET FOR TWELFTH PLAN.

Environment and Climate Change

1. Assess and remediate 12 identified contaminated sites (hazardous chemicals and wastes) with potential for ground water contamination by 2017.
2. Clean 80 per cent of critically polluted stretches in rivers by 2017 and 100 per cent by 2020.
3. States to meet NAAQS in urban areas by 2017.
4. To reduce emission intensity of our GDP in line with the target of 20 to 25 percent reduction over 2005 levels by 2020.

Forests and Livelihood

1. Greening 5 million ha under Green India Mission including 1.5 million ha of degraded lands, afforestation and eco-restoration of 0.9 million ha of ecologically sensitive areas.
2. Technology-based monitoring of forest cover, biodiversity and growing stock including change- monitoring on periodical basis through dedicated satellite by 2017 and establishment of open web-based National Forestry and Environmental Information system for research and public accessibility by 2015.
3. Engagement of Village Green Guards/Community Foresters for every Joint Forest Management (JFM) village by 2016.
4. Establish forestry seed bank in forest circles and Model Nursery in every district with information on public portal by 2014.

Wildlife, Ecotourism and Animal Welfare

1. Twenty per cent of veterinary professionals in the country will be trained in treating wildlife.
2. Integrated Ecotourism District Plans covering 10 per cent of all potential Protected Areas (PAs) by 2017.

3. Promoting participation of private sector, civil societies, NGOs and philanthropists in animal welfare.

Ecosystem and Biodiversity

1. Restore 0.1 million ha of wetlands/inland lakes/water bodies by 2017.
2. Mapping and preparation of biodiversity management plans for deserts (both cold and arid), coastal areas, important coral zones, wetlands, mangroves and so on to be completed by 2017.

10.2 AS PER THE TWELFTH PLAN DOCUMENT OF THE PLANNING COMMISSION UNDER ENVIRONMENT, FORESTRY AND WILDLIFE 209 THE FOLLOWING ARE THE GOALS.

Environment

1. Epidemiological studies to assess improvement in health status due to better management of Environment and ecology.
2. Promotion and adoption of cleaner technology, strengthening and initiation of reforms in regulations, policy making and enforcement institutions for environmental governance.
3. Move towards cumulative and strategic EIA.
4. Ensure ecological flows in all rivers by regulating abstractions so as to allow conservation of riverine ecosystems through developing a legal framework and management strategy for conservation of river basins.
5. Promotion of recycling and reuse of treated sewage in urban projects such as sanitation, Landscaping, central air conditioning and so on.

Forests and Livelihood

1. Improve forest productivity, production and sustainable management of biodiversity (equity in access to benefit sharing with local people).
2. Restoration and intensification of forest-range lands/grazing-land management and establish community grazing land around forest fringe villages.
3. Build capacity of Village Forest Committees/Joint Forestry Management Committees for management of forest resources including ecotourism.

4. Revive seed orchards and silviculture plots for various forest types of the country, as well as, for enlisted species under Minor Forest Produce/Non-Timber Forest Produce (MFP/NTFP) including genetic improvement of and establishment of clonal orchards.

Wildlife, Ecotourism and Animal Welfare

1. Reducing and managing human–wildlife conflict.
2. Commercialization of permissible marine products rich in poly unsaturated fatty acids (PUFAs), vitamins and so on.
3. Promotion of ecotourism and participatory eco-development support livelihood of local population.

Ecosystem and Biodiversity

1. Develop national targets and indicators related to biodiversity and support actions to strengthen implementation of Biological Diversity Act, 2002 and ensure bio-safety for economic and social development of local communities.
2. Assess coastal biodiversity resources, ensure sustainable management, restoration of mangroves, coral reefs and wetlands and support livelihood.

PAST SYSTEMS OF MANAGEMENT

11.1 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.

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

11.1.2 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.

11.1.3 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 anywhere 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.

11.2 PAST SYSTEM OF MANAGEMENT AND THEIR RESULTS

Period of Regular Working under Different Working Plans: During this period the forest areas were surveyed and the forest officers tried to introduce 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.11.1 Working Plans and their Periods:

Sr.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

11.2.1 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. 11.2 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.

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3. Unworkable Working Circle.

4. Grazing Working Circle.

i. 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.

ii. 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.

iii. 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.

iv. 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.

v. 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.

11.2.2 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

i. 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.

ii. 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

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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.

Thinning's 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.

iii. 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.

iv. 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.

11.2.3 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.

i. 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.

ii. 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.

iii. 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.

iv. 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.

v. 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.

11.2.4 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

i. 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. **PDF Compressor Free Version** 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.

ii. 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.

iii. 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.

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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.

iv. 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.

v. 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.

vi. 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.

vii. 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.

viii. 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 10years. No. grazing enquiry was done during the preparation of the plan.

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

a. 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.

b. 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.

c. 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 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.

d. 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.

e. 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.

f. 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.

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

11.2.5 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.

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2. Coppice with Reserves Working Circle.

3. Pasture Working Circle.

4. Miscellaneous Working Circle.

5. Bamboo (Overlapping) Working Circle.

6. Lac (Overlapping) Working Circle.

i. 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 these 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. 11.3 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 coppices 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.

ii. 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. 11.4 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 thinning's 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

- Regeneration and advance growth if malformed and suppressed was to be cut back.
- All miscellaneous species and Bamboos likely to interfere with the resultant crop were to be removed.
- 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,

- All sound trees of Bija and Haldu up to 90 cm, Shisham and Salai up to 60 cm. in girth were to be reserved.
- 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.

iii. 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, Shedea, 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.

iv. 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.

v. 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.

vi. 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.

vii. Results:

a. 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.

b. 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, BijaDhaoda, 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.

c. 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.

d. 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.

e. 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 split 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.

f. 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.

11.2.6 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.

i. 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:

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- 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.

ii. 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 nallas 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.

iii.Kuran Working Circle: The total area included in this working circle was 981.9 ha and 5 grass birs. 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 birs were to be strictly closed to grazing and were to be rigidly protected from fire.
- iv. Cutting of grass was allowed after the seeding.

iv. 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.

v. 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.

vi. 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

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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.

vii. Results:

a. 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.

b. 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.

c. 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.

d. 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.

11.2.7 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. 11.5. 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

i. Selection-Cum-Improvement Working Circle:

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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 work, 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 were 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.

ii. 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 was 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 $1/3^{\text{rd}}$ 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.

iii. 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.

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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.

iv. 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 Gadegoan 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.

v. 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 in to 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 place's 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.

vi. Wildlife (Overlapping) Working Circle:
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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 Navegaon 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 Itiadoh 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 whether 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 firefighting 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.

vii. 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. 11.6 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. 11.7 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 Paoni 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 SingoriHamesha 2. JogikhedaKamesha 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 -

1stcrop - From July to August.

2ndcrop - From September to October.

3rdcrop - 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. 11.8 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.

viii. 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.

a. 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

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- 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.

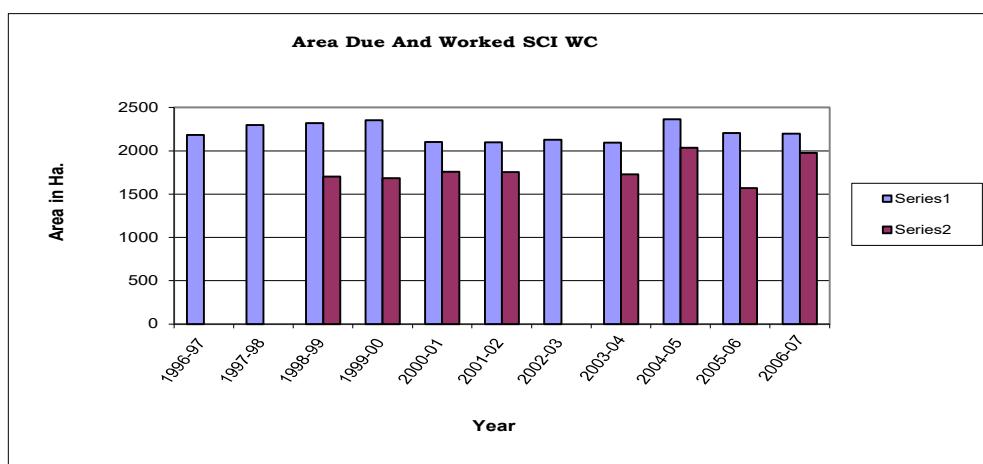
The details are as follow:

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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. 11.9 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 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



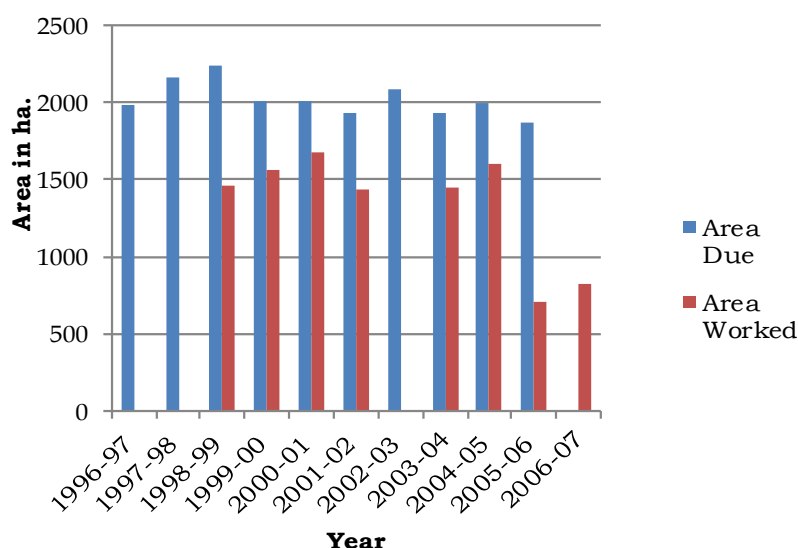
- Regarding the regeneration operations, a total of 2044 ha i.e. 8.40 % of plantations under various schemes were taken during the period of this working Plan. Many of these plantations, in the areas adjoining to the villages, are in very bad shape due to fire and grazing.
- At places it was noticed 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.

b. 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.11.10 Table Showing the Actual Working under IWC during Working Plan Period 1996-97 to 2006-07:

Year of Demarcation	Due for main		Actually worked (in ha)	% of working	Production	
	Coupe No	Area (ha)			Timber in cum	Fire wood in
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

Chart Showing Area Due for Working and Area Actully Worked



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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, whereas the areas away from the villages, it is comparatively better.

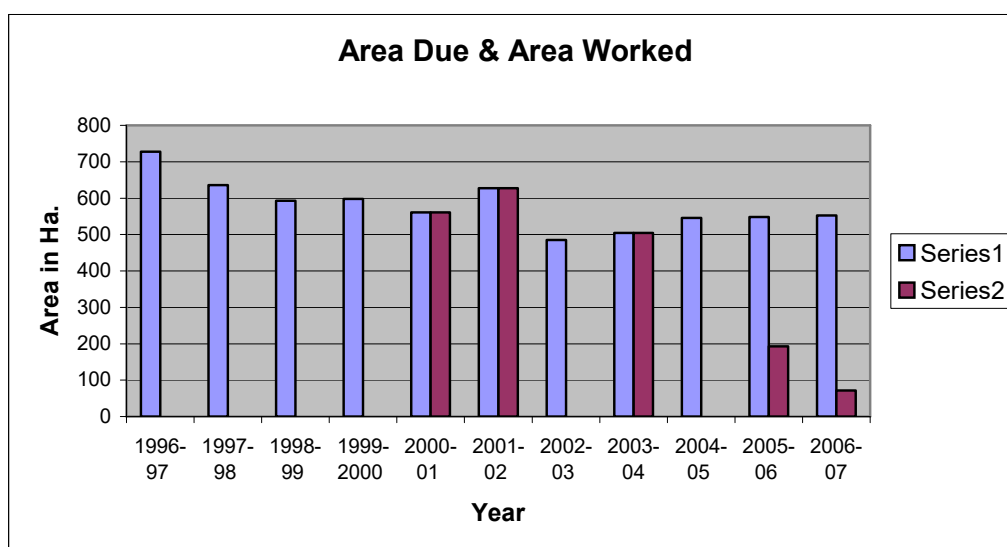
c. Fuel Wood, Fodder and Pasture Working Circle: The area under this working circle was not properly taken care of. As per the prescriptions, the area was supposed to be closed for grazing, high quality grasses were supposed to be planted and protected from fire and grazing, but none of these operations 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.11.11 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

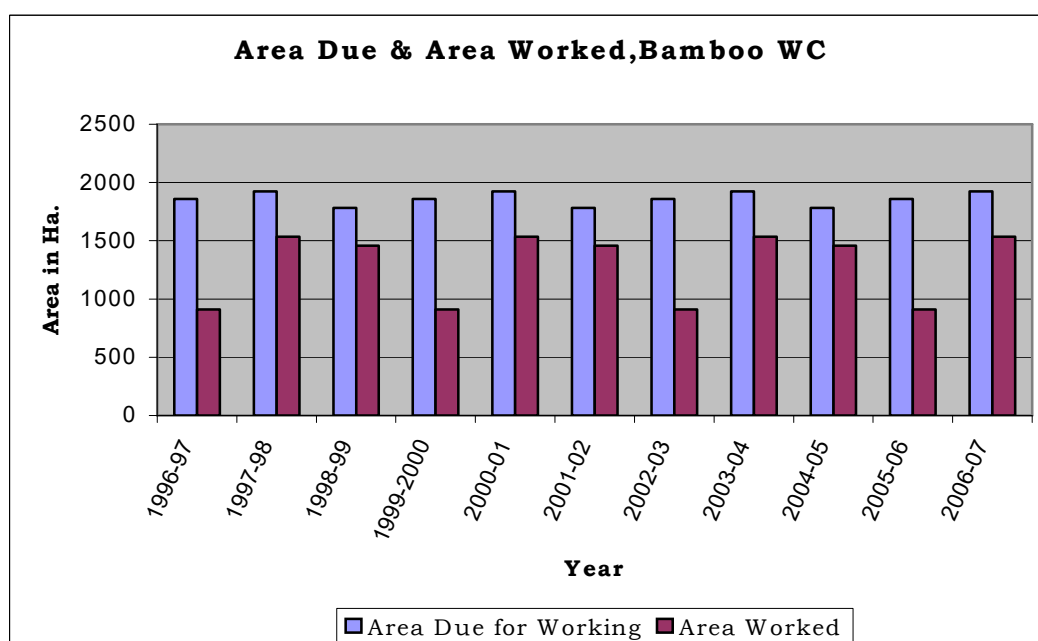


d. Miscellaneous Working Circle: The rest of the areas of the division were allotted to this Working Circle. A total of 30161.547 ha. area was allotted to this Working Circle, out of which 2097.289ha was small scattered patches of forest land with the forest deptt. And rest of the areas were with other agencies as mentiond 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.

e. 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.11.12 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.11.13 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.

f. 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 Division is extremely important as it lies between five major wildlife Protected Areas i.e. Tadoba, Navegaon, 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.

g. 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.11.14 Area Distribution under under Tassar Working Circle

Year	Work to be done			Actual work done			No of beneficiaries
	Name of village	Comptt/ Survey	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.



Crop Damaged due to Pollarding for Kosa Cultivation. Cocoon of Kosa worm on a Saja branch.

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

Tendu Leaves Collection: The following table shows the collection in revenue from Tendu in the previous plan period:

Table No. 11.15 Year Wise Yield of Tendu and revenue realized

Year	Tendu Collection(in Std. bag)	Revenue(in Rs.)
2009-10	29916.005	36769335
2010-11	37672.745	51128268
2011-12	36014.93	43179373
2012-13	33303.045	56652097
2013-14	29474.425	26551587
2014-15	27286.35	28825294
2015-16	22126.19	38378299
2016-17	25539.995	55432793
2017-18	2730.665	168439206
2018-19	26428.46	72523969
Total	270492.8	577880221

h. Yield of Forest Produce during the Plan:

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

11.3. SPECIAL WORKS OF IMPROVEMENT UNDER TAKEN:

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Some special work of improvement in the management of forests has been taken in the last few years. Notable among them are as follows.

1. GR No. FDM2011/C No.100/F2 dt 05/10/2011 (Appx No. LXXIII) implicating the Tendu Contractor in case of a fire happening in his jurisdiction which has resulted in the dramatic decrease in incidences of fire.
2. PDAs were distributed to the staff of the Division pre-loaded with applications on Offence reporting, fire incidences, beat checking, etc in which incidences of fire and other illicit activities can be tracked more accurately with geo-tagged photos and Lat-Long details. Communication gap between the DCF and his officers to the lowest functionary of the Division is being slowly bridge. Real-time reporting of illicit incidences has become a possibility if the technology is being used properly.
3. Real time updating of nursery and plantation information through Nursery Management Information System (NMIS) and Plantation Management Information System (PMIS) applications were developed and training were imparted to field staffs. Through these applications the real-time information is collected assessed at division, circle and state level.

11.4 PAST YIELD REVENUE AND EXPENDITURE :

Actual yield of timber, fuelwood and bamboo obtained from the execution of planned operations of the previous plan is given in the table 11.16

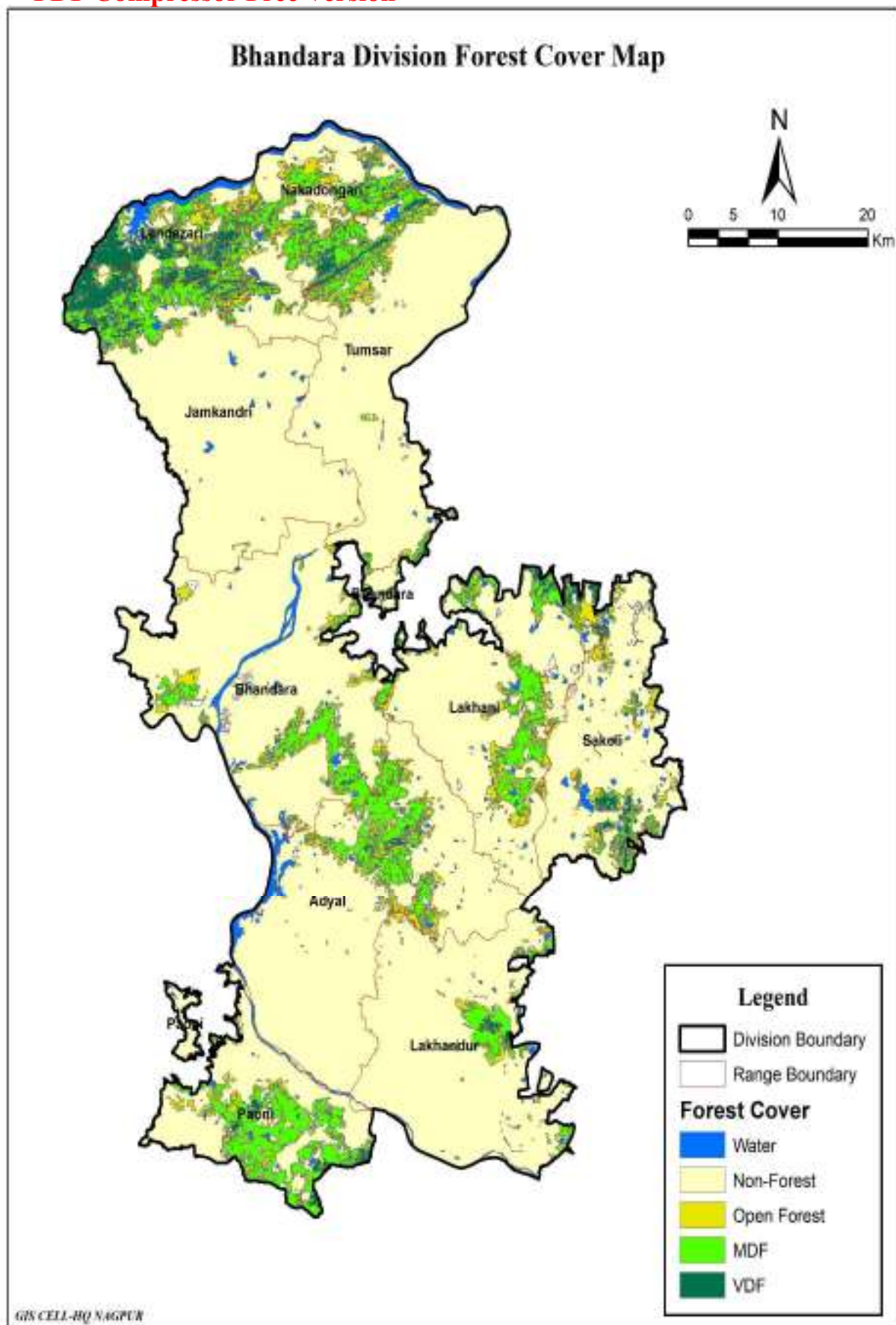
Table No. 11.16 Yield of Timber, fuelwood and Bamboo:

Year	Timber (cu. m.)	Fuelwood (cu. m.)	Bamboo	
			Long Bamboo	Bamboo bundles
2009-10	0	0	13500	1000
2010-11	498.658	4668.88	96210	6200
2011-12	847.093	7336	2500	-
2012-13	1636.362	6569.6	282000	1000
2013-14	1252.708	7719.2	141520	-
2014-15	1538.562	8925.6	46000	-
2015-16	1616.398	8098.4	277931	5548
2016-17	3774.367	5956.8	260590	-
2017-18	2167.14	8902.72	83000	-
Total	13331.29	58177.2	1203251	13748

Actual revenue realised from the execution of planned operations of the previous plan is given in the table 11.17

Table No 11.17. Revenue and Expenditure during the Plan Period:

Year	Revenue (Rs. in lakhs)	Expenditure (Rs. in lakhs)
2009-10	105.89	162.85
2010-11	116.56	141.20
2011-12	225.16	146.56
2012-13	306.58	172.67
2013-14	549.85	136.19
2014-15	416.79	642.75
2015-16	363.02	1151.65
2016-17	366.30	325.47
2017-18	355.92	518.08
2018-19	209.91	512.36
Total	3015.98	3909.78



12. STATISTICS OF GROWTH AND YIELD

The forest of Bhandara division comprises of miscellaneous forest with few teak patches. The division has volume table for teak, Ain, Bija, Dhaoda, Garadi and for other miscellaneous species which is given in the following table.

Local Volume Tables:

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 12.1

Table No.12.1 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

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.12. 2Local 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

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12.1 STATISTICS OF FOREST CARBON STOCK

Carbon Stock Estimation:

The Forest of Survey of India, Dehra Dun has already come up with the calculation of the current Carbon Stock of India in its publication 'Carbon Stocks of India', this Working Plan has taken advantage of the same. The excerpts from this publication are produced below and a calculation for the carbon stock of Bhandara District taking the C-values of the Tropical Dry Deciduous Forests for the state of Maharashtra were extrapolated for this calculation.

12.1.1: Excerpts from FSI's publication 'Carbon Stock in India's Forests':

Introduction:

Carbon is an element commonly found on earth in various forms. It is an essential element of all forms of life. The bodies of living organisms contain a substantial portion of carbon. Carbon is also found in large quantities in non-living things like oil, nature gas, coal, rocks and air. Globally carbon is held in a variety of different stocks as oceans, fossil fuel deposits, terrestrial system and the atmosphere. In the terrestrial system, carbon is stores in rocks, sediments, swamps, wetlands, forests, forest soil, grassland and agricultural. About two thirds of global terrestrial carbon is contained in forests and forest soil. In addition, there are some non-natural human-created carbon stocks as wood products and waste dumps.

The exchange of carbon among its various forms from the atmosphere, oceans and land is called the carbon cycle. The most significant form of carbon exchange is by the plant. Plants draw in carbon dioxide (CO₂) from the atmosphere through the process of photosynthesis and turn it into biomass (wood, leaves, fruits etc.). A part of the CO₂ taken in by plants is returned to the atmosphere through respiration. Thus, the carbon cycle is renewed and continues interminably.

The delicate balance maintained by nature is being overturned by anthropogenic factors. The extraction of fossil fuels from the earth and many other human induced activities are overloading the atmosphere with carbon dioxide and other greenhouse gases thereby raising serous issues including the very survival of the human race.

Excessive quantities of greenhouse gases disturb the balance of transfer of heat through the atmosphere. Normally solar radiation absorbed by space heats the earth while infrared radiation lost to space cools the earth. The presence of excessive anthropogenic greenhouse gas emission (mostly carbon dioxide from fossil fuel burning) in the atmosphere reduces the Earth's ability to cool to outer space through infrared radiation. The result is a heightening of the greenhouse effect, a nature process by which gases as CO₂ absorb and reflect long-wave radiation retaining much of that heat in the Earth's atmosphere and consequently warming the planet.

Human induced disturbance to the carbon cycle have been both direct and indirect. Direct effects include the addition of new carbon to the active global carbon cycle through the combustion of fossil fuels and land use change leading to modification of the vegetation structure and distribution. Indirect human impacts on the carbon cycle include changes in other major global biogeochemical cycle, alteration of the atmosphere composition through the additions of pollutants as CO₂ and changes in the biodiversity of landscape and species. Currently about three-quarters of the direct human induced disturbances to the global carbon cycle are due to fossil-fuel combustion. Emission currently exceed 6 GT C/yr (gigatonnes of carbon per year) and are still increasing.

Carbon and Forest Eco-System

Forests play an important role in mitigation and adaptation of climate change. Forests sequester and store more carbon than any other terrestrial ecosystem and are an important natural 'brake' on climate change. Carbon sequestration by forests has attracted much interest as a mitigation approach, as it has been considered a relatively inexpensive means of addressing climate change immediately. In India, the varied climate regimes, the large geographical area, varied topography, long coastline and the possession of the oceanic island have endowed it with a diversity of natural biomass from desert to alpine meadows, from tropical rain forests to temperate pine forests, from mangroves to coral reefs and from marshland to high altitude lakes.

Research it still in progress to understand the effect of climate change on life forms and ecosystem. It has been suggested that the increased proportion of carbon dioxide in the atmosphere increase fertilization effect and enhances growth in plants. In that case warming and an increase in atmosphere CO₂ should productivity and increase the sink potential of vegetation (assuming nutrient

supply is adequate and enough moisture is available). A study on the effects of CO₂ fertilization on vegetation and soil in temperate forest ecosystem suggests that plant C increase in response to excess atmospheric CO₂ (Downing et al., 1992).

Gregor draws the conclusion that climate change might have positive effects on some of the factors of the forest ecosystem but the overall effect of global warming on the forests does not seem to be positive in terms of an increase in the absorption of carbon. Greenhouse effect result in air pollution, damage to forests, drier and warmer summers, frequent droughts and heat periods as well as frequent extreme wind storm events which would offset any possible effect resulting from longer vegetation periods (Gregor, 1992).

The main carbon pools in tropical forest ecosystems are the living biomass of trees and under story vegetation and the dead mass of litter, woody debris and soil organic matter. The carbon stored in the aboveground living biomass of trees is typically the largest pool and the most directly impacted by deforestation and degradation.

While living trees are growing, they continued to store carbon and therefore acted as carbon sinks. Consequently, mature forests are huge storehouses of carbon. The young trees which grow faster rates also work as carbon sinks. The bigger (and older) the trees, the higher is their ability to cycle and sequester carbon (Morris Bishop, 1998). Though, it is important to consider the annual rate of carbon uptake, one should not ignore the carbon holding capacity within a forest which is a more critical factor (Harmon et al., 1990). In India, a more effective management practice is selective felling of those trees which have already attained a matured age and no more work as sink. On felling such trees, younger trees are planted which sequester more carbon.

Forests that play a potentially significant role in climate change adaptation, maintenance of ecosystem services and provision of livelihood options, are increasingly threatened by deforestation, fragmentation, climate change and other stressors linked to human activities. A particular effect of climate change is likely to be on forest to provide soil and water protection, habitat for species and other ecosystem services. The potential negative impacts of climate change on dry forests are of particular concern since dry forest soil are more of particular concern since dry forest soil are more susceptible to wind and water erosion. According to the Millennium Ecosystem Assessment, dry lands occupy 41 % of the earth's land area

and home to more than 2 billion people. Intensive human intervention as fire, grazing, agriculture, firewood collection, has adversely transformed many forests.

Methodology for the assessment of Forest Carbon

The 'Good Practices Guidance' (GPG) developed by Intergovernmental Panel on Climate Change (IPCC) is universally accepted source book for concepts, definitions, various pools, methods, default values, various required equations etc. for preparing account of forest carbon stocks (FCS). Since the subject has been developing in last two decades, many new concepts and methods have emerged but still many challenges remain. The GPG uses the term "Categories" to refer specific sources of emissions/ removals of greenhouse gases. As per the IPCC GPG 2003, the categories are: Forest land, Cropland, Grassland, Wetlands, Settlements and other land. Each land-use category is further subdivided. The following sub-categories are considered for the sector:

Forest land remaining Forest land: An increase in the carbon stocks of Forest Land remaining Forest Land would mean improvement in canopy density and growing stock of forest. A decrease in the carbon stock of Forest Land remaining Forest Land is generally considered as degradation of forest resources.

Land Converted to Forest land: Any non-forest land converted to Forest land would generally be considered as afforestation.

According to GPG, the calculation of GHG inventories require information on extent of area (in case of LULUCF) of an emission/removal category termed as 'Activity data' and emission or removal of GHG per unit of area (removal of CO₂ per ha. of added forest area) termed as 'Emission factors'. The main aim is to estimate these factors for the reporting unit. Once these are estimated, the emission or removal, can be ascertained using the change in carbon stocks.

The different approaches are given in the GPG to present the activity data (the change in area of different land categories). **Approach 1** identifies the total area for each land category; it only provides "net" area. **Approach 2** identifies the land conversion between categories by tracking and provides tabular information about land-use conversion. **Approach 3** involves, in addition, the spatial tracking of land-use conversion.

Table No. 12.3: Three IPCC tiers and data requirements

Tier	Data needs / examples of appropriate biomass data
Tier 1	IPCC default factors: Default MAI (for degradation) and/or forest biomass stock (for deforestation) values for broad continental forest types – default values given for all vegetation – based pools.
Tier 2	Country specific data for key factors: MAI and/or forest biomass values from existing forest inventories and/or ecological studies. Defaults values provided for all non-tree pools. Newly- collected forest biomass data is required.
Tier 3	Detailed national inventory of key C stocks, repeated measurements of key stocks through time or modelling: Repeated measurement of trees from permanent plots and/or calibrated process models. Can use default data for other pools stratified by in-county regions and forest type, or estimated from process module.

The total carbon which is stocked in the forests is divided into several pools and the emission factors are derived from assessments of the changes in carbon stocks in these carbon pools. These factor are developed using estimates which are used at different levels; global, national and sub-national and based on the level the 'Tier levels' (Table 12.3) are defined which are independent of the approach being followed.

In general, moving to higher tiers improves the accuracy of the inventory and reduces uncertainty, but the complexity and resources needed for conducting inventories also increases with higher tiers.

The Tier 1 approach employs the basic method and default emission factors provided in the IPCC Guidelines (Workbook), Tier 1 methodologies usually use activity data that are spatially coarse, such as nationally or globally available estimates of deforestation rates, agricultural production statistic and global land cover maps.

The Tier 2 approach applies emission factors and activity data which are defined by the country. Tier 2 can also apply stock change methodologies based on country-specific data. Country-defined emission factors/activity data are more appropriates for the climatic regions and land use systems in the country.

At Tier 3, higher order methods including models and inventory measurement are repeated over time and supported by high-resolution activity data

and disaggregated at sub-national level. Such systems may use Remote Sensing and GIS tools for tracking land-use change over time.

In Forest ecosystem, enormous carbon is stored which is classified in five pools by GPG. The living portion of biomass carbon is classified in two approaches to emission accounting: the inventory approach and the activity based approach, which are outlined below. Both approaches are supported under IPCC guidance (IPCC, 2003) and are based on the underlying assumption that the flows of GHGs to or from the atmosphere are equal to changes in carbon stocks in the biomass and soils.

Table No. 12.4: Different Forest Carbon Pools

Pools		Description
Living Biomass	Above ground biomass (AGB)	All living biomass above the soil including stem, stump, branches, bark, seeds and foliage.
	Below ground biomass (BGB)	All living biomass of live roots. Fine roots of less than 2 mm diameter (country specific) are often excluded because these often cannot be distinguished empirically from soil organic matter or litter.
Dead Organic Matter	Dead wood	Includes all non-living woody biomass not contained in the litter, either standing or lying on the ground. Dead wood also includes dead roots and stumps larger than or equal to 10 cm. in diameter or any other diameter used by the country.
Dead Organic Matter	Litter	Includes all non-living biomass with a diameter less than a minimum diameter chosen by the country (for FSI 5 cm.), lying dead, in various states of decomposition above the mineral or organic soil.
Pools		Description
Soil	Soil organic matter	Includes organic carbon in mineral and organic soil (including peat) to a specific depth chosen by the country (for FSI 30 cm) and applied consistently through the time series.

(i) Collating existing forest data

Forest carbon accounting can make use of existing national, regional or global data. Sources will vary between territories, as will the reliability and uncertainty of the source. However, good quality secondary data reduces. However, good quality secondary data reduces both time and cost requirement for accounting.

At a national level, forest inventories, woody biomass assessments, agricultural surveys, land registry information and scientific research can prove useful for land classification and model parameters. Data on temperature, rainfall, soil type and topography should also be sources at smaller scales. In particular, data sources will include national statistical agencies, sectoral experts and universities.

(ii) Using remote sensing

Remote sensing is useful in forest carbon accounting for measurement of total forest area, forest types and canopy cover.

(iii) Data from field sampling

Actual field data is preferable to default data for forest carbon accounting and is required to verify remotely sensed information and generalised data sets. Gathering field measurements for forest carbon accounting requires sampling as completer enumerations are neither practical nor efficient. By definition, sampling infers information about an entire population by observing only a fraction of it. In order to confidently scale up this data to the required geographical level, proper sampling design is vital.

Stratified random sampling is generally used for forest/carbon inventory as mostly forest areas are heterogeneous. Under stratified sampling, forest area are stratified into homogenous strata and samples are selected from each strata randomly. This provides precise estimates for different strata and also population. Once sample sites have been selected, established methods of biomass inventory are employed for different pools.

12.1.2: Accounting for Forest Carbon Stocks

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(i) Above-Ground Biomass (AGB):

The AGB carbon pools consists of all living vegetation above the soil, inclusive of stems, stumps, branches, bark, seeds and foliage. For accounting purposes, it can be broadly divided into two parts viz. trees and understory. The most comprehensive method to establish the biomass of this carbon pool is destructive sampling, whereby vegetation is harvested, dried to a constant mass and the dry to-wet biomass ratio established. Destructive sampling of trees, however, is both expensive and somewhat counter-productive in the context of promoting carbon sequestration. Two further approaches for estimating the biomass density of tree biomass exist and are more commonly applied. The first directly estimates biomass density through biomass regression equations. The second converts wood volume estimates to biomass density using biomass expansion factors (Brown, 1997).

(ii) Below-Ground Biomass (BGB):

The BGB carbon pool consists of the biomass contained within live roots. As with AGB, although less data exists, regression equation from root biomass data have been formulated which predict root biomass based on above-ground biomass carbon (Brown, 2002; Cairns et al., 1997)

(iii) Dead Organic Matter (wood):

The DOM wood carbon pools include all non-living woody biomass and includes standing and fallen trees, roots and stumps with diameter over 10 cm.

(iv) Dead Organic Matter (Litter):

The DOM litter carbon pool includes all non-living biomass with a size greater than the limit for soil organic matter (SOM), commonly 2 mm, and smaller than that of DOM wood, 10 cm. diameter. This pool comprises biomass in various states of decomposition prior to complete fragmentation and decomposition where it is transformed to SOM.

(v) Soil Organic Matter (SOM):

SOM includes carbon in both mineral and organic soil and is a major reserve of terrestrial carbon (Lal et al., 2001). Inorganic forms of carbon are also found in soil; however, forest management has greater impact on organic carbon and so

inorganic carbon impact is largely unaccounted. SOM is influenced through land use and management activities that effect the litter input. In SOM accounting, factors affecting the estimates include the depth of which carbon is accounted, commonly 30 cm. and the time lag until the equilibrium stock is reached after a land use change, commonly 20 years.

12.1.3: Forest Carbon Stock of Tropical Dry Deciduous Forests in Bhandara:

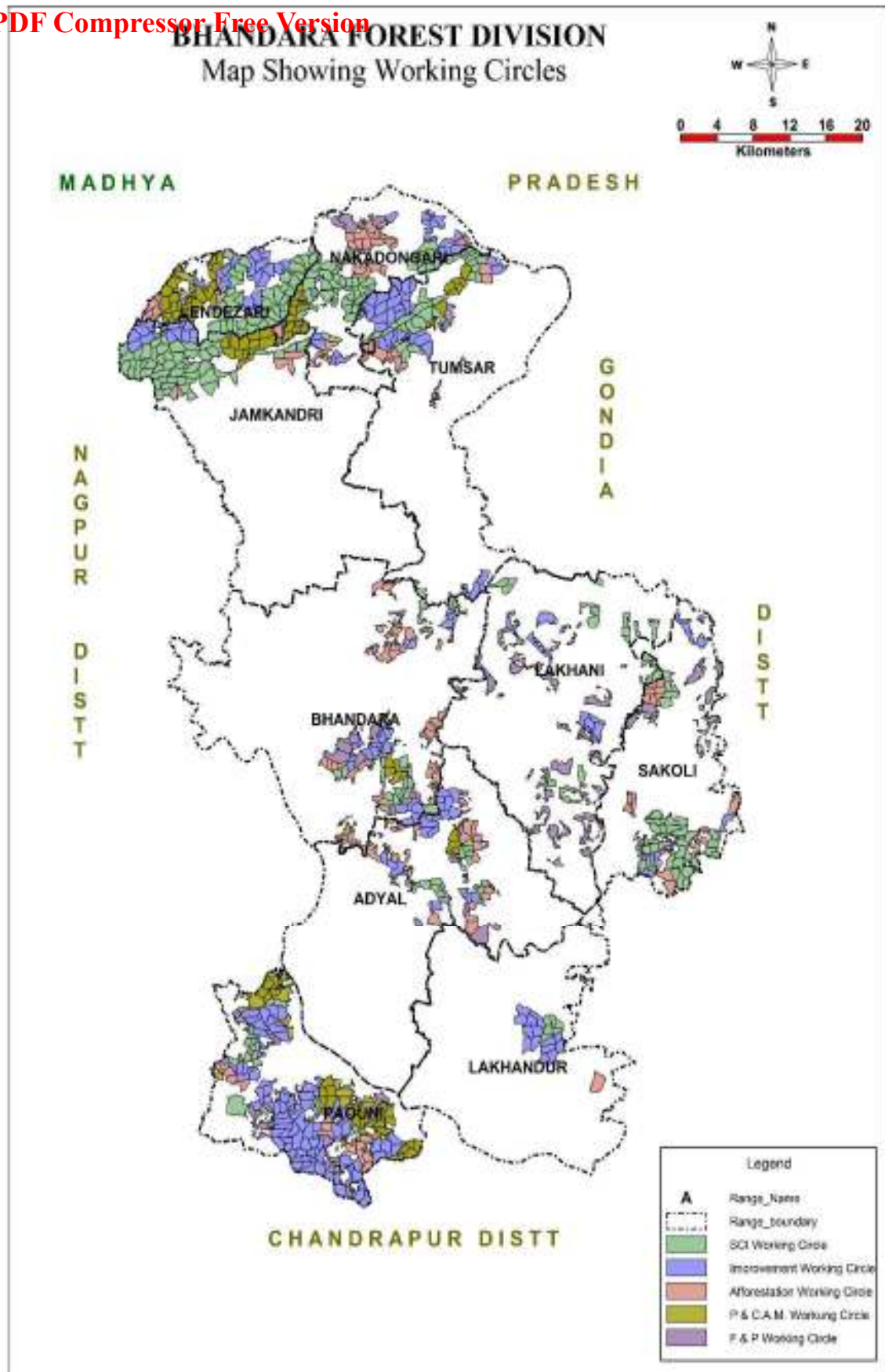
The Forests of Bhandara Division mainly falls in Tropical Dry Deciduous Forests. On the basis of above data from FSI Carbon stock assessment for Tropical Dry Deciduous Forests the carbon stock is calculated as under:

Table 12.5 Forest Carbon Stock in Bhandara Forest Division

(In '000 tonnes)

Forest type stratum	Density	Area (sq.km)	AGB	BGB	Dead wood	Litter	SOC	Total	C Stock /ha. (tonnes)
Tropical Dry Deciduous Forest	VDF	171	10684.1	4194.6	78.66	1109.8	10128.3	26195.49	153.19
	MDF	567	33453	13137	85.05	351.54	29863.9	76890.87	135.61
	OF	268	3427.72	1345.4	34.84	112.56	8042.68	12963.16	48.37
Total		1006	47564.8	18677	198.6	1573.9	48034.9	116049.5	115.36

Thus, the Bhandara Forest Division holds 116049.5 tonnes of Carbon in its forests at an average of 115.36 tonnes/Ha. This data can be used a base line for the future monitoring of the Carbon stock in the Division.



CHAPTER- 1
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BASIS OF PROPOSALS

1.1 OBJECTIVES OF MANAGEMENT

1.1.1 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 Zudpi Jungle of the Division. Long term strategic goals have to be established to guide our steps towards sustainable, ecosystem-based forest management. Under the Ecosystem based management, equal emphasis is given to ecological, social and economic aspects of the Forest resources.

1.1.2 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.

1.1.3 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.

1.1.4 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 biodiversity, 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.

1.1.5 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.

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- 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.

1.1.6 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.

1.2 METHOD OF TREATMENT TO BE ADOPTED

1.2.1 Functional Classification of Forests:

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 recognized 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.

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 underground 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 felling is 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 moisture 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. Zudpi 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 Zudpi Jungle will be treated as a reserved forest as the proposal has already been sent to the Government.

These Zudpi 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.

1.2.2. 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 side 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 Division are extremely important from wildlife corridor management point of view as it lies between six important wildlife protected areas viz. Tadoba, Navegaon, 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

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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 Zudpi jungles adjoining the Reserved Forests and large patches, away from villages into Reserved Forests.

1.3 CONSTITUTION OF WORKING CIRCLE

1.3.1 Analysis and Valuation of the Crop:

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.

- i. 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.
- ii. Compartments under non-forest use, forest nurseries or other special purposes such as Forest Research have not been included under any Working Circle.
- iii. 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.
- iv. 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.

- v. Areas having sparse tree crops, open areas without tree growth and isolated small forest patches are included in the Afforestation Working Circle (A.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.
- vi. 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 birds have been proposed to be managed under 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.

1.3.2 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 No. -XXXI**).

Table 1.1 Distribution of Forest Areas in various Working Circles:

Working Circle	Reserved Forests	Protected Forests	Unclassed Forests	Zudpi Jungle	Total Area	% of area under different WC	Area handed over to Wildlife during the Plan period
SCI WC	20622.69	5059.394	0.00	0.00	25682.084	27.74	946.552
IWC	21661.477	3250.576	0.00	0.00	24912.053	26.91	1931.864
AFF WC	9676.533	11753.412	0.00	4499.405	25929.35	28.01	428.324
F & P WC	862.705	5363.064	0.00	0.00	6225.769	6.72	114.203
P & CAM WC	8861.581	967.38	0.00	0.00	9828.961	10.62	951.525
Total Area	61684.986	26393.826	0.00	4499.405	92578.217	100.00	4372.468
Overlapping Working Circles							
Wildlife (OL) WC					Entire Area		
Bamboo (OL) WC					22626.218		
Old Teak Plantation (OL) WC					5272.7		
NTFP (OL) WC					Entire Area		

1.3.3. 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 1.1. The areas have been allotted after analysing the enumeration data.

- i. **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
- ii. **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.
- iii. **F & P WC:** Old pasture, grass birs, and areas of Protected Forests adjoining to villages have been included in the Fodder and Pasture Working circle.
- iv. **AWC:** 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.

The SCI working circle areas are largely concentrated in Jamkandri, Sakoli, Nakadongri and Pauni 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 Lakhani Ranges. Fodder and Pasture working Circle are distributed among almost all the ranges except Jamkandri, Lakhandur and Lendezari. Whereas, Afforestation Working Circle areas are distributed in all the ranges as most of the lands are from Zudpi jungle.

The following tables showing the proposed Range-Wise Distribution of Areas of different Working Circles for the Current Plan.

Table 1.2 Table showing Distribution of Area under Selection Cum Improvement Working Circle. (Area in Ha)

SCI						
Ranges	RF		PF		Comptts (Total No)	Total area in Ha.
	No.of Comptts	Area.in Ha.	No.of Comptts	Area.in Ha		
Bhandara	04	586.717	08	981.429	12	1568.146
Tumsar	06	2397.152	03	364.355	09	2761.507
Jamkandri	11	5512.724	01	37.717	12	5550.441
Sakoli	08	2883.448	07	826.527	15	3709.975
Pauni	0	0.00	05	405.764	05	405.764
Adyal	01	413.386	01	458.258	02	871.644
Lakhani	02	117.783	07	1327.675	09	1441.458
Nakadongri	07	3256.719	04	518.943	11	3775.712
Lendezari	09	4200.631	02	142.676	11	4343.307
Lakhandur	03	1254.130	00	0.00	03	1254.130
Grand Total	51	20622.69	38	5063.344	89	25682.08

Table 1.3 Table showing Distribution of Area under Improvement Working Circle. (Area in Ha)

Range	RF		PF		Total Compt.	Total Area in ha.
	No. of Compt.	Area	No. of Compt.	Area		
Bhandara	3	1165.605	4	558.114	7	1723.719
Jamkandri	4	1466.937	0	0.00	4	1466.937
Lakhandur	10	4347.350	0	0.00	10	4347.350
Lendezari	4	1879.361	1	77.623	5	1956.984
Nakadongri	5	1056.126	2	263.842	7	1319.968
Paoni	16	6778.847	1	131.911	17	6910.758
Sakoli	3	107.569	3	571.424	6	678.993
Tumsar	7	2872.863	5	692.095	12	3564.958
Adyal	3	1485.734	3	459.23	6	1944.964
Lakhani	5	501.085	5	496.337	10	997.422
Grand Total	60	21661.477	24	3250.576	84	24912.053

Table 1.4 Table showing Distribution of Area under Afforestation Working Circle. (Area in Ha)

Range	R. F			PF		Zudpi Jungle	Un-classed Forest	Total Area
	No. of Compt.	No. Of Village	Area	No. of Compt.	Area			
Bhandara	02	58	1666.311	35	2816.108	0.28	0	4482.699
Tumsar	1	12	314.81	12	772.089	1034.065	0	2120.964
Jamkandri	0	20	682.56	08	397.792	5773	0	1222.332
Sakoli	2	26	2020.655	14	1531.721	467.2	0	4019.576
Pauni	02	07	969.696	14	284.16	184.69	0	1438.546
Adyal	4	17	824.095	20	1701.839	1154.65	0	3680.174
Lakhani	1	14	730.529	11	644.487	790.58	0	2165.596
Nakadongri	3	0	963.157	7	1255.615	376.79	0	2595.562
Lendezari	1	0	411.97	2	86.494	59.89	0	558.354
Lakhandur	01	22	1092.75	20	2263.517	289.28	0	3645.547
Grand Total	38	176	9676.533	143	11753.522	10130.425	0	25929.35

Table 1.5 Table showing Distribution of Area under Fodder and Pasture Working Circle. (Area in Ha)

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	2	82.22	9	665.502	11	747.722
Sakoli	0	0	6	833.115	6	833.115
Tumsar	0	0	3	236.771	3	236.771
Adyal	3	482.223	2	116.772	5	598.995
Lakhani	0	0	18	2179.458	18	2179.458
Grand Total	11	862.705	48	5363.064	59	6225.769

Table 1.6 Table showing distribution of Area under Protection and Catchment Area Management Working Circle. (Area in Ha)

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	1	445.15	0	0	1	445.15
Lendezari	6	2720.532	0	0	6	2720.532
Nakadongri	3	925.416	0	0	3	925.416
Paoni	4	1901.284	7	829.306	11	2730.59
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	8861.581	9	967.38	31	9828.961

1.3.4 Blocks and Compartments:

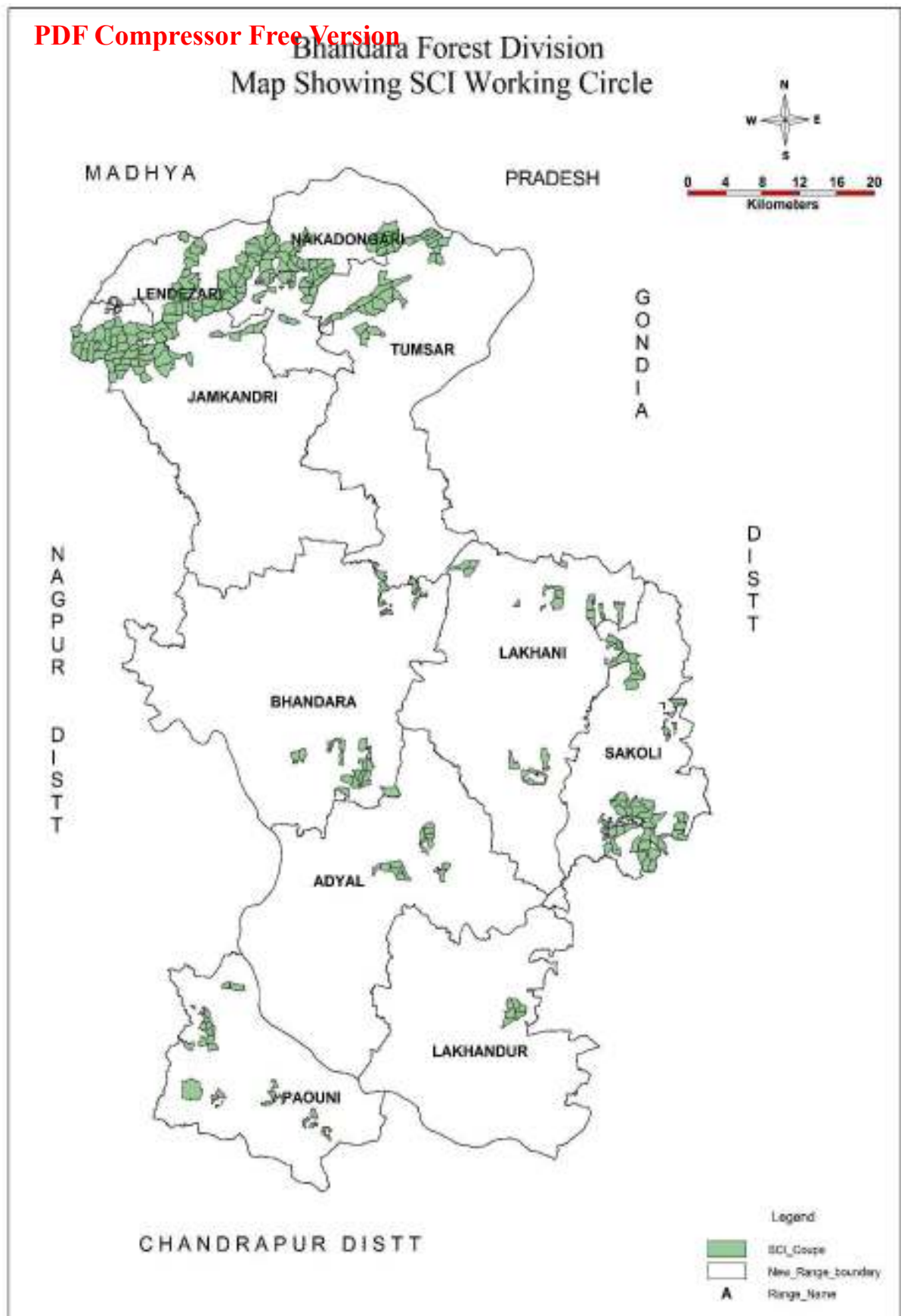
Reserved Forests of this division have been distributed in 170 compartments and 48 forest blocks. All the compartments of Reserved Forests have been retained their original numbers.

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.

The Revenue Authorities have handed over 44.99 km² of Zudpi Jungle in 182 villages to the Bhandara Division in the year 1990. **(Appendix No.- XI)** Compartments have not been formed in such areas.

1.4 PERIOD OF THE WORKING PLAN AND NECESSARY FOR INTERMEDIATE REVISION:

This plan will be implemented for a period of 10 years from the year 2020-21 to 2029-30. 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. Principal Chief Conservator of Forests (Production & Management), Maharashtra State, Nagpur may issue necessary supplementary instructions on the aspects not covered in the plan.



CHAPTER 2
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SELECTION-CUM IMPROVEMENT WORKING CIRCLE

2.1 SELECTION-CUM IMPROVEMENT WORKING CIRCLE

The area of this Working Circle has been clearly marked on the GIS based map of 1:50000 which are appended as Management Map in the Plan and a copy of the same is given on a smaller scale on A4 size here.

2.2 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 pole and sound trees of both seedling and coppice origin. It includes 25682.084 Ha of total areas comprising of 20622.69 Ha of Reserved Forests and 5059.394 Ha of Protected Forests. It constitutes an area of 27.74 % of the total forest area of the division.

2.2.1. Based on the results of the enumeration data and satellite imageries and existing stock map details, the following criteria is adopted for allocation of compartments to the SCI areas:

- i. Compartments suitable for producing timber of medium and large size and not critically important for the protection of the topography.
- ii. Compartments having dense Teak Forest of IVA quality having patches of quality III and IVB inextricably mixed in the crop.
- iii. 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.
- iv. 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 No. - XXXIII).**

2.2.2 Area Statement: Range wise allocation of compartments and area is shown in the table below.

Table 2.1 Range wise Area allocation of compartments and area.

Ranges	RF		PF		Comptts (Total No)	Total area in Ha.
	No.of Comptts	Area.in Ha	No.of Comptts	Area.in Ha		
Bhandara	04	586.717	08	981.429	12	1568.146
Tumsar	06	2397.152	03	364.355	09	2761.507
Jamkandri	11	5512.724	01	37.717	12	5550.441
Sakoli	08	2883.448	07	826.527	15	3709.975
Pauni	0	0.00	05	405.764	05	405.764
Adyal	01	413.386	01	458.258	02	871.644
Lakhani	02	117.783	07	1323.675	09	1441.458
Nakadongri	07	3256.719	04	518.993	11	3775.712
Lendezari	09	4200.631	02	142.676	11	4343.307
Lakhandur	03	1254.130	00	0.00	03	1254.130
Grand Total	51	20622.69	38	5059.394	89	25682.08

2.3 GENERAL CHARACTER OF THE VEGETATION:

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*, *Decamaliare* the main species in the understorey. 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.

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.

As per the enumeration results, composition and structure of forest crop in SCI Working Circle area as surveyed by the Survey of Forest Resources Division is as given below

Table 1.2 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



SCI Forest during Summer



Natural Regeneration in SCI Coupes is good

2.4: FELLING SERIES, CUTTING SECTIONS AND JFM AREAS.

Felling series and annual coupes: The entire area of this working circle has been divided into 14 Felling Series with an average area of 1834.43 Ha and each felling series is further divided into 20 coupes with an average area of 91.72 Ha. (Details in **Appendix No. – XXXV**)

2.5 BLOCKS, COMPARTMENTS AND JFM AREA: Details of block and compartment wise area distribution is given in the **Appendix No.- XXXIII.**

2.6 SPECIAL OBJECTIVES OF MANAGEMENT:

The special objects of management of the forest areas under the SCI Working Circle are as follows:

- i. To gradually convert stunted Teak and other valuable coppice crop with reduced coppicing vigour into 'High Forest' by suitable silvicultural techniques and tending existing natural regeneration of seed origin.
- ii. To obtain sustained supply of medium to large-sized timber and poles.
- iii. 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.
- iv. 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.
- v. 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.

- vi. 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.
- vii. To conserve the local bio-diversity

2.6.1 Analysis and Valuation of the Crop:

- i. **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.
- ii. **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.
- iii. **SiteQuality:** Site quality governs the harvestable diameter. 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.
- iv. **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 No. - XXX.**
- v. **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 2.3. 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 2.3 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

2.6.2 Silvicultural System:

- i. SCI System prescribes removal of mature trees above the harvestable diameter 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.
- ii. Except Teak, forests of Bhandara Division support very few valuable species of good coppicing nature. Moreover, a significant part of these forests has 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 Ha 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 thinning 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.

2.6.3 Rotation period: Rotation period has been fixed for 80 years

2.6.4 Harvestable Diameter

Harvestable diameter for various important species, in SCI working circle, has been determined at maximum volume production as per the CAI and MAI curves in stem analysis exercises, carried out by the C.F Working Plan Nagpur during 2007. The details are given in the Table 2.4.

Table 2.4 Harvestable diameter for various species in the Division:

Group	Species	Harvestable Girth	Harvestable Diameter
Group-1	Teak	135 cm.for quality III (If found)	42.99
		120 cm.for quality IV	38.21
Group-2	Ain, Bija, Haldu and Kalam	135 cm.for quality III (If found)	42.99
		120 cm.for site quality IV	38.21
Group-3	Dhaoda, Tiwas,Surya, Shisham, Rohan,Bhirra, Kasai, Mokha, Palas, Dhaman, Bhilawa, Chichwa,etc	90 cm.for site quality IV	28.66
Group-4	Garadi, Lendia	45 cm.for site quality IV	14.33
Group-5	Species protected from felling (Semal, Kullu, Beheda,Karai, etc and all fruit	No. felling	

2.6.5 Reducing Factors and reduced areas: Not applicable.
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2.6.6 Felling cycle: Felling cycle has been fixed at 20 years.

2.6.7 Division into periods and allotment to Periodic Block (PB): Not applicable as Shelter wood system is not adopted for this Working Circle.

2.6.8 Calculation of the yield

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. From the enumeration data of SCI WC of this working plan, the average number of stems per Ha is calculated. For the purpose of yield, data of each species mentioned above is used. The data is as under:

Table 2.5 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	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

2.6.8.1 Survival Percentage: The percentage of trees, that will be reaching the harvestable diameter 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.DeLiocourt.

2.6.8.2 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.DeLiocourt, 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 trees 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

$$r = \frac{1}{8} \left(\frac{a_1}{a_2} + \frac{a_2}{a_3} + \dots + \frac{a_8}{a_9} \right)$$

b) Since $\frac{a_1}{a_2} = \frac{a_2}{a_3} = \dots = \frac{a_8}{a_9}$

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$$\text{and so } \frac{a_1 + a_2 + \dots + a_8}{8} = r$$

$$\text{c) Since } \frac{a_1}{a_2} = \frac{a_2}{a_3} = \frac{a_8}{a_9} = r$$

$$\text{and therefore } \frac{a_1}{a_2} = \frac{a_2}{a_3} = \frac{a_8}{a_9} = r, \text{ or } r = \frac{1}{8}$$

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

$$S = a + ar^{-1} + ar^{-2} + ar^{-3} \dots \dots \dots + ar^{-(n-1)}$$

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 sum 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 diameter.

Yield Calculation for Group-I Species (Teak)

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Table 2.6 Average Annual Recruitment for Teak. *Harvestable diameter 38.21 cm.*

Girth Class (cm)	Stem per ha	Stem/ha as per De Liocourt's Law	% of survival	Stem/ha reaching harvestable size (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

$$\begin{aligned}
 & a_1 + a_2 + \dots + a_8 \\
 \text{i) } r &= \frac{a_1 + a_2 + \dots + a_8}{a_2 + a_3 + \dots + a_9} \\
 &= \frac{15.14 + 8.26 + \dots + 0.13}{8.26 + 4.39 + \dots + 0.24} \\
 &= \frac{32.61}{17.6} = 1.85
 \end{aligned}$$

$$\text{and } S = a_1 + a_2 + \dots + a_9$$

$$= 15.14 + 8.26 + \dots + 0.13$$

$$= 32.74$$

$$\text{ii) } a = s (r^{n-1} (r-1) / (r^n - 1))$$

$$= 32.74 (136.89)(0.85) / (253.25-1)$$

$$= 32.74 \times 116.36 / 252.25$$

$$= 15.10 = \text{Recruitment in successive three felling series}$$

Felling Cycle Total Recruitment

$$\begin{aligned}
 1) \quad 18R_7 + 2R_6 &= 0.234 + 0.03 = 0.264 \\
 2) \quad 13R_6 + 7R_5 &= 0.195 + 0.105 = 0.300 \\
 3) \quad 7R_5 + 13R_4 &= 0.105 + 0.195 = 0.300
 \end{aligned}$$

Realisable recruitment in successive three felling cycles

a) First Felling Cycle

$$\begin{aligned}
 i) \quad R_{r1} &= \frac{1}{2} \{0.264 - 18(0.264 / 20 - 0.013)\} \\
 &= \frac{1}{2} \{0.264 - 18(0.0132 - 0.013)\} \\
 &= \frac{1}{2} (0.264 - 0.0036) \\
 &= 0.1302
 \end{aligned}$$

ii) Available recruitment R_{a1}

$$\begin{aligned}
 R_{a1} &= 0.264 - 0.1302 \\
 &= 0.134
 \end{aligned}$$

b) Second Felling Cycle

$$\begin{aligned}
 i) \quad R_{r2} &= \frac{1}{2} \{0.300 - 13(0.300 / 20 - 0.015)\} \\
 &= \frac{1}{2} \{0.300 - 13(0.015 - 0.015)\} \\
 &= \frac{1}{2} (0.300 + 0) = 0.150
 \end{aligned}$$

ii) Available recruitment R_{a2}

$$R_{a2} = 0.300 - 0.150 = 0.150$$

c) Third Felling Cycle

$$\begin{aligned}
 i) \quad R_{r3} &= \frac{1}{2} \{0.300 - 7(0.300 / 20 - 0.015)\} \\
 &= \frac{1}{2} \{0.300 - 7(0.015 - 0.015)\} \\
 &= \frac{1}{2} (0.300 + 0.00) \\
 &= \frac{1}{2} (0.300) = 0.150
 \end{aligned}$$

ii) Available recruitment R_{a2}

$$R_{a3} = 0.300 - 0.150 = 0.150$$

Table 2.7 Table Showing the Net Realisable Recruitment

Felling cycle	Total Recruitment	i) Realisable ii) Accumulation	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:

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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 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 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.

Yield Calculation for Group-II Species (Ain, Bija, Haldu, Kalam)

Table 2.8 Annual Average Recruitment (*Harvestable diameter 38.21cm*)

Girth Class (cm)	Stem per ha.	Stem/ha as per DeLicourt's Law	% of survival	Stem/ha reaching harvestable size (2 x 4/100)	Years required to pass over next	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

$$\begin{aligned}
 i) \quad r &= \frac{a_1 + a_2 + \dots + a_8}{a_2 + a_3 + \dots + a_9} \\
 &= \frac{29.57 + 17.84 + \dots + 1.19}{17.84 + 10.67 + \dots + 1.05} \\
 &= \frac{78.56}{50.04} = 1.57
 \end{aligned}$$

$$\text{and } S = a_1 + a_2 + \dots + a_9$$

$$= 29.57 + 17.84 + \text{-----} + 1.05 = 79.61$$

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$$\begin{aligned} \text{ii) } a &= s (r^{n-1}) (r - 1) / (r^n - 1) \\ &= 79.61 (36.92) (0.57) / (57.96 - 1) \\ &= 79.61 \times 21.04 / 56.96 \\ &= 29.41 \end{aligned}$$

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

$$\begin{aligned} \text{i) } R_{r1} &= \frac{1}{2} \{1.9892 - 14 (1.9892 / 20 - 0.1)\} \\ &= \frac{1}{2} \{1.9892 - 14 (0.09946 - 0.1)\} \\ &= \frac{1}{2} (1.9892 + 0.00756) \\ &= 0.9984 \end{aligned}$$

$$\begin{aligned} \text{ii) Available recruitment } Ra_1 \\ Ra_1 &= 1.9892 - 0.9984 \\ &= 0.9908 \end{aligned}$$

b) Second Felling Cycle

$$\begin{aligned} \text{i) } R_{r2} &= \frac{1}{2} \{2.3878 - 7 (2.3878 / 20 - 0.0982)\} \\ &= \frac{1}{2} \{2.3878 - 7 (0.1194 - 0.0982)\} \\ &= \frac{1}{2} (2.3878 - 0.1484) \\ &= 1.1197 \end{aligned}$$

$$\begin{aligned} \text{ii) Available recruitment } Ra_2 \\ Ra_2 &= 2.3878 - 1.1197 \\ &= 1.2681 \end{aligned}$$

c) Third Felling Cycle

$$\begin{aligned} \text{i) } R_{r3} &= \frac{1}{2} \{2.186 - 10 (2.186 / 20 - 0.1328)\} \\ &= \frac{1}{2} \{2.186 - 10 (0.1093 - 0.1328)\} \\ &= \frac{1}{2} (2.186 + 0.235) = 1.211 \end{aligned}$$

$$\begin{aligned} \text{ii) Available recruitment } Ra_3 \\ Ra_3 &= 2.186 - 1.211 \\ &= 0.975 \end{aligned}$$

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Table 2.9 Net Realisable Recruitment:

Total Recruitment	i) Realisable ii) Accumulation	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.

Yield Calculation for Group-III Species (Dhaoda, Khair, Rohan, Shiwan, Shisham, Salai, Mowai, Surya) Harvestable diameter 28.66 cm.

Table2.10 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

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$$\begin{aligned}
 i) \quad r &= \frac{a_1 + a_2 + \dots + a_8}{a_2 + a_3 + \dots + a_9} \\
 &= \frac{55.30 + 32.37 + \dots + 1.30}{32.37 + 21.35 + \dots + 1.17} \\
 &= \frac{142.15}{88.02} = 1.61
 \end{aligned}$$

$$\begin{aligned}
 \text{and } S &= a_1 + a_2 + \dots + a_9 \\
 &= 55.30 + 32.37 + \dots + 1.17 \\
 &= 143.32
 \end{aligned}$$

$$\begin{aligned}
 ii) \quad a &= s (r^{n-1}) (r - 1) / (r^n - 1) \\
 &= 143.32 (45.14) (0.61) / (72.68 - 1) \\
 &= 143.32 \times 27.53 / 71.68 = 55.05
 \end{aligned}$$

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

$$\begin{aligned}
 i) \quad R_{r1} &= \frac{1}{2} \{6.658 - 18 (6.658 / 20 - 0.321)\} \\
 &= \frac{1}{2} \{6.658 - 18 (0.3329 - 0.321)\} \\
 &= \frac{1}{2} (6.658 - 0.2142) \\
 &= 3.2219
 \end{aligned}$$

ii) Available recruitment R_{a1}

$$\begin{aligned}
 R_{a1} &= 6.658 - 3.2219 \\
 &= 3.4361
 \end{aligned}$$

b) Second Felling Cycle

$$\begin{aligned}
 \text{i) } R_{r2} &= \frac{1}{2} \{9.05 - 10 (9.05 / 20 - 0.440)\} \\
 &= \frac{1}{2} (9.05 - 10 (0.453 - 0.440)) \\
 &= \frac{1}{2} (9.05 - 0.13) = 4.46
 \end{aligned}$$

ii) Available recruitment R_{a2}

$$\begin{aligned}
 R_{a2} &= 9.05 - 4.46 \\
 &= 4.59
 \end{aligned}$$

c) Third Felling Cycle

$$\begin{aligned}
 \text{i) } R_{r3} &= \frac{1}{2} \{10.406 - 10 (10.406 / 20 - 0.465)\} \\
 &= \frac{1}{2} \{10.406 - 10 (0.520 - 0.465)\} \\
 &= \frac{1}{2} (10.406 - 0.55) \\
 &= 4.928
 \end{aligned}$$

ii) Available recruitment R_{a3}

$$R_{a3} = 10.406 - 4.928 = 5.478$$

Table 2.11 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.

Yield Calculation for Group-IV Species (Lendia, Garadi) Harvestable diameter 14.33 cm.

Table 2.12 Annual Average Recruitment

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

$$\begin{aligned}
 & a_1 + a_2 + \dots + a_8 \\
 \text{i) } r &= \frac{a_1 + a_2 + \dots + a_8}{a_2 + a_3 + \dots + a_9} \\
 &= \frac{69.90 + 34.62 + \dots + 0.09}{34.62 + 14.80 + \dots + 0.03} \\
 &= \frac{129.22}{59.35} = 2.18
 \end{aligned}$$

$$\begin{aligned}
 \text{And } S &= a_1 + a_2 + \dots + a_9 \\
 &= 69.90 + 34.62 + \dots + 0.03 \\
 &= 129.25
 \end{aligned}$$

$$\begin{aligned}
 \text{ii) } a &= s (r^{n-1} (r-1) / (r^n - 1)) \\
 &= 129.25 (510.10) (2.18-1) / (1112.009 - 1) \\
 &= 129.25 \times 601.918 / 1111.009 \\
 &= 70.025
 \end{aligned}$$

Recruitment in successive three felling series

Felling cycle **Total recruitment**

$$1) 19R2 + R1 = 15.8802 + 1.505 = 16.9307$$

2) $13R_1 + 7R_2 = 13.6565 + 5.8506 = 19.5071$
3) $12R_2 + 8R_1 = 10.296 + 8.404 = 18.4336$

Realisable recruitment in the successive three felling cycles.

a) First Felling Cycle

i) $R_{r1} = \frac{1}{2} \{16.9307 - 19 (16.9307 / 20 - 0.8358)\}$
 $= \frac{1}{2} \{16.9307 - 19 (0.8465 - 0.8358)\}$
 $= \frac{1}{2} \{16.9307 - 0.2040\}$
 $= 8.3634$

ii) Available recruitment R_{a1}

$R_{a1} = 16.9304 - 8.3634$
 $= 8.5673$

b) Second Felling Cycle

i) $R_{r2} = \frac{1}{2} \{19.5071 - 13 (19.5071 / 20 - 1.0505)\}$
 $= \frac{1}{2} \{19.5071 - 13 (0.9754 - 1.0505)\}$
 $= \frac{1}{2} (19.5071 + 0.9763)$
 $= 10.2417$

ii) Available recruitment R_{a2}

$R_{a2} = 19.5071 - 10.2417$
 $= 9.2654$

c) Third Felling Cycle

i) $R_{r3} = \frac{1}{2} \{18.4336 - 12 (18.4336 / 20 - 0.8358)\}$
 $= \frac{1}{2} \{18.4336 - 12 (0.9217 - 0.8358)\}$
 $= \frac{1}{2} (18.4336 - 1.306) = 8.7015$

ii) Available recruitment R_{a3}

$R_{a3} = 18.4336 - 8.7015$
 $= 9.7321$

Table 2.13 Net Realisable Recruitment:

Felling cycle	Total Recruitment	i) Realisable ii) Accumulation	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:

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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 2.14 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.

2.6.9 Table of Felling:

The abstract of the table of felling is given below in table 2.15.

Table 2.15 Year wise working of coupe

Year	Range	No. of total Felling Series	Coupe No.	Total no. of coupes	Total no. of Comp involved	Total Area (in Ha)
2020-21	Adyal	1	XI	1	1	57.281
2020-21	Bhandara	1	XI	1	1	152.489
2020-21	Jamkandri	3	XI	3	3	283.358
2020-21	Lakhani	1	XI	1	1	54.780
2020-21	Lendezari	2	XI	2	2	224.755

Year	Range	No. of total Felling Series	Coupe No.	Total no. of coupes	Total no. of Comp involved	Total Area (in Ha)
2020-21	Nakadongri	2	XI	2	2	192.687
2020-21	Paoni	1	XI	1	1	26.878
2020-21	Sakoli	2	XI	2	2	262.570
2020-21	Tumsar	1	XI	1	1	162.878
	Total	14		14	14	1417.676
2021-22	Adyal	1	XII	1	1	57.291
2021-22	Bhandara	1	XII	1	1	87.412
2021-22	Jamkandri	3	XII	3	3	345.298
2021-22	Lakhani	1	XII	1	1	59.560
2021-22	Lendezari	2	XII	2	2	249.877
2021-22	Nakadongri	2	XII	2	2	130.026
2021-22	Pauni	1	XII	1	1	51.422
2021-22	Sakoli	2	XII	2	2	188.867
2021-22	Tumsar	1	XII	1	1	132.347
	Total	14		14	14	1302.100
2022-23	Adyal	1	XIII	1	1	57.281
2022-23	Bhandara	1	XIII	1	1	95.785
2022-23	Jamkandri	3	XIII	3	3	289.7
2022-23	Lakhani	1	XIII	1	1	75.796
2022-23	Lendezari	2	XIII	2	2	173.247
2022-23	Nakadongri	2	XIII	2	2	170.776
2022-23	Pauni	1	XIII	1	1	51.423
2022-23	Sakoli	2	XIII	2	2	159.847
2022-23	Tumsar	1	XIII	1	1	72.229
	Total	14		14	14	1146.084
2023-24	Adyal	1	XIV	1	1	57.281
2023-24	Bhandara	1	XIV	1	1	67.886
2023-24	Jamkandri	3	XIV	3	3	286.865
2023-24	Lakhani	1	XIV	1	1	122.162
2023-24	Lendezari	2	XIV	2	2	209.13
2023-24	Nakadongri	2	XIV	2	2	227.942
2023-24	Pauni	1	XIV	1	1	73.94
2023-24	Sakoli	2	XIV	2	2	192.586
2023-24	Tumsar	1	XIV	1	1	48.675
	Total	14		14	14	1286.467
2024-25	Adyal	1	XV	1	1	57.281
2024-25	Bhandara	1	XV	1	1	54.754
2024-25	Jamkandri	3	XV	3	3	310.736
2024-25	Lakhani	1	XV	1	1	166.853
2024-25	Lendezari	2	XV	2	2	186.699
2024-25	Nakadongri	2	XV	2	2	168.532
2024-25	Lakhandur	1	XV	1	1	54.210
2024-25	Sakoli	2	XV	2	2	155.005
2024-25	Tumsar	1	XV	1	1	108.419
	Total	14		14	14	1262.529

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Year	Range	No. of total Felling Series	Coupe No.	Total no. of coupes	Total no. of Comp involved	Total Area (in Ha)
2025-26	Adyal	1	XVI	1	1	57.281
2025-26	Bhandara	1	XVI	1	1	56.656
2025-26	Jamkandri	3	XVI	3	3	297.111
2025-26	Lakhani	1	XVI	1	1	37.344
2025-26	Lendezari	2	XVI	2	2	268.314
2025-26	Nakadongri	2	XVI	2	2	258.395
2025-26	Lakhandur	1	XVI	1	1	54.210
2025-26	Sakoli	2	XVI	2	2	114.245
2025-26	Tumsar	1	XVI	1	1	70.544
	Total	14		14	14	1214.100
2026-27	Adyal	1	XVII	1	1	57.281
2026-27	Bhandara	1	XVII	1	1	78.749
2026-27	Jamkandri	3	XVII	3	3	274.124
2026-27	Lakhani	1	XVII	1	1	37.231
2026-27	Lendezari	2	XVII	2	2	264.395
2026-27	Nakadongri	2	XVII	2	2	219.297
2026-27	Lakhandur	1	XVII	1	1	55.810
2026-27	Sakoli	2	XVII	2	2	147.013
2026-27	Tumsar	1	XVII	1	1	67.369
	Total	14		14	14	1201.69
2027-28	Adyal	1	XVIII	1	1	57.281
2027-28	Bhandara	1	XVIII	1	1	103.819
2027-28	Jamkandri	3	XVIII	3	3	241.516
2027-28	Lakhani	1	XVIII	1	1	66.251
2027-28	Lendezari	2	XVIII	2	2	204.231
2027-28	Nakadongri	2	XVIII	2	2	151.062
2027-28	Pauni	1	XVIII	1	1	58.87
2027-28	Sakoli	2	XVIII	2	2	120.648
2027-28	Tumsar	1	XVIII	1	1	66.808
	Total	14		14	14	1070.486
2028-29	Adyal	1	XIX	1	1	78.67
2028-29	Bhandara	1	XIX	1	1	107.208
2028-29	Jamkandri	3	XIX	3	3	343.26
2028-29	Lakhani	1	XIX	1	1	133.038
2028-29	Lendezari	2	XIX	2	2	210.347
2028-29	Nakadongri	2	XIX	2	2	253.017
2028-29	Lakhandur	1	XIX	1	1	55.810
2028-29	Sakoli	2	XIX	2	2	199.074
2028-29	Tumsar	1	XIX	1	1	62.996
	Total	14		14	14	1443.420
2029-30	Adyal	1	XX	1	1	78.509
2029-30	Bhandara	1	XX	1	1	126.044
2029-30	Jamkandri	3	XX	3	3	243.447
2029-30	Lakhani	1	XX	2	1	117.783
2029-30	Lendezari	2	XX	2	2	258.189

Year	Range	No. of total Felling Series	Coupe No.	Total no. of coupes	Total no. of Comp involved	Total Area (in Ha)
2029-30	Nakadongri	2	XX	2	2	163.142
2029-30	Pauni	1	XX	1	1	50.087
2029-30	Sakoli	2	XX	2	2	181.595
2029-30	Tumsar	1	XX	1	1	78.474
	Total	14		14	14	1297.270

2.6.10 Method of executing the felling

2.6.10.1 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. JFM committees should also be taken into confidence to encourage the participatory system of forest management.

2.6.10.2 Coupe Demarcation, Preparation of Treatment Maps and Marking Techniques:

2.6.10.2 (i) 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.

2.6.10.2 (ii) 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.

2.6.10.2 (iii) 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 Miscellaneous Regulations.
- iv) Plantation:** Plantation of suitable species 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 and Blank Areas: Under stocked areas can be categorised into 2 types:

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- **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.

2.6.10.2 (iv) The following operations are recommended:

- i. **Enumeration in Annual Coupes:** Species and girth-class of all trees above harvestable diameter 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 diameter 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.

2.6.10.3 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 diameter 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*, *Hirda*, *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 recouplement 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.

2.6.11 Subsidiary Silvicultural Operations:

- i. **Cutback Operations:** Cutback operations shall be carried out, in the next year of coupe working in the annual coupes. **(Appendix No. – 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.
- ii. **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.
- iii. **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.

2.6.12 Regeneration

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2.6.12.1 Method of Regeneration

- i. 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.
- ii. 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.
- iii. Bamboo plantations shall be taken in suitable areas in such a way that it does not suppress the valuable light demanding species like Teak.
- iv. 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*, *Mahrugh*, *Kinhi*, *Semal*, *Sisso*, *Babul* and fruit trees (*Ficus* spp. *Ber* etc for wildlife).

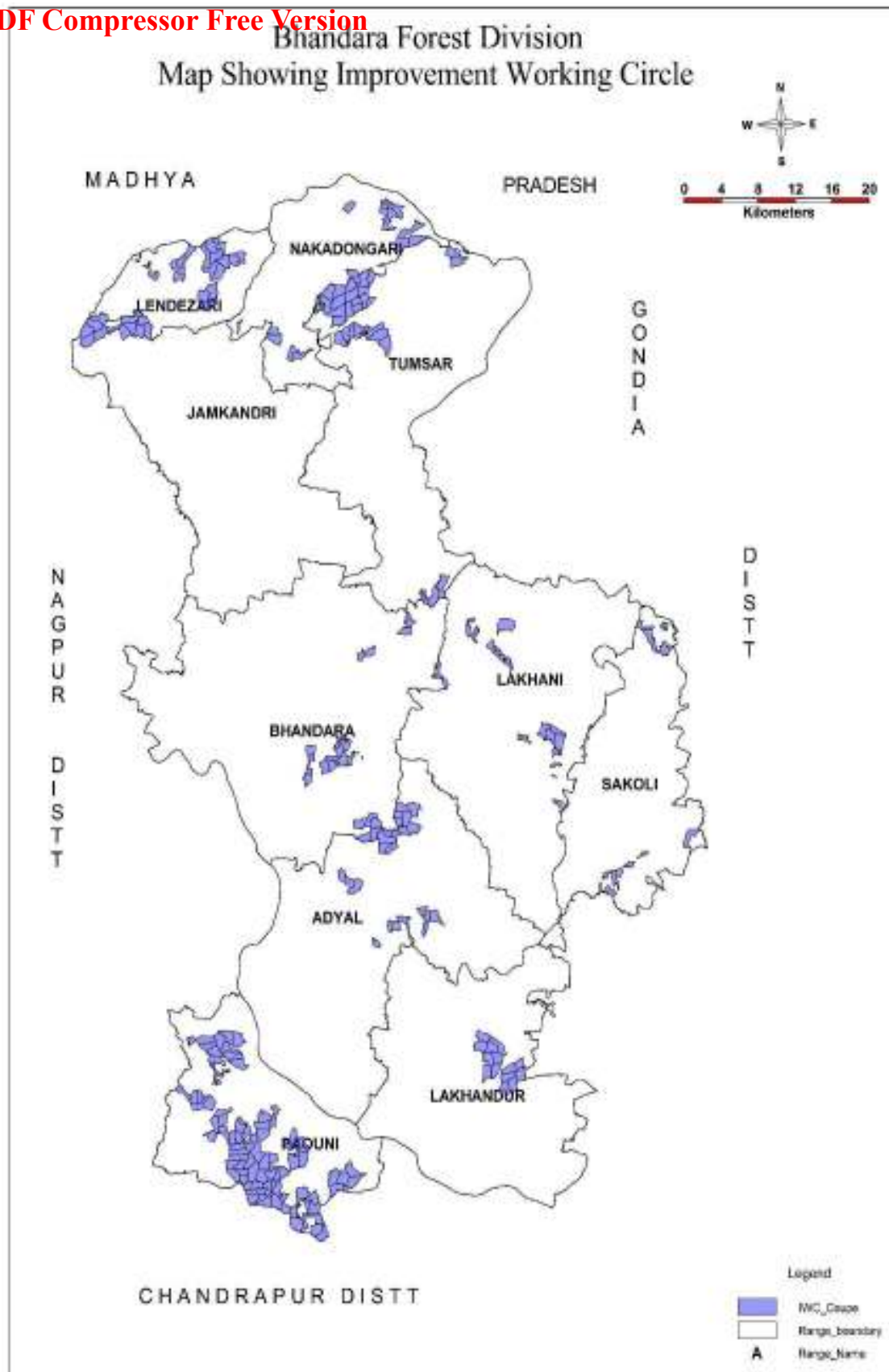
2.6.12.2 Soil and Moisture Conservation: The soil and moisture conservation works will be taken up along with marking operation and completed before on set of monsoons in the next financial year. The soil and moisture conservation works will include gully plugging and nala bunding etc. These works will 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.

2.6.12.3 Choice of Species: 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.

2.6.13 Associated regulations and measures:

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.



IMPROVEMENT WORKING CIRCLE

3.1: IMPROVEMENT WORKING CIRCLE

The area of this Working Circle has been clearly marked on the GIS based map of 1:50000 and a copy of the same is given on a smaller scale on A4 size here.

3.2: GENERAL CONSTITUTION OF 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 24912.053 Ha, comprising 21661.477 Ha of Reserved Forests and 3250.576 Ha of Protected Forests. It constitutes 26.91 % 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 adopted for allocation of compartments to the I.W.C. area.

- i. Areas with young crop and damaged crop, requiring spacing out (thinning) and improvement felling to develop it as future SCI crop.
- ii. 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.
- iii. 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 No.- XXXVI**)

The distribution of areas by ranges is given in the table 3.1.

Table 3.1 Range wise area allocation of compartments and area

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	10	4347.35	0	0	10	4347.35
Lendezari	4	1879.361	1	77.623	5	1956.984
Nakadongri	5	1056.126	2	263.842	7	1319.968
Paoni	15	6778.847	1	131.911	16	6910.758
Sakoli	3	107.569	3	571.424	6	678.993
Tumsar	7	2872.863	5	692.095	12	3564.958
Adyal	3	1485.734	3	459.23	6	1944.964
Lakhani	5	501.085	5	496.337	10	997.422
Grand Total	59	21661.477	24	3250.576	83	24912.053

Table 3.2 Species and Girth-wise Distribution in IWC Area

(Source: Enumeration Data)

Total Area = 24901.163 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



Representative IWC areas

3.3 GENERAL CHARACTERISTICS OF VEGETATION

On the basis of enumeration results, the species composition and their girth distribution in forest areas under this working circle, is given in Table 3.2.

3.4 FELLING SERIES, CUTTING SECTIONS AND JFM AREAS

The entire area of this working circle is divided into 13 Felling Series with average area of treatment series of 1916.31 ha. The area of each Felling series is further divided into 20 (twenty) coupes with an average area of about 95.81 Ha. (**Appendix No. – XXXVIII.**)

3.5 BLOCKS, COMPARTMENTS AND JFM AREA

Details of the allotment of compartments to Improvement Working Circle have been given in **Appendix No. - XXXVI.**

3.6 SPECIAL OBJECTIVES OF MANAGEMENT

The special objectives of management for this working circle are:

- i. To improve the quality and productivity of the existing tree stand 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.
- ii. To check soil erosion and conserve soil moisture, essential for creating conditions conducive for rejuvenation and growth of natural regeneration and rootstock.
- iii. 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.
- iv. To conserve the biological diversity of the area.

3.6.1 Analysis and valuation of the Forest plantations

- i. **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.
- ii. **Age and Density:** The tree stand 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.
- iii. **Site Quality:** Site quality governs the harvestable diameter.
- iv. **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 No.- XXX**. This data was used for the relative distribution of species, girth wise, basal area wise, which ultimately is used for allocation of working circles.
- v. **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 3.3 Regeneration recorded in the IWC

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

3.6.2 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 forest plantation has been visualized to have mixed composition of valuable species like *Teak*, and other superior miscellaneous species.

3.6.3 Rotation Period: Rotation Period has not been fixed.

3.6.4 Harvestable Diameter: Not applicable as the operation is not for obtaining yield, but for improvement of the forest plantation.

3.6.5 Reducing factors and Reducing areas: Not applicable.

3.6.6 Felling Cycle/ Treatment cycle: The treatment cycle is fixed at 20 years.

3.6.7 Division into Periods and allotment to Periodic Block (PB): Not applicable, as the silvicultural system applied is for improvement, there is no division into period or any Periodic Block.

3.6.8 Calculation of Yield

Regulation of yield: Since harvesting is not prescribed, yield regulation is not described. The silvicultural tending operations will be regulated by area.

3.6.9 Table of Felling The abstract of the Table of Felling is given below but the detailed schedule is given in **Appendix No. XXXVIII**

Table 3.4 Year wise working of coupes

Year	Range	No. total F.S.	Coupe No.	Total no. of coupes	Total no. of Compt.	Total area (in Ha)
2020-21	Adyal	1	XI	1	1	143.433
	Bhandara	1	XI	1	1	47.4

Year	Range	No. total F.S.	Coupe No.	Total no. of coupes	Total no. of Compt.	Total area (in Ha)
	Jamkandri	1	XI	1	1	140.218
	Lakhandur	2	XI	2	2	247.643
	Nakadongri	1	XI	1	2	55.881
	Pauni	4	XI	4	4	360.573
	Tumsar	2	XI	2	2	244.478
Total		12		12	12	1239.426
2021-22	Tumsar	1	XII	1	1	153.805
	Jamkandri	1	XII	1	1	147.206
	Bhandara	1	XII	1	1	76.865
	Adyal	1	XII	1	1	94.329
	Lakhandur	2	XII	2	2	247.962
	Paoni	4	XII	4	4	348.3
	Lakhni	1	XII	1	1	96.98
	Lendezari	1	XII	1	1	116.227
Total		12		12	12	1281.674
2022-23	Tumsar	1	XIII	1	1	140.412
	Bhandara	1	XIII	1	1	76.54
	Adyal	1	XIII	1	1	89.499
	Lakhandur	2	XIII	2	2	245.665
	Pauni	4	XIII	4	4	389.483
	Lakhani	1	XIII	1	2	44.054
	Lendezari	2	XIII	2	2	258.3
Total		12		12	13	1243.953
2023-24	Tumsar	2	XIV	2	2	206.039
	Bhandara	1	XIV	1	1	87.816
	Adyal	1	XIV	1	1	78.35
	Lakhandur	2	XIV	2	2	248.180
	Pauni	4	XIV	4	4	408.544
	Lendezari	2	XIV	2	2	253.803
Total		12		12	12	1282.732
2024-25	Tumsar	2	XV	2	2	180.549
	Bhandara	1	XV	1	1	55.442
	Adyal	1	XV	1	1	110.074
	Pauni	4	XV	4	4	376.042
	Lendezari	2	XV	2	2	261.435
	Sakoli	1	XV	1	3	107.569
	Lakhandur	1	XV	1	1	120.300
Total		12		12	14	1150.749
2025-26	Tumsar	1	XVI	1	1	77.545
	Bhandara	1	XVI	1	1	72.843

Year	Range	No total F.S.	Coupe No.	Total no. of coupes	Total no. of Compt.	Total area (in Ha)
	Adyal	1	XVI	1	1	159.492
	Pauni	4	XVI	4	4	436.564
	Lendezari	2	XVI	2	2	198.333
	Sakoli	1	XVI	1	1	66.6
	Lakhani	1	XVI	1	2	43.260
	Lakhandur	1	XVI	1	1	120.510
Total		12		12	13	1175.147
2026-27	Tumsar	2	XVII	2	2	258.81
	Bhandara	1	XVII	1	1	78.014
	Adyal	1	XVII	1	1	148.924
	Pauni	4	XVII	4	4	411.425
	Lendezari	2	XVII	2	2	220.504
	Sakoli	1	XVII	1	1	133.332
	Lakhandur	1	XVII	1	1	162.260
Total		12		12	12	1413.269
2027-28	Tumsar	2	XVIII	2	2	189.008
	Bhandara	1	XVIII	1	1	79.571
	Adyal	1	XVIII	1	1	147.305
	Pauni	4	XVIII	4	4	376.909
	Lendezari	2	XVIII	2	2	236.493
	Sakoli	1	XVIII	1	1	133.63
	Lakhandur	1	XVIII	1	1	144.330
Total		12		12	12	1307.246
2028-29	Tumsar	1	XIX	1	1	112.654
	Bhandara	1	XIX	1	1	108.452
	Lakhani	1	XIX	1	1	104.408
	Adyal	1	XIX	1	1	71.957
	Pauni	4	XIX	4	5	390.662
	Lendezari	2	XIX	2	2	214.246
	Sakoli	1	XIX	1	1	153.27
	Lakhandur	1	XIX	1	1	157.700
Total		12		12	13	1313.349
2029-30	Tumsar	2	XX	2	2	231.077
	Bhandara	1	XX	1	1	54.839
	Adyal	1	XX	1	1	96.799
	Pauni	3	XX	3	3	272.653
	Lendezari	2	XX	2	2	197.643
	Sakoli	1	XX	1	1	84.592
	Lakhandur	2	XX	2	2	291.5
Total		12		12	12	1229.103

3.6.10.1 Coupe Demarcation, Treatment Map:

The coupe demarcation of annual coupes shall be carried out one year in advance of main working as per prescriptions described in the Chapter of Miscellaneous Regulations.

Treatment Map 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 and areas having adequate promising NR and rootstock

Treatment 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:

- i) A₁ type areas, which have slope more than 25°.
 - ii) A₂ type areas i.e., 20 m wide strip on both sides of streams.
 - iii) A₃ type areas; which are susceptible to excessive erosion.
1. Soil and moisture conservation work/measures, as described in the Chapter on Miscellaneous Regulations are prescribed.
 2. No harvesting is prescribed in these areas.

B-Type Areas: Under-stocked Areas

1. Soil and moisture conservation works/measures, as prescribed in the Chapter of Miscellaneous Regulations.
2. Site with clear open patch and found suitable for plantation will be taken up for afforestation works.

C-Type Areas: Congested pole crop

1. Areas with sufficient pole crop of valuable species which can be retained as a future crop.
2. No planting shall be done in these areas.

3. Thinning shall be carried out in young pole crop to bring down stem numbers and spacing, matching with the yield table, as prescribed under the Thinning Guidelines.

D -Type Areas: Well-stocked Areas

Areas having density 0.4 or over showing adequate regeneration 400 or above established seedlings are considered as well stocked areas. The following operations are carried out.

- i. **Marking for Harvesting:** Trees for improvement felling in favour of valuable species and over matured trees in few dense patches (above harvestable diameter 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.
- ii. **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 seedling/saplings per hectare. The natural regeneration shall be encouraged by soil working and mulching around them in accordance with the guidelines for the rootstock management.
- iii. Singling of coppice shoots to retain one or two promising shoots is prescribed.

3.6.10.2: Marking Rules and Prescriptions:

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 excessive marking, if any.

The following rules are proposed to be observed strictly for marking in various treatment type areas;

A Type Areas: Protection Areas: No tree shall be marked for felling.

B Type Areas: Under stocked Areas:

1. All dead trees, retaining 2 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 one or two promising pole/ stool, shall be marked.

C Type Areas: Groups of young poles:

1. The congested pole crop shall be marked for thinning to maintain 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 fruit bearing species, such as, *Moha, Achar, Tendu, Anola, Sitafal, Chinch, Bel* and minor forest produce yielding species such as *Kullu, Semal and Salai* shall be reserved.
2. All dead and malformed trees, trees with hollowness, retaining 2 trees per hectare and all live high stumps shall be marked for felling.
3. All, but one or two, vigorously, growing coppice pole per stool shall be marked for felling.
4. Only improvement felling shall be carried out where ever necessary.

3.6.11 Subsidiary Silvicultural Operations

A. Cutback Operation: The cutback operations will be carried out in the next year of coupe working (**Appendix No.- 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: 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: 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 forest plantation. Poles of vigorously growing non-Teak species should be preferred for retention so long as not less than 50 percent of the forest plantation is dominated by Teak.

3.6.12 Regeneration:

3.6.12.1. 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 everywhere. 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.

3.6.12.2. Methods of Regeneration:

Natural Regeneration:

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.

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 forest plantation.* 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.
 - 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 and facilitate loosening and aeration of the soil by worms and insects. One soil working shall 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 shall be carried out in the first week of August around the shoots of coppice seedlings.
 - c) **Third year operations:** Singling of coppice shoots, management of damaged and malformed saplings, climber cutting and shrub clearance shall be done.

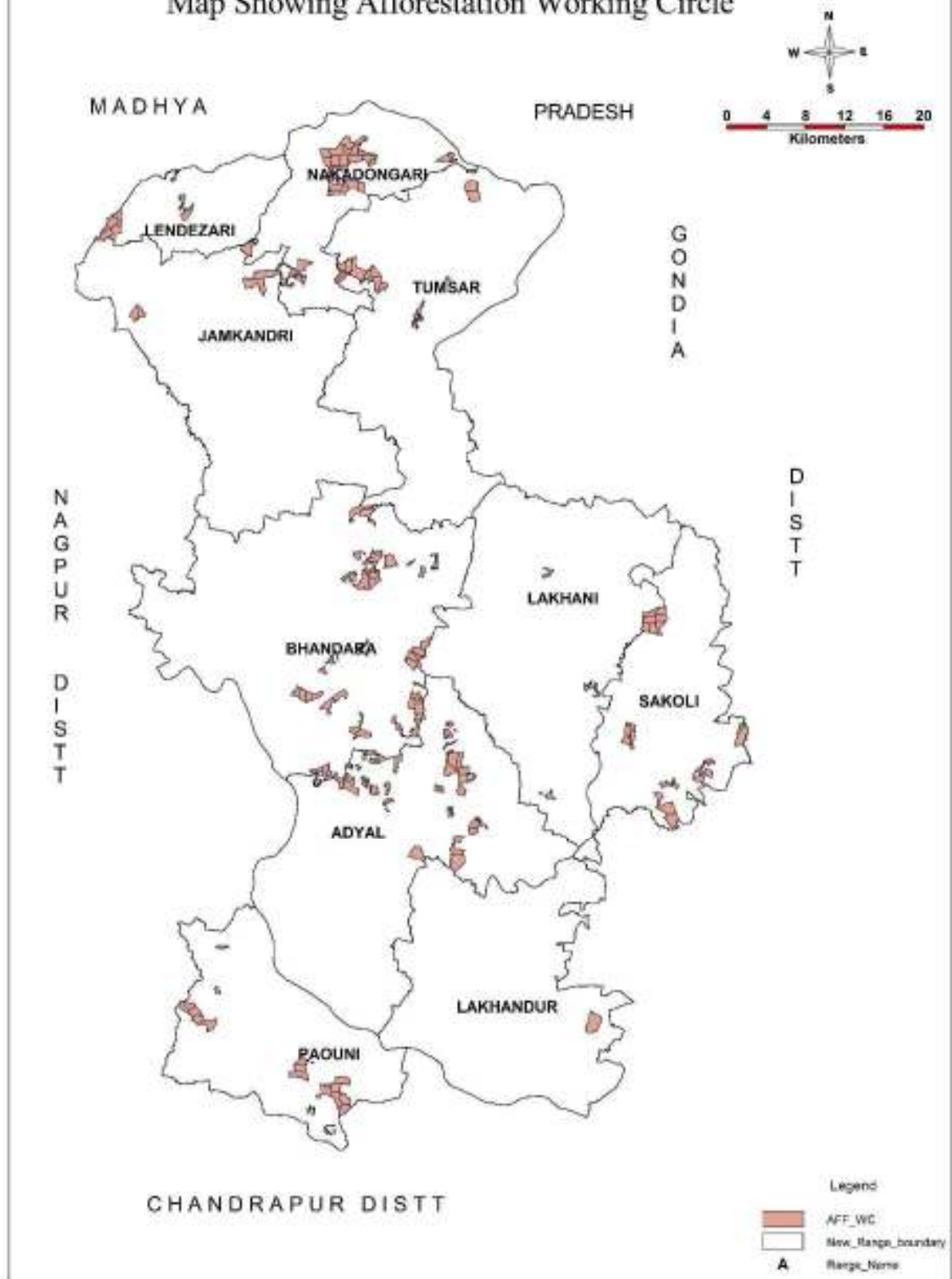
Plantations in the B2-type and A-type areas are prescribed as per the plantation guidelines given in the Miscellaneous Rules. Preference will be given to the local valuable species and as desired by the local people. Areas suitable for Bamboo will be brought under the Bamboo plantations but reasonable care should be taken while taking Bamboo plantation, so that it should not suppress the young forest plantation 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, Kinh, Siras, Semal, Sissoo, Babul and other NTFP species* at suitable sites. Some suitable species like *Ficus, Ber, Babul* etc. species should also be planted to improve the habitat of wild animals and birds.

3.6.13 Associated regulations and measures

Closure to Grazing and Fire Protection:

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.

Bhamburda Forest Division Map Showing Afforestation Working Circle



AFFORESTATION WORKING CIRCLE

4.1: AFFORESTATION WORKING CIRCLE:

The area of this Working Circle has been clearly marked on the GIS based map of 1:50000 and a copy of the same is given on a smaller scale on A4 size here.

4.2: GENERAL CONSTITUTION OF 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 (AWC) forms about 28.36 % of the forest areas of the division. It includes 25929.35 Ha. of the forest areas comprising of Reserved Forests to the extent of 9676.533 Ha., Protected Forests 11753.412 Ha, Zudpi Jungle 4499.405 Ha. The Compartment and Village wise area allotted to various Ranges is shown in the following Table

The following criteria have been considered for allocation of compartments to the Afforestation Working Circle:

- i. Compartments having blank areas.
- ii. Compartments having poor quality open forests (degraded forests), which need some tending operations to become productive.

Table 4.1 Range-wise Area Distribution to AFF. W.C:

(Area in Ha.)

Range	R.F			PF		Zudpi Jungle	Un-classed Forest	Total Area
	No. of Compt.	No. of Village	Area in Ha	No. of Compt.	Area in Ha.			
Bhandara	02	58	1666.311	35	2816.108	0.28	0	4482.699
Tumsar	1	12	314.81	12	772.089	1034.065	0	2120.964
Jamkandri	0	20	682.56	08	397.792	5773	0	1222.332
Sakoli	2	26	2020.655	14	1531.721	467.2	0	4019.576
Pauni	01	07	969.696	10	284.16	184.69	0	1438.546
Adyal	4	17	824.095	20	1701.839	1154.65	0	3680.174
Lakhani	1	14	730.529	11	644.487	790.58	0	2165.596
Nakadongri	3	0	963.157	7	1255.615	376.79	0	2595.562
Lendezari	1	0	411.97	2	86.494	59.89	0	558.354
Lakhandur	02	22	1092.75	24	2263.517	289.28	0	3645.547
Grand Total	17	154	9676.533	143	11753.522	10130.425	0	25929.35

4.3 GENERAL CHARACTERISTICS OF VEGETATION

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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.

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. 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.

The crop consists mainly of scattered trees or patches of open forests. Girth-class wise distribution of species is depicted in table 4.2.

Table 4.2 Species and Girth wise Distribution in AFF WC.
(Source: Enumeration Data)

Species and Girth Distribution in AWC Area per ha. (Source - Enumration data)											
Total Area = 25929.35 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

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 4.3 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

4.4 FELLING SERIES, CUTTING SECTIONS AND JFM AREAS

Treatment Cycle: The treatment cycle for this working circle has been fixed at 20 (twenty) years.

Treatment Series and Annual Coupes: These treatment series and annual coupes comprises only of RF and PF, it does not include the area of Zudpi jungle and Unclassed Forests, handed over to the Forest Department. The small and scattered areas of Zudpi 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 2592.935 ha. Each Treatment Series has been further divided into 20 (twenty) annual coupes with an average area of 129.646 ha. Details are provided in **Appendix No.- XL and Appendix No.- XLI.**

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.

4.5 BLOCKS, COMPARTMENTS AND JFM AREA (MARKED ON GIS BASED MAPS)

Details of the allotment of compartments to Afforestation Working Circle have been given in **Appendix No - XXXIX**.

4.6 SPECIAL OBJECTIVES OF MANAGEMENT

The special objectives of management for this working circle are:

- To restore the vegetative cover and of degraded and open areas and increase their productivity by site protection and tending of natural regeneration and rootstock, supplementing it with plantations, wherever, necessary.
- 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 actively involve Gram Panchayats and other village institutions like JFM committees in re-vegetating degraded areas.
- To improve the quantity and quality of fodder by planting fodder tree species and introducing superior and high yielding fodder grasses and legumes.

4.6.1 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 No.- 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 diameter. 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:
- **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 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 No. – XXX**.

4.6.2 Silvicultural System:

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- 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 area 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

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Appendix No. - XLIX.

4.6.3 Rotation Period: No rotation period is fixed.

4.6.4 Harvestable Diameter: Not applicable

4.6.5 Reducing factors and Reducing areas: Not applicable.

4.6.6 Felling Cycle/ Treatment cycle: The treatment cycle is fixed at 10 years.

4.6.7 Division into Periods and allotment to Periodic Block (PB): Not applicable.

4.6.8 Calculation of Yield

Regulation of yield: No yield is prescribed for this working circle. Only removal of dead trees (after retaining 2 dead trees/ha as snags) are prescribed.

4.6.9 Table of Felling Not Applicable.

4.6.10. Method of executing the Felling.

4.6.10.1: Demarcation, Treatment Map and Treatment Prescription: The coupe Demarcation, preparation of treatment maps and marking will abide by the prescriptions mentioned in the chapter of Miscellaneous Regulations.

Treatment Map: Treatment map shall be prepared in detail well in advance to facilitate effective planning for raising nursery stock and also to mobilise financial resources to execute the work.

Treatment Prescribed: Treatment map shall be prepared for each working coupe on the basis of treatment prescribed for various areas. Treatment map should invariably be verified by ACF before estimates are technically approved by the DCF.

Area specific treatment is as below:

A -Type Areas (Protection Areas)

They will include-

- A1 type areas, which have slope more than 25°,
- A2 type areas, i.e. 30 m wide strip on both sides of streams,

B -Type Areas (Under-stocked 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, whereas **B2-Type** will include degraded lands without sufficient Natural Regeneration.
- The areas which were earlier planted but the plantations have failed.

C -Type Areas(pole crop)

Areas with sufficient pole crop of valuable species which can be retained as future crop shall be marked separately.

D - Type Areas: Well-stocked Areas

Well stocked areas shall be separately shown in the treatment map.

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.

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.

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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.

4.6.11: Subsidiary Silvicultural Operations Cleaning and Thinning:

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Not Applicable

4.6.12 Regeneration

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 No.– 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).

Method of Regeneration

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.

Artificial Regeneration: Plantations shall be taken only in the B2-Type and A-Type areas of the Afforestation Working Circle having inadequate Natural

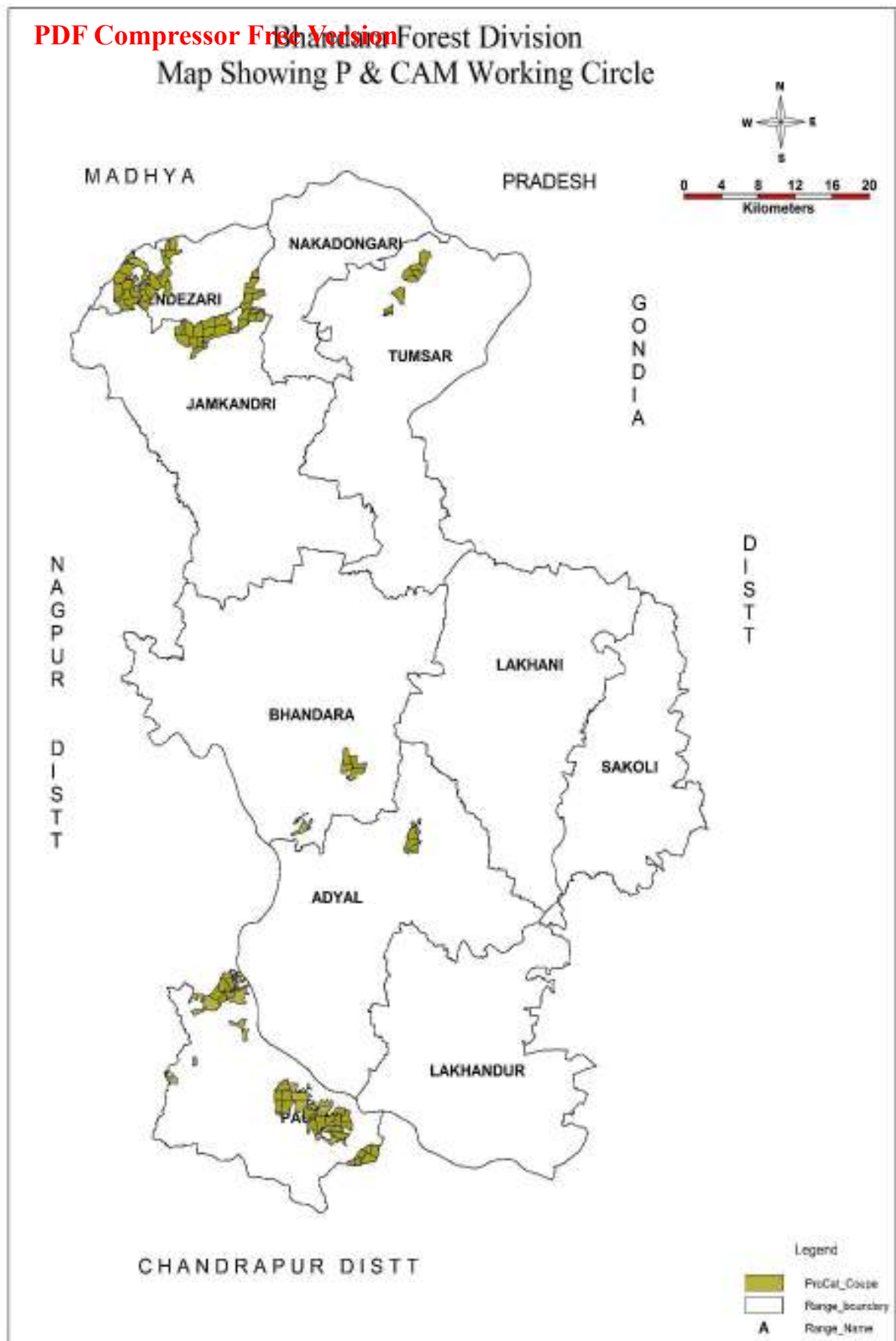
Regeneration. Plantations are proposed to be undertaken in accordance with the Ecological Index of the site and Plantation Guidelines described in the Chapter of Miscellaneous Regulations. Plantation register is to be maintained as per **Appendix No.-LXXXVIII**. Bamboo plantations should also be given 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.

4.6.13 Associated regulations and measures:

Protection from fire and grazing is essential for the success of natural and artificial regeneration. All annual coupes will be provided strict fire protection and will remain closed for grazing till the seedlings reach a minimum height of 10 feet.

Bhandara Forest Division Map Showing P & CAM Working Circle



PROTECTION AND CATCHMENT AREA MANAGEMENT WORKING CIRCLE

5.1: PROTECTION AND CATCHMENT AREA MANAGEMENT WORKING CIRCLE:

The area of this Working Circle has been clearly marked on the GIS based map of 1:50000 and a copy of the same is given on a smaller scale on A4 size here.

5.2: GENERAL CONSTITUTION OF 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 9828.961 Ha of forest areas, comprising 8861.581 Ha of the Reserved Forests and 967.38 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.

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.

Following criteria have been adopted for the allocation of forest areas or compartments to this working circle:

- i. The compartments having more than half of its areas on the steep slope or in the stream buffer.
- ii. The compartments which are close to and fall under the catchments of the major dams and directly draining into these water bodies.

Table 5.1 Range wise Compartments & Area Allocation to Protection & Catchment Area Management Working Circle

Range	RF		PF		(Area in Ha.)	
	Compts.	Area in Ha	Compts.	Area in Ha	Total Compts.	Total Area
Bhandara	1	452.438	1	95.615	2	548.053
Jamkandri	2	1401.022	0	0	2	1401.022
Lakhandur	01	445.150	02	0	0	445.150
Lendezari	6	2720.532	0	0	6	2720.532
Nakadongri	3	925.416	0	0	3	925.416
Pauni	04	1901.284	05	829.306	11	2730.59
Sakoli	0	0	0	0	0	0
Tumsar	7	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	8861.581	9	967.38	30	9828.961

5.3 GENERAL CHARACTERS OF THE VEGETATION:

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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*, *Palasetc*. Majority of the area supports stuntedtree crop. Planted Bamboos have come up well at many places. 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 5.2.

Table 5.2 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

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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.

Table 5.3 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

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 catchment 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.

The details of the compartments included in this Working Circle has been provided in the **Appendix No.- XLII**.

5.4 FELLING SERIES, CUTTING SECTIONS AND JFM AREAS

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 1965.792 ha for each treatment series. Each series is further divided into 20 annual coupes with an average area of 98.28 ha. The

statement showing the allotment of compartments to the working series and their sequence of working is given in **Appendix No.- XLIIIA.**

5.5 BLOCKS, COMPARTMENTS AND JFM AREA

Details of the allotment of compartments to this Working Circle have been given in **Appendix No.- XLII.**

5.6 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 wellbeing of the people of this tract. To check the soil erosion (siltation) and to arrest the water runoff, 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.

- i. To check the soil erosion and to arrest the run off by implementing soil and water conservation measures in the forest catchments so as to increase the longevity of streams and water bodies.
- ii. The special object of management of Protection Working Circle areas is the protection of fragile forest sites and to prevent the siltation of the dams and water bodies by checking the soil erosion in the forest catchments through soil and water conservation measures.
- iii. To preserve and increase the vegetal cover and to help in enhancing water regime of the forest tracts.

5.6.1 Analysis of the Crop

- i. **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 is given in Appendix in volume II of Draft Plan Report and crown density mapping through image analysis of satellite imageries.
- ii. **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.
- iii. **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.

5.6.2 Silvicultural System

Silvicultural system is proposed on the pattern of watershed management viz. ridge to valley treatment approach. Soil and moisture conservation work to prevent soil erosion, siltation of reservoirs and to enhance the vegetation cover and ground water table.

Harvesting of green trees is prohibited. However, removal of dead trees by retaining two dead trees per hectare as snags is permitted. These areas are proposed to receive strict protection from grazing and fire.

5.6.2 Rotation Period:

No Rotation period is fixed for this Working Circle as there is no production prescribed.

5.6.4: Harvestable diameter: Not Applicable

5.6.5: Reducing factors and reduced areas:Not Applicable

5.6.6: Felling Cycle:Treatment cycle is fixed at 10 years.

5.6.7: Division into Periods and allotment To Periodic Block (PB):Not Applicable

5.6.8: Calculation of the yield:Not Applicable

5.6.9: Table of felling: Not Applicable

5.6.10: Method of executing the felling: Not Applicable

5.6.11: Subsidiary Silvicultural Operations Cleaning and Thinning:

5.6.11.1 Demarcation, Treatment Map and Prescription Demarcation:

- i. The annual coupes shall be demarcated one year in advance.
- ii. The Range Forest Officer shall prepare a treatment map for Soil and Moisture Conservation works keeping in view the principles of watershed treatment.

5.6.11.2. Treatments Prescribed:

The treatments prescribed for various treatment-type areas shall be, as follows:

A- Type Areas:

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- i. **Harvesting of Trees:** No harvesting of trees is recommended in these areas except wind fallen trees of valuable species.
- ii. **Soil and Moisture Conservation:** Soil and moisture conservation works, as prescribed in the chapter of Miscellaneous Regulations shall be taken in A3 type areas
- iii. **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.
- 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. Soil and 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 0.4.
- 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 will be taken in this area.

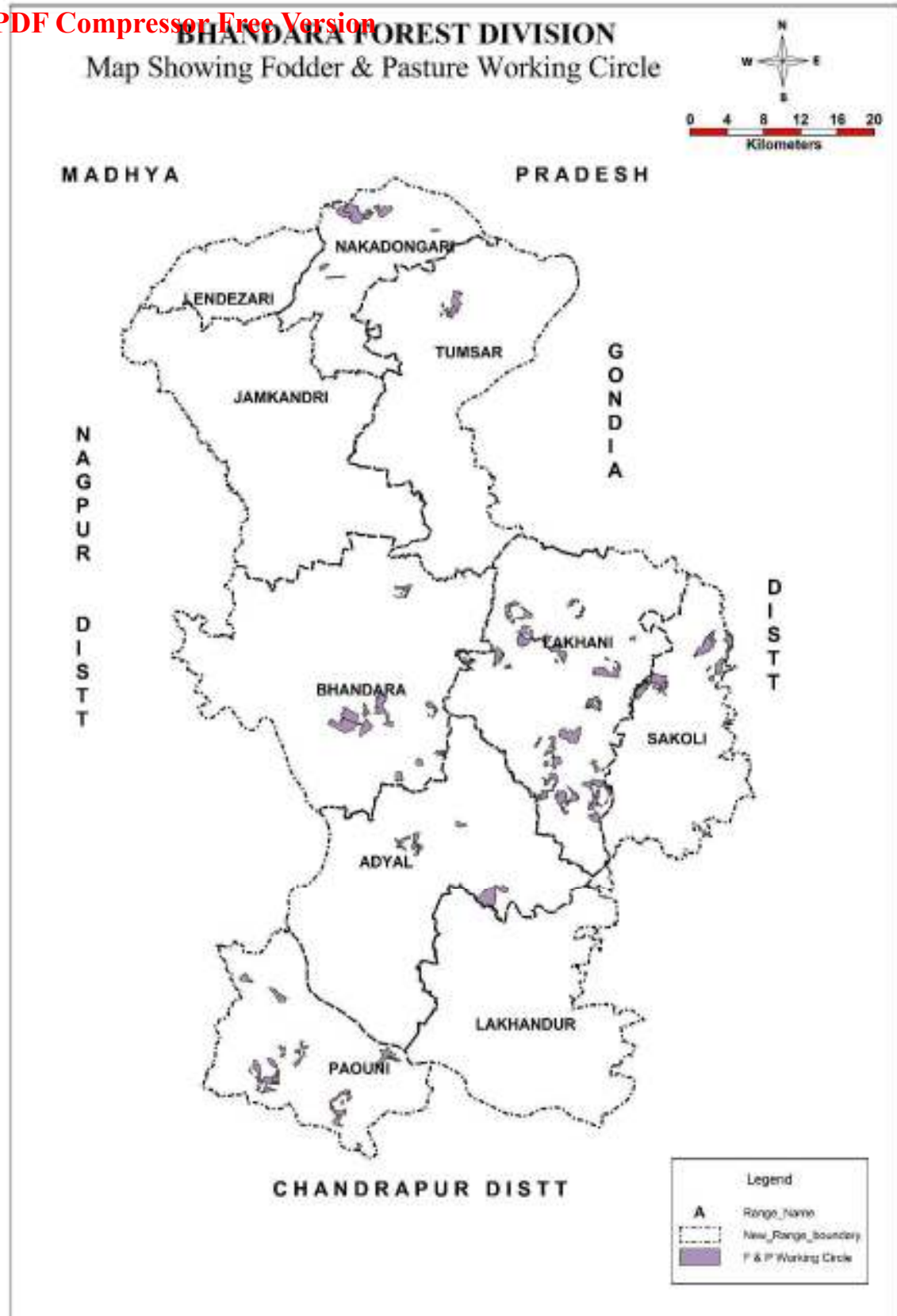
D Type Areas: Well Stocked Areas:

- i. Harvesting: No harvesting, except of dead trees, will be done.
- ii. Suitable soil and moisture conservation work, if required, will be taken in the erosion prone areas.

5.6.12: Regeneration: As mentioned in B type area para 5.6.11.2.

5.6.13: Associated regulations and measures

- i. **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.
- ii. 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.
- iii. The entire area will be provided with Class-I fire line protection.



FODDER AND PASTURE WORKING CIRCLE

6.1. FODDER AND PASTURE WORKING CIRCLE

The area of this Working Circle has been clearly marked on the GIS based map of 1:50000 and a copy of the same is given on a smaller scale on A4 size here.

6.2. 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 cannot 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 6225.769 Ha comprising 862.705 Ha of Reserved Forests and 5363.064 Ha of Protected Forests. It is extending over an area of 6.72 % 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

- i. 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.
- ii. Failed plantation and highly degraded forest areas, adjoining to villages, with heavy biotic pressure of grazing and fire wood.

Table 6.1 Range wise Area Distribution: (Area in Ha)

Range	RF		PF		TotalCompt.	TotalArea
	Compt.	Area in Ha	Compt.	Area in Ha		
Bhandara	3	150.336	7	815.111	10	965.447
Jamkandri	0	0.00	0	0.00	0	0.00
Lakhandur	0	0.00	0	0.00	0	0.00
Lendezari	0	0.00	0	0.00	0	0.00
Nakadongri	3	147.926	3	516.335	6	664.261
Pauni	2	82.22	9	665.502	11	747.722
Sakoli	0	0.00	6	833.115	6	833.115
Tumsar	0	0.00	3	236.771	3	236.771
Adyal	3	482.223	2	116.772	5	598.995
Lakhani	0	0.00	18	2179.458	18	2179.458
Grand Total	11	862.705	48	5363.064	59	6225.769

6.3 GENERAL CHARACTERISTICS OF VEGETATION

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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 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. 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. The grass species like *Kusal, Bhurbhushi, Ghonad, Sheda, Marvel* is also common.

Rantulsia 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.

6.4 FELLING SERIES, CUTTING SECTIONS AND JFM AREAS

Treatment cycle is fixed at 4 years.

Treatment Series and Annual coupe - This working circle has been divided into 6 Fodder Series with an average area of treatment series 1039.443 Ha. Each Fodder Series has been further divided in to four annual coupes with an average area of coupe 259.86 Ha. Details are provided in **Appendix No.-XLVI**.

6.5 BLOCKS, COMPARTMENTS AND JFM AREA: Details of the allotment of compartments to this Working Circle have been given in **Appendix No.- XLIV**

6.6 SPECIAL OBJECTIVES OF MANAGEMENT

- i. 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.
- ii. 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.

- iii. 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.

6.6.1 Analysis of the Crop

- i. **Stock Mapping** - The conventional stock mapping has 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.
- ii. **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.
- iii. **Site Quality**: Site quality governs the harvestable diameter. 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 6.2 Species and Girth Distribution in F.P. W.C

Area = 6236.659									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

- iv. **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.
- v. **Analysis and Valuation of Fodder and Pasture Resources:** Present enumeration primarily evaluates tree crop and this has been given under Table 6.2 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.

6.6.2 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.

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:

- i. Eradication of harmful and obnoxious weeds
- ii. Seed Sowing of high-quality local grass spp. like *Paunia*, *Sheda*, *Marvel* etc. and good nutritious legumes like *Stylohemata* should be carried out in these areas to improve the quantity as well as quality of the fodder
- iii. Plantation of good fodder tree species like *Anjan*, *Maharukh*, *Ber*, *Babul*, *Sissoo* etc. for assured supply of fodder in case of draught or fire.

iv. Regulated and rotational grazing in pasture areas.

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v. Regulating seeding, grass cutting and complete closure to grazing in identified grass lands.

vi. 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.

Method of Treatments: The method of treatment to improve grasses shall be as follows.

(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.

6.6.3 Rotation Period: Rotational grazing is practiced and the rotation period has not been fixed though the grass is harvested once in every 4 years.

6.6.4 Harvestable diameter: Not applicable

6.6.5 Reducing factors and Reducing areas: Not applicable.

6.6.6 Felling Cycle/ Treatment cycle: The 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 1039.443 Ha. Each Fodder Series has been further divided in to four annual coupes with an average area of coupe 259.86 Ha. Details are provided in **Appendix No. -XLVI.**

6.6.7 Division into Periods and allotment to Periodic Block (PB): Not applicable.

6.6.8 Calculation of Yield: The yield is fixed by area.

6.6.9 Table of Felling: Not Applicable.

6.6.10. Method of executing the felling/cutting: The grass is to be cut by “Cut and Carry away basis” to be regulated by the Department through the JFMC’s wherever exist.

6.6.11: Subsidiary Silvicultural Operations Cleaning and Thinning:

Demarcation and Treatment Prescriptions:

Demarcation: The coupe due for closure to grazing will be demarcated one year in advance, by cutting 3m 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.

Treatments Prescribed: After demarcation, the area will be thoroughly inspected by the RFO and the treatment map will be prepared showing the following areas.

A-Type Area: Protection areas – slope more than 25°, areas along the water courses and areas prone to soil erosion.

- a) Soil and Moisture Conservation works

- b) Seed Sowing and Stake Planting of Fodder Tree spp. (like *Babul*, *Khair* etc.) and seed broadcasting of superior grasses in open areas is recommended.

B-Type Area: Degraded and open areas: Area suitable for the introduction of better fodder grasses, legume and fodder trees.

- a) Soil and moisture conservation work as per Miscellaneous Regulations.
- b) In open patches/areas the grass tussocks will be planted as prescribed in silvicultural pasture model approved by PCCF (HoFF) office, Nagpur as shown in table 6.3
- c) 30cm X 30 cm pits for fodder tree plantation will be dug at a spacing of 15m x 15m.

C & D-Type Areas: If patch/patches of dense crop are found then

- a) All dead and damaged (including live high stumps) trees, to be removed.
- b) Spacing out will be done in case the crop is young.
- c) All fruit and NTFP trees to be retained.
- d) If open areas are found, grass tussocks will be carried out as mentioned in B-Type area.

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.

6.6.12 Regeneration

As mentioned in 6.6.2 (b), work of Augmenting of Natural Grass in grass land will be carried out. DCF shall however take up ploughing followed by seed showing of indigenous palatable grass on small scale for the purpose of experimentation and proper records should be kept and proper protection (Fencing) should be provided.

Wherever ANR/ enrichment plantation required to be carried out in existing forest stands, species to be planted should be primarily fodder species, like, *Hardwickiabinata* (Anjan), *Soymidafebrifuga*(Rohan), *Accacianilotica* (Babul),

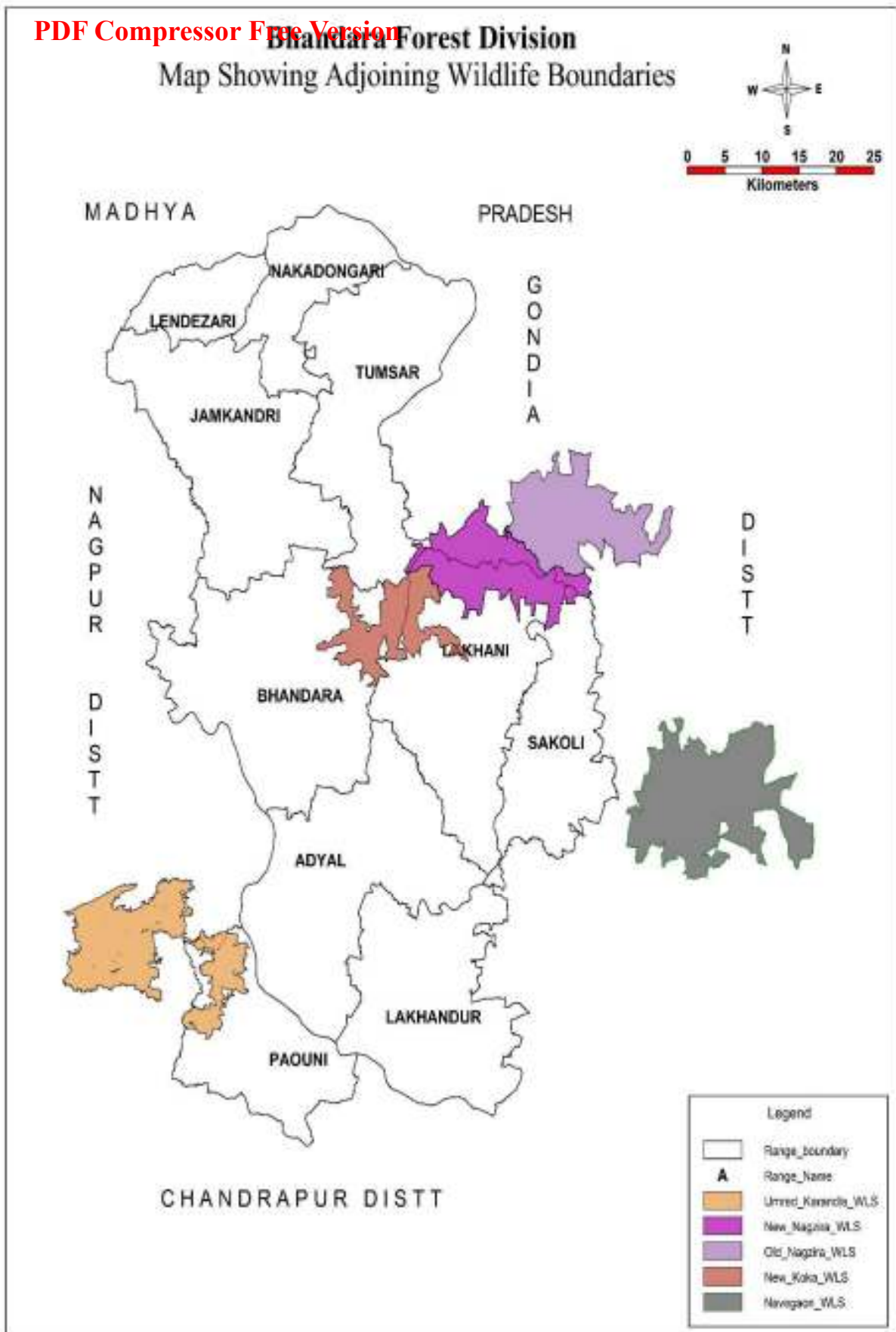
Accasialeucophloea (Hiwar), *Zizyphusmauritiana* (Ber), *Ficusglomerata* (Umbar), *Terminalia bellerica* (Beheda) etc. and other fruit bearing and other miscellaneous species. No teak should be planted in these areas.

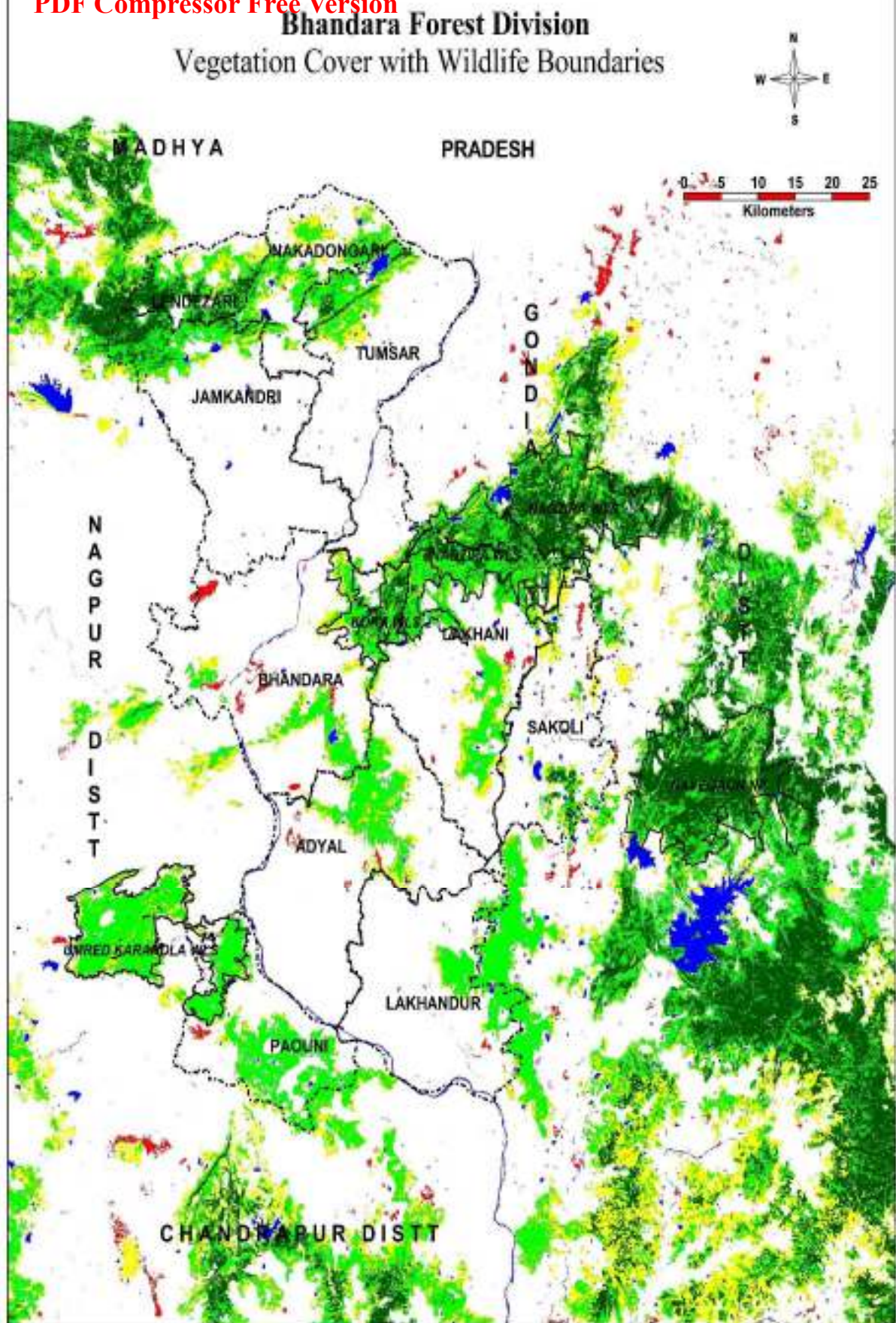
6.6.13 Associated regulations and measures

Other Regulations:

- i. **Seeding of Grasses:** In order to allow seeding of fodder grasses, the coupe shall be closed to cutting of grass and will be prohibited from 1st June to 30th November, after which the grass will be allowed to be removed by cutting. Data on such removals should be kept with JFMCs.
- ii. **Fire Protection:** The areas will be strictly protected from fire every year with the involvement of local JFM Committees.
- iii. **Inspection:** The area closed to grazing will be inspected 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 Department, so that the villagers of these areas can be benefited by other Rural Development Programmes implemented by these agencies.

Bhandara Forest Division Map Showing Adjoining Wildlife Boundaries





WILDLIFE (OVERLAPPING) WORKING CIRCLE

7.1. WILDLIFE (OVERLAPPING) WORKING CIRCLE

The area covers the whole area of the division and is therefore not specifically marked on GIS based map.

7.2. GENERAL CONSTITUTION OF THE WORKING CIRCLE

The location of Bhandara Division's forest is very important from the Wildlife 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 Protected Areas like Tadoba, Navegaon, Nagzira, Koka, Umred – Karandala, Kanha, Pench (MP) and Pench of Maharashtra, as it provides the continuity of forests among these P.As. Out of these six P.A.s, four are Project Tiger areas. The adjoining PAs, like Navegaon and Nagzira, Koka, Umred – Karandala provides an additional space for wild animals. Under the present circumstances when most of the PAs are facing the problem of management 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.

7.3. GENERAL CHARACTERISTICS OF VEGETATION.

The forests of Bhandara division belongs to the sub-group 5-A, 'Southern Tropical Dry Deciduous Forests' as per the classification of forests types of India by Champion and Seth. Within this main type, considerable local variations in the altitude are not considerable, it does not influence the distribution of various forest species, and however, aspect plays an important part in determining the character of the vegetation in hilly area. Generally, the western and northern slopes are better stocked than the drier eastern and southern slopes. Geology, soil type and depth play an important role in determining the composition and quality of the crop.

7.4. FELLING SERIES, CUTTING SECTIONS AND JFM AREAS: Not Applicable.

7.5. BLOCKS, COMPARTMENTS AND JFM AREA: Entire Forest area of the Division.

7.6. SPECIAL OBJECTIVES OF MANAGEMENT

- i. To ensure wildlife (animals & plants found in wild) protection and conservation in the managed forests of this Division.
- ii. 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.
- iii. To provide extra space for Nagzira Wildlife Sanctuary and corridor for other P.As.
- iv. 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).
- v. To check wildlife trade and smuggling.
- vi. To promote and encourage ecotourism without disturbing and damaging wildlife.
- vii. To disseminate percept of biodiversity and wildlife conservation and generate awareness among local communities, to seek support for this cause.
- viii. To protect the wild animals from various diseases.
- ix. To provide best possible habitat to the wild animals in the forest areas to minimise the Man-Animal Conflict.

7.6.1. Analysis of Wildlife in district:

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 Pauni Range. The minimum concentration of wildlife is in Pauni range. The

common wild animals found in tract are given as under: (List of animals is given in **Appendix No. – LVII**).

A. Carnivores: (i) Tiger (*Pantheratigris*) (ii) Panther (*Pantherapardus*) (iii) Wolf (*Canis lupus*). (iii) Striped Hyena (*Hyaenahyaena*) (iv) Wild dog (*Cuonalpinus*) (v) Jackal (*Canisaureus*) (vi) Indian Fox (*Vulpesbengalensis*)(viii) Leopard Cat (*Felisbengalensis*) (ix) Jungle Cat (*Felischaus*). (x) Common Mongoose (*Herpestresedwardsi*).

Herd of Gava in Nagzira Lake

Tiger is usually found in Tumsar 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. 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 (*Bibosgaurus*) (ii) Nilgai (*Boselaphustragocamelus*) (iii) Sambhar (*Cervusunicolor*) (iv) Cheetal (*Axis axis*) (v) Barking Deer (*Muntiacusmuntjak*) (vi) Wild boar (*Sus scrofa*) (vii) Sloth bear (*Melursusursinus*) (viii) Four horned antelope (*Tetracerosquadricornis*) (ix) Common Langurs (*Presbytis entellus*), (x) Rhesus Macaque (*Macacamulatta*), (xi) Bonnet Macaque (*Macacaradita*).

Gava is 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, especially 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*), Gavtia snake (*Macropisthodon 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 (*Viperarusselli*) and 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 (*Bagrus bagarius*) and Tambu (*Anguilla bengalensis*). Prawn rearing mainly of *Macrobrachium 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 (*Cirrhinamrigala*), Botri (*Channa punctatus*), Dookkarmachhi (*Nandus nandus*), Bam (*Mastocembelus pencaulus*).

F. Wild Birds: (i) Painted sand grouse (*Pterocles indicus*) (ii) Common sand grouse (*Pterocles exustus*) (iii) Pea fowl (*Pavocristatus*) (iv) Grey jungle fowl (*Gallus sonnerati*)

(v) Red junglefowl (*Gallus gallus*), (vi) Red spur fowl (*Gallus spadicea*) (vii) Painted partridges (*Francolinus pictus*) (viii) Grey partridges (*Francolinus pondicerianus*) (ix) Jungle bush quail (*Perdica asiatica*) (x) Black breasted quail (*Coturnix coturnix*) (xi) Indian Bustard quail (*Turnix sorsolator*) (xii) Common or grey quail (*Coturnix*), (xiii) Pigeon (*Treron phoenicoptera*) (xiv) Crane (*Grus antigone*) (xv) Dove (*Streptopelia spp.*) (xvi) Cotton teal (*Nettion coromandelianus*) (xvii) Whistling teal (*Dendrocygna javanica*) (xviii) Comb duck (*Sarkidiornis melanotos*) (xix) Little Grebe (*Podiceps ruficollis*) (xx) Cormorant (*Phalacrocorax carbo*) (xxi) Grey Heron (*Ardea cinerea*) (xxii) Large Egret (*Ardea alba*) (xxiii) Black ibis (*Pseudibis papillosa*) (xxiv) Pariah Kite (*Milvus migrans*) (xxv) Shikra (*Accipiter badius*) (xxvi) Indian Whitebacked Vulture (*Tyrso bangalensis*) (xxvii) Parakeets (xxviii) Moorhen (*Gallinula chloropus*), (xxix) yellow Legged Green pigeon (*Ternstroemia phoenicoptera*).



Pair of Pea-fowl



Cattle egret



Blossom Headed Parakeets



A pair of Yellow Legged green pigeon

7.6.2 Silvicultural system: Not applicable

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7.6.3 Rotation Period: Not applicable

7.6.4 Harvestable Diameter: Not applicable

7.6.5 Reducing factors and Reducing areas: Not applicable.

7.6.6 Felling Cycle: Not applicable

7.6.7 Division into Periods and allotment to Periodic Block (PB): Not applicable.

7.6.8 Calculation of Yield: Not applicable

7.6.9 Table of Felling: Not Applicable.

7.6.10. Method of executing the felling: Not applicable

7.6.11: Subsidiary Silvicultural Operations Cleaning and Thinning: Not applicable

7.6.12. Regeneration: Not applicable

7.6.13. Associated regulations and measures.

7.6.13.1. History of 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 tribes 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.

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.

However, after the enactment of the Wildlife (Protection) Act, 1972, the hunting and trading of wild animals and its trophies were strictly monitored and 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

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animals however can be allowed for special purposes but only in exceptional circumstances. The maintenance of biological diversity is the new mandate of National Forest Policy, 1988. 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. Hence, special efforts are required to be made by the Division to protect the wildlife in the region.

There are many endangered insects and plants included in the schedule of wildlife protection act 1972. They silently play a very important role in the ecology but information about such species is scanty. Hence, division should make efforts to build database on such species by instituting special studies involving research organizations.

Existence of Wildlife in Forest: Existence of particular wild animals in a particular forest can be identified from the following observations.

- i. **By Actual Sighting:** In the early morning or evening, near water holes, grazing sites or on the roads, we can see the wild animals.
- ii. **Pug Marks:** By keen observation of these pug/hoof marks we can identify the category of wild animals, their sex and age.
- iii. **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.
- iv. **Antlers Marks (on the stem of tree):** Before falling of antlers, Spotted Deer and Sambars rub their antler
- v. **By Smell (Odour):** Many animals have the smell glands. In Hyena these glands are found in his Anus and in case of Black Buck they are found below their eyes.
- vi. **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.

- vii. **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.
- viii. **By Wallowing Sights:** Sambar, Wild Boars etc like mud and they wallow in mud. By this they clean their skin and protect it from insects.
- ix. **Nail Marks:** Tiger and bear with the help of their Claws/Nails scratch the bark of some trees

7.6.13.2. Injuries to wild animals:

Poaching:

Inspite 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 use various methods to kill wild animals. Vulnerability to poaching increases during summer (pinch period) when number of water holes reduce drastically and also water in a water hole recedes to minimum.

It has been noticed that poisoning of drinking water by mixing urea in large concentration can kill wild animals instantaneously. When an animal drinks such water, it dies within hours due to intense gas formation in stomach and choking 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 spring steel traps for killing the large animals, like Tigers and Panthers, very effectively. This method is often used by *Baheliya* gangs for killing tiger.

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 method which is proving to be a potential threat to animals, besides sometimes being hazardous to local people.

Degradation of Habitat:

Due to various human activities the habitat of various wild animals is 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 barriers for the movement of wild animals on one hand and risk to their lives, especially for the young ones, on the other hand. Suitable mitigating measures should be included in the sanction orders.

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. Therefore, coordinated efforts with Animal Husbandry Department to vaccinate domestic animals in wildlife rich areas is a must to safeguard wildlife.

Forest Fire: 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, which live on ground and cannot escape the fire and its heat. In case they survive, their food, grasses, herbs and shrubs are destroyed though 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.

7.6.13.3: Damages to Crop, livestock and humans:

Damages to the Crops: Incidences of crop damages by herbivores have been reported predominantly in forest fringe villages. This is leading to economic losses to farmers. Statistics of Crop damage by wildlife is given in Volume II, Appendix LV.

Farmers are compensated for the losses as per the Govt. orders issued from time to time.

Injuries to Cattle and Human: The carnivores, Tiger and Panther 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. Statistics of damage to livestock and humans is given in Appendix LV and LVI. The Govt. of Maharashtra, has therefore has evolved a policy of compensating for the loss of livestock as well as for the injury or loss of human life.

7.6.14. Recommendations for Future management.

Nagzira Sanctuary and Navegaon National Park adjoining the Division, which is exclusively managed for wildlife protection and conservation. Besides these two PAs, the forests of Bhandara Division lie 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 D.C.F shall take initiative and educate all the field staff regarding this Standing Order and all the instruction shall be followed.

i. 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.

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- Cognizance of cases of injury due to wild animals as per Govt. Orders from time to time with speedy and transparent disposal of cases.

- 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.
- Establishing a network of informers with the aid of Secret Service Fund.
- There shall be regular short-term training/ workshops in anti-poaching activities and legal requirements in dealing with wildlife offence cases.
- Cases of Man-animal conflict should be handled swiftly and efficiently. Keeping in view the vast area of the division, at least two Rapid Response teams shall be operationalized 24 x7. Such team should be given need-based training. Every Range HQ should contain equipment's necessary to handle conflict situations.

- ii. Nature education programme in the villages adjoining forests and in schools and colleges shall be arranged.
- iii. Ecologically sensitive habitats shall be identified and protected.
- iv. Antler trade is now banned; hence, no collection of shed antlers is to be allowed.
- v. The involvement of Honorary Wildlife Warden and serious NGO's be encouraged for nature education programme.
- vi. It will be ensured that cattle grazing in forests near the important wildlife habitats are inoculated against contagious diseases.

7.6.14.1. Creation of Data Base:

The Division will 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 potential 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 annual population estimation of the wildlife, including the migratory and other rare birds, in addition to All India Tiger and Panther population estimation. Special note should be taken if any nesting site of endangered birds like Vultures is noticed. Concurrent monitoring of top carnivores through camera trapping shall be made.

7.6.14.2. 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.

7.6.14.3. 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. (List of compartments, where various habitat development works are recommended, is mentioned in **Appendix No.-LVII**) To meet the minimum requirement of the wild animals the following activities are recommended:

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.
- 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 and be linked with Solar Powered pumps fitted to borewells.

B. 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, especially during the summer season, when the forest grasslands are burnt. The open areas in wildlife rich zones should be developed into meadows for the herbivores.

C. Development of Nesting Sites: To provide suitable nesting places to these birds, seed sowing of species like Babul and stake planting of species like Banyan and other *Ficus* spp. should be done near water-bodies and in the riparian areas.

D. 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 Bawanthadi 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 m. 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.

7.6.14.4. 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 livestock, 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. The list of medical equipments and kits for treating wild animals prescribed should be consulted and verified with the resource person in TTC Seminary Hills, Nagpur. 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:

- i. **Vaccination of Village Cattle:** All cattle of adjoining villages should be vaccinated every year for Foot and Mouth disease.
- ii. **Regular Health Check-up for Cattle:** Forest staff, with the help of veterinary doctor of the area, should organize annual cattle health check-up camps in villages. Required vaccination should be done and if required, proper treatment to sick animal should be given.
- iii. **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.
- iv. **Protection from Poaching and Trade:** The forest staff shall develop an intelligence system with the help of local people, especially 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, especially 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.
- v. **Protection Camps:** Setting up of Protection camps in Territorial-Forest division similar to camps set up in National parks and Wildlife sanctuaries.
- vi. **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.
- vii. **Supply of Books:** Books, related to Wild animal 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.

7.6.14.5. 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.

i. 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 cannot see outside specially the human crowd and is not scared or disturbed by people while loading, transporting and unloading.
- The cage 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.

ii. Material Required for Transportation:

- Empty cages.
- Nylon rope, heavy duty wire rope, iron mesh, crow bar.
- Drinking Water.
- Bucket, Mug.
- Tarpaulin.
- Stretcher.
- Torch, Walkie Talkie, Mobile Phones.
- Phenyl and Other essential materials.

iii. Transportation Cages: Following 4 types of cages used for transportation of wild animals. The size of cages varies according to size of animal and nature of transportation.

- 1) Transportation Cage:** Used for transportation. General size is - length--8 feet, Width--5.5 feet, height--4.5 to 5 feet.
- 2) Treatment Cage:** Treatment to wild animals is given in these cages. Sometimes transportation is also done in these cages. Size is according to the requirement.
- 3) Bait Cage:** Without tranquilization or where tranquilization facility is not available, wild animals can be captured and transported in such cages. General size is Length-8 feet, width 4 feet, height 4feet.

- 4) Combined Transportation and Treatment Cages:** Many times, wild animals get injured while capturing in such cases, it is necessary to give them treatment before transportation.

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 Tranquilization:

Ketamine 100(50 ml x 2)

Xylazil100(50 ml x 2)

AntagozilSA(20 ml x 10)

7.6.14.6. 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 50m 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.

7.6.14.7. Development of Fodder and Browse.

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- 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.

The D.C.F. Bhandara will take special care to motivate and orient the field staff in favour of Wildlife 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 No.- LXXXV**

7.6.14.8. 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 cannot 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 MEDB and 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 is 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.

7.6.15. Eco-sensitive Zone

The Government of India *vide* notification dated the 25th February, 2016 declared the Eco-sensitive Zone around Nagzira Wildlife Sanctuary, New Nagzira Wildlife Sanctuary, Koka Wildlife Sanctuary, Navegaon Wildlife Sanctuary and Navegaon National Park in Maharashtra. These Sanctuaries and Park are located in Gondia and Bhandara Districts. The Extent and boundaries of Eco-sensitive Zone which falls within the Bhandara Forest Division includes 39 villages of Bhandara Tehsil, 49 villages of Sakoli Tehsil, 22 villages of Lakhani Tehsil and 14 villages of Mohadi Tehsil. The detail notification is given in **Appendix No.-XCIV**

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The extremely close vicinity of the above-mentioned sanctuaries and national park to human habitation and ongoing developmental activities, necessitate the requirement of proper safeguards and control over such activities. It is necessary to conserve and protect the area, the extent and boundaries adjoining the Nagzira Wildlife Sanctuary, New Nagzira Wildlife Sanctuary, Koka Wildlife Sanctuary, Navegaon Wildlife Sanctuary and Navegaon National Park as Eco-sensitive Zone from ecological and environmental point of view and to prohibit industries, or class of industries and their operations and processes in the said Eco-sensitive Zone.

BAMBOO (OVERLAPPING) WORKING CIRCLE

8.1. BAMBOO (OVERLAPPING) WORKING CIRCLE

The area covers the whole area of the division wherever bamboo and is therefore not specifically marked on GIS based map.

8.2. GENERAL CONSTITUTION OF THE WORKING CIRCLE

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 Compartments 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 No.-LI**. They are proposed to be worked as per the prescriptions given in this working circle.

8.3. GENERAL CHARACTERISTICS OF VEGETATION

This working circle comprises of area included in SCI, IWC and few plantations. The general character of vegetation of this working circle has the characteristics mentioned in different working circles. In this chapter bamboo is described in detail. 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 river streams. 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.

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.

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.

8.4. FELLING SERIES, CUTTING SECTIONS AND JFM AREAS: Bamboo area have been divided into 9 Felling Series; each felling series further divided in to three coupes *i.e.* A, B & C.

8.5. BLOCKS, COMPARTMENTS AND JFM AREA: The abstract of Range wise Bamboo area distribution is shown in the table 8.1.

Table 8.1. 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	5	2345.024	200.3	0	200.3
Sakoli	3	1279.937	180	50	230
Tumsar	10	3832.065	651.2	330	981.2
Lakhandur	1	523.666	100	0	100
Total	50	20670.316	3244.274	1307	4551.274

8.6 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.

- i. This working circle aims at improving the Bamboo productivity for meeting local needs and demand in the surrounding areas.
- ii. Harvesting of Bamboo on scientific manner to obtained maximum sustained yield.

iii. To meet the local people demand, Agriculture, Crafts and, Artisans.

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iv. To protect the Bamboo clumps, both natural and artificial, from illicit cutting, browsing, fire and congestion.

8.6.1 Analysis of crop

Stock mapping: The conventional stock mapping has also been carried out, besides the extensive enumeration exercise and density mapping through image processing and analysis of the satellite imageries. Stock mapping of bamboo is carried out along with respective working circle as presence of bamboo and the number of clumps.

Age and Density: The bamboo is of mostly of middle aged to mature (second year and above).

8.6.2. Silvicultural system

Each clump is prescribed to be treated as an independent entity 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 8.6.10 under Bamboo harvesting.

8.6.3. Rotational period: The rotational period is fixed for 3 years

8.6.4. Harvestable Diameter: Not applicable

8.6.5 Reducing factors and Reducing areas: Not applicable.

8.6.6 Felling Cycle/ cutting cycle:

- i. Cutting cycle of 3 year duration is proposed for the Bamboo harvesting.
- ii. The entire area in the working circle has been divided into 9 Felling Series of an average area 2514.02 Ha.
- iii. 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 No– LI-A.**

8.6.7 Division into Periods and allotment to Periodic Block (PB): Not applicable.

8.6.8 Calculation of Yield: For bamboo, yield is calculated based on number of culms in a clump (second and third year culms) per Ha. Most of the areas included

in this working circle contain planted Bamboos at spacing of 6m x 6m. The growth of Bamboos differs from compartment to compartment and even in the same compartment. In natural Bamboo growth, the clump size varies. In area 5% enumeration of Bamboo will be done and the Bamboo will be classified in to 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 river streams and slopes. As per the enumeration the estimates of various works and yield of Bamboo will be made.

8.6.9 Table of Felling: The sequence of cutting is given in the **Appendix No.– LI-A.**

8.6.10.Method of executing the felling:

8.6.10.1. 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.

8.6.10.2. Method of Harvesting (Bamboo clump management)

- i. 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.
- ii. Estimation of Clumps:** Most of the areas included in this working circle contain planted Bamboos at 6m x 6m spacing. 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 x 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 river streams and slopes. As per the enumeration the estimates of various works and yield of Bamboo will be made.

iii. 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.

- a) No harvesting works should be permitted from 15th June to 30th September.
- b) 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).
- c) It is prescribed to first mark the bamboo culms in a clump. The man-days required for marking per culm should be decided by Dy.C.F in consultation with Chief Conservator of Forests, (T) Nagpur Circle after under taking sample plot estimate.
- d) No culms below the age of two years will be felled.
- e) Following culms shall be removed from all clumps.
 - All dead, decayed and dry Bamboos.
 - Culms whose half or more top part is broken or damaged.
 - Twisted or malformed culms.
- f) In a matured clump the following type of culms (green and living) will be retained:
 - All current seasons i.e. less than one year old culms.
 - From rest of culms equal in number to the current seasons (i.e. less than one year old) culms or eight, whichever is more.
 - The remaining culms will be considered available for harvesting.
- g) The cutting height of culms will be between 15 cm to 45 cm above ground level i.e. above the first internode above the ground. The cut shall be made with a sharp instrument.
- h) In case of any flowering, no Culm from flowered clumps shall be felled in the year of flowering.
- i) 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.

j) Following acts will be strictly prohibited.

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- Digging of rhizome.
- Lopping of Bamboo culms for fodder.
- Use of tender Bamboo culms for bundling.

k) Climbers affecting the growth of Bamboo clumps shall be cut.

l) 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.

m) 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.

n) 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.

iv. 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 grey.

v. Management of Congested, Crooked and stunted bamboo clumps:

Observation from the field shows majority of the bamboo clumps are congested, crooked, and stunted in growth. The labourers while harvesting bamboo culms there is general tendency to exclude these congested and crooked bamboo clumps. A separate rate may be fixed for harvesting congested and crooked bamboo clumps by the Dy.C.F. in consultation with the Chief Conservator of

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Forests, (T) Nagpur Circle. The Dy.C.F should make special efforts in working the congested, crooked and stunted bamboo clumps in the coupes whichever is due along with the regular coupe works. For sustainable harvesting of bamboo, the cross tunnel harvesting method (plus method) shall be followed compared to the traditional horseshoe harvesting method **Appendix No.-XCII**

8.6.11: Subsidiary Silvicultural Operations Cleaning and Thinning:

Cleaning Operations: All clumps will be cleaned during the coupe working. Cleaning operations in Bamboo clumps will include following elements:

- i. Climbers infesting Bamboo clumps will be removed.
- ii. All dead, decayed and dry culms will be removed.
- iii. All culms, cut high above the ground, will be cut above the first inter-node.
- iv. Twisted culms will be removed.
- v. Top-broken culms, with more than half of the top damaged and malformed culms will be removed.

8.6.12 Regeneration: Natural regeneration should be given preference over artificial regeneration since the forest area has mixed species. The prescriptions mentioned in part 2 chapter 2.6.12 and 3.6.12 is applicable here also.

8.6.13 Associated regulations and measures

8.6.13.1. 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 an area is as given below.

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 Bavistin.

- i. **Treatment of Gregariously Flowered Areas:** The area of gregarious flowering must be closed to grazing and special fire protection measures must be implemented.
 - a. 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.
 - b. Once the seeding is over, all the flowered clumps will be clear felled and removed in the year following the gregarious flowering
- ii. **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.
- iii. **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.
- iv. **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.
- v. **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.

- vi. **Mature Bamboo Crop:** Fully mature clumps may be harvested in the eighth year onward depending upon location in the annual coupe.
- vii. **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.

8.6.13.2. Other Regulations:

- i. **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.
- ii. **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.
- iii. **Control of Injuries Due to Insects:** The Bamboo culms damaged by the insects like, *Estigminachinensis*, *Chrysomelidaccolioptera* 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.

OLD TEAK PLANTATION (OVERLAPPING) WORKING CIRCLE**9.1. OLD TEAK PLANTATION (OVERLAPPING) WORKING CIRCLE**

The area covers the whole area of the division and is therefore not specifically marked on GIS based map.

9.2. 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, '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

Table 9.1. Table Showing Range wise area distribution of Teak Plantations:

Sr No.	Ranges	No of Sites	Area(in Ha)
1	Adyal	0	0
2	Bhandara	16	443.3
3	Jamkandri	9	605
4	Pauni	8	206.5
5	Lendezari	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		79	5018.90

Area Distribution: The list of various old Teak plantations has been compiled by the Working Plan Division, Nagpur, it includes the Teak plantations raised between the year 1958 and 2003. Based on the stock map and information provided by Bhandara Forest Division, efforts were made to obtain up to date detailed information of old Teak plantations. The information about these plantations is given in the **Appendix No. – L** and the range wise abstract is given in table 9.1.

9.3. GENERAL CHARACTERISTICS OF 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.

Thinning operations were not carried out in most of the old plantations as prescribed in Working plan. Natural regenerations are quite good in the plantation area.

9.4. FELLING SERIES, CUTTING SECTIONS AND JFM AREAS: Not Applicable.

9.5. BLOCKS, COMPARTMENTS AND JFM AREA: The details of these plantations are shown in **Appendix No.-L.**

9.6 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.

9.6.1 Analysis of the crop

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.

9.6.2 Silvicultural System

The Silvicultural operations are the regular silvicultural thinning every tenth year till the age of 65 year of formation of the plantation. Thinning Rules are given in the **Appendix No-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 first 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 thinning every tenth year subsequently till the plantations attain the age of 65 years. In case of plantations raised in 2003 and afterwards, the first silvicultural thinning will be done in between sixth and eleventh year followed by silvicultural thinning (C grade) in every tenth year subsequently. This schedule is given in **Appendix No.- L**

9.6.3. Rotational period:Not applicable

9.6.4. Harvestable diameters: Not applicable

9.6.5 Reducing factors and Reducing areas: Not applicable.

9.6.6 Felling Cycle/ cutting cycle:Not applicable.

9.6.7 Division into Periods and allotment to Periodic Block (PB): Not applicable.

9.6.8 Calculation of Yield: Not applicable.

9.6.9 Table of Felling: The thinning schedule is given in the **Appendix No. – L**

9.6.10. Method of executing the felling:

9.6.10.1. Agency for 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.

9.6.10.2 Thinning Schedule:

As mentioned earlier no tending and thinning operations have been done in the teak plantations in the past. In the Financial Year 2018-19, Natural Regeneration works were done in few teak plantation sites. In all the backlog old teak plantations the thinning operations should be scrupulously followed as per the schedule given in Appendix-L During thinning operations, due care is taken to exclude the NR worked area of the old teak plantations and these areas will be revisited after 5th year as per schedule.

The FDCM has issued procedure for carrying out second and subsequent thinning in teak plantation.

The detail of the thinning operation is given in **Appendix No.- L**

9.6.11: Subsidiary Silvicultural Operations Cleaning and Thinning:

The thinning schedule is given in **Appendix No.-L** As mentioned in para 9.3, thinning operations were not carried out in the past years. The details of thinning are as under.

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. No mechanical thinning is prescribed. Rather silvicultural thinning is prescribed in Old teak plantations. The first silvicultural thinning will be done in between sixth and eleventh year followed by silvicultural thinning (C grade) in every tenth year subsequently.

Prescriptions for Silvicultural Thinning: The various operations required for thinning in a Teak plantation are summarised below:

- i. 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.
- ii. 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.
- iii. 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.
- iv. 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.

- v. 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 is 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.

- Non-Teak coppice trees (except any rare tree) are first to be marked.
 - Teak coppice trees are marked.
 - Non-Teak trees of seed origin are marked. However, trees of *Haldu*, *Bija*, *Shisham*, *Semal*, *Tiwasand* all trees of NTFP will be retained even if the number is more than desired number.
 - Sound Teak trees of seed origin to be marked for felling only in the last.
- vi. 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.

Subsequent thinning 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 thinning will be according to prescriptions in paras 1 to 5 above.

9.6.12 Regeneration: Not Applicable

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9.6.13 Associated regulations and measures

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.

NON-TIMBER FOREST PRODUCE (OVERLAPPING) WORKING CIRCLE

10.1. NON-TIMBER FOREST PRODUCE (OVERLAPPING) WORKING CIRCLE

The area of this working circle covers the whole area of the division and hence not specifically marked on GIS based map.

10.2. GENERAL CONSTITUTION OF THE WORKING CIRCLE

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. 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.

10.3. GENERAL CHARACTERISTICS OF VEGETATION.

The forests of Bhandara Forest Division belong to the sub-group 5-A, 'Southern Tropical Dry Deciduous Forests' as per the classification of forest types of India by Champion and Seth. Within this main type, considerable local variations in the altitude are not considerable, it does not influence the distribution of various forest species, however, aspect plays an important part in determining the character of the vegetation in hilly area. Geology, soil type and depth play an important role in determining the composition and quality of the crop.

10.4. FELLING SERIES, CUTTING SECTIONS AND JFM AREAS: Not Applicable.

10.5. BLOCKS, COMPARTMENTS AND JFM AREA: Entire Forest area of the Division.

10.6. SPECIAL OBJECTIVES OF MANAGEMENT

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 thereby improving their socio-economic conditions.

10.6.1. Analysis of the crop

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.

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 No.-XXVI.**) Different parts of different species used for medicine, are given in the table 10.1.

Table 10.1. Distribution of important NTFP species:

Sr. No.	Name of specie	No. of compartment in which		
		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

Besides the species mentioned in table 10.1 and 10.2, 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.

10.6.2. Silvicultural system: Not applicable

10.6.3 Rotation Period: Not applicable

10.6.4 Harvestable diameter: Not applicable

10.6.5 Reducing factors and Reducing areas: Not applicable.

Table 10.2. Distribution of 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

10.6.6 Felling Cycle: Not applicable

10.6.7 Division into Periods and allotment to Periodic Block (PB): Not applicable.

10.6.8 Calculation of Yield: Not applicable

10.6.9 Table of Felling: Not Applicable.

10.6.10. Method of executing the felling: Not applicable

10.6.11: Subsidiary Silvicultural Operations Cleaning and Thinning: Not applicable
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10.6.12 Regeneration: Not applicable

10.6.13. Associated regulations and measures

10.6.13.1. Ownership of NTFP:

The statutory provisions have vested ownership rights over the listed NTFP 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.

The Seventy-third Amendment of the Constitution of India has brought the NTFPs under the management of the Village Panchayat. NTFPs(also referred as Minor Forest Produce, MFP) in the State and its sale procedure can be categorised into two parts:

i. **33 Minor Forest Produce in Scheduled Areas:**

- a) "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."
- b) As per 1997 amendment, 33 Minor Forest Produce (list enclosed in **Appendix No. – XXVIII A**) found on Govt land in Scheduled Areas; ownership lies with Village Panchayat.
- c) Ownership rights of NTFPs in practice have not been handed over to village Panchayat because today village Panchayat are not technically sound.
- d) 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.

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e) 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.

f) Collection wages for NTFPs are paid to labourers by Tribal Development Corporation.

ii. **Other Non-Timber Forest Produce, (excluding 33 NTFPs in Scheduled Area), and NTFPs in Non-Scheduled Areas:**

a) R & RD, GoM, Govt. Resolution dated 5th October 2011, confers the rights of NTFP collection, processing and sale to the JFMCs. Therefore, capacity building of JFMCs is crucial for realising the potential of harnessing employment generation to JFMC members and additional income to the committee to further invest in the development of NTFPs.

b) Forest Rights Act, 2006 confers the rights over NTFPs to the community right holders. Therefore, in areas where the CFRs (involving NTFPs) have been vested with village community, in such areas, the process of NTFP collection, processing and sale has to be initiated by that community.

c) Excluding the above-mentioned areas, DCF can form NTFP units and put for auction. However, mechanism has to be evolved to regulate excess harvesting.

10.6.13.2. NTFPs Collection:

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 its Rules.

The details of NTFP collection is given in **Appendix No. XXVIII and XXVIII - A**. From these tables, it is evident that, NTFP collection is very meagre and restricted to only few species. Therefore, specific holistic efforts are needed to encourage JFMCs to harvest NTFPs to create livelihoods. Demonstrative effect has to be shown in at least few villages, so that, the positive results will spread to other villages.

There are 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.

10.6.13.3 Methods of Treatment:

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.

Training Programme for NTFP Collection: To reduce the Destructive Harvesting Techniques, training programmes and workshops 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.

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 theses 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.

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.

The treatment to be given will be different for different types of NTFPs. therefore, each NTFP will have separate treatment as follows.

10.6.13.4 Management of Tendu:

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 and continues up to first week of June.



New Flush of Tendu Leaves

Tendu tree heavily lopped for Leaves

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 10.3 Revenue realized from Tendu Leaves Collections:

Year	Actual Collection (in Std. bag)	Revenue (in Rs.)
2009-10	29916.005	36769335
2010-11	37672.745	51128268
2011-12	36014.93	43179373
2012-13	33303.045	56652097
2013-14	29474.425	26551587
2014-15	27286.35	28825294
2015-16	22126.19	38378299
2016-17	25539.995	55432793
2017-18	2730.665	168439206
2018-19	26428.46	72523969
Total	270492.8	577880221

- i. Tendu leaf collection is governed by the policy of the State Govt in conjunction with various Laws presently in force.
- ii. 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.
- iii. 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.
- iv. Maintenance and improvement of Tendu in the forest crop composition is prescribed by ensuring regeneration of Tendu and its subsequent protection.

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- v. 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.
 - vi. Tendu regenerates through root suckers. Hence, young root suckers should be identified and aided for creation of congenial growth conditions such as cleaning of bushes, protection from fire etc.

10.6.13.5 Management of Mahua:

i. 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

ii. 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.

10.6.13.6 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.

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 calico printing, 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.

Dhaoda trees are quite common in the forest crop of this tract. Salai trees are also found in a large number of compartments. Hence collection of Dhaoda and Salai gum is also permitted. The Forest Department should collect species wise data for various types of Gums.

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.

Tapping Rules:

- i. The tapping season will commence from November to end of May each year.
- ii. No tree below 90 cm in girth will be tapped.

- iii. 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.
- iv. Each tree shall be tapped continuously for 3 years; and, thereafter, will be given rest for 3 years.
- v. 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.
- vi. 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.
- vii. 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.
- viii. 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.
- ix. 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.
- x. The number of blazes to be made on each tree will depend on its girth at breast height, as given below:

Table 10.4 Maximum Blazes Allowed on Each Tree:

Category	Girth at BH (m)	Maximum blazes allowed on each tree
I	0.9 to 1.3	2
II	1.3 to 2.0	3
III	2.0 to 3.0	4
IV	Over 3m	One blaze for each 45 cm girth in addition to the category III above

- xi. No fresh blaze will be made on the partially healed up surface or old wounds.

- xii. 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.
- xiii. 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.
- xiv. 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.
- xv. 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.
- xvi. 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.
- xvii. 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.

10.6.13.7 Management of Hirda, Beheda, Aonla, Char and Other NTFPs.

- i. **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.

- ii. **Regeneration of Hirda, Beheda, Aonla and Char:** Compartments having Natural regeneration of Beheda, Aonla and Char are 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.

10.6.13.8 Kosa Cultivation Management:

i. Kosa Cultivation (Tassar) 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 10.5 Table Showing Area under Tassar Cultivation:

Range	No. of villages	Area 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 forest and in 2 Khasras of Protected Forests. In Pimpalgaon Range, Kosa cultivation is done in 9 khasras of Protected Forests.

ii. 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 10.6 Table showing Range wise area of Arjun Plantation:

Plantation Year	Range	Compartment No. (P.F)	Area in Ha.
1986	Pimpalgaon	377	40
1987	Pimpalgaon	377	20
1988	Pimpalgaon	Palaspani P. F.	40
1989	Pauni	393	40
1991	Pauni	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.

iii. 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 Hamesha2. 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.

iv. Traditional Method of Kosa Cultivation: Eggs which are used for formation of Kosa cocoons are for two types. One is *Mulki* and 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).

v. 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.

vi. 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 spacing 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.

vii. 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 spacing of 1.2 x 1.2m. Besides this, *Sabai* grass at spacing 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 80 Ha 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 wherever necessary.
- Preparation of TCM along the periphery of plantation.
- 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.

viii. 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. Pollarding of other plants will be carried out, when they attain height of 4' to 5' with a view to start Kosa cultivation

ix. 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.

10.6.13.9 Management of Grass:

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.

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 Fodder and Pasture Working Circle.

10.6.13.9 Future Management:

For building the database on NTFPS, it is prescribed that weekly markets will be surveyed extensively to find out the types of NTFPs coming from forest areas, their extent, purpose of utilisation, rate, chain and the agency of marketing and final destination. JFMCs being primary stakeholders should be involved in this

important exercise. A suitable printed register be supplied to all the JFMCs by the division so as to collect this information.

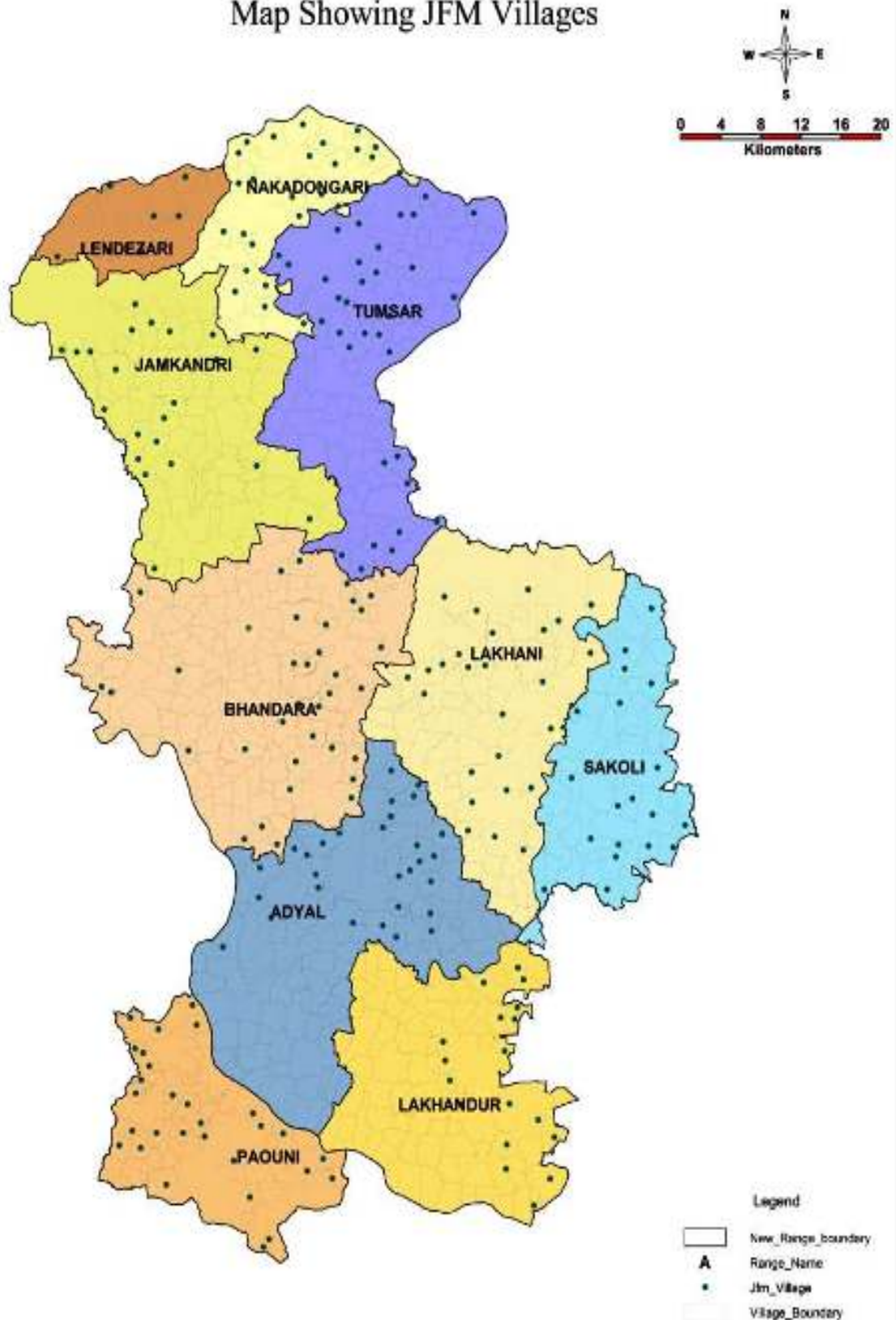
It is prescribed that the above information should be used to formulate correct prescriptions at the time of next revision.

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” with the help of Tropical Forest Research institute (TFRI), Jabalpur.

A research project may be submitted to TFRI with the following broad objectives.

- Survey and documentation of potential NTFP in the Division
- Market potential of potential NTFP
- Community based collection and marketing
- Value addition to NTFP
- Supply chain and buy back mechanism

Bhandara Forest Division Map Showing JFM Villages



JOINT FOREST MANAGEMENT

11.1. JOINT FOREST MANAGEMENT

The active JFM committees and their locations are marked on GIS based map.

11.2. GENERAL CONSTITUTION

Degradation of forests is a continuing process, besides, very heavy pressure of human and livestock, 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 Government control and consequent, reservation of forests permitting only specified forest resources and the 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 neighbourhood 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 Department 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 Joint Forest Management is extended to the entire area of the Bhandara forest Division which is co-terminus with the area of Bhandara District. Villages that are adjoining to the forest areas are the focal areas for practicing Joint Forest Management.

11.3. GENERAL CHARACTERISTICS OF VEGETATION.

The forests of Bhandara Forest Division belong to the sub-group 5-A, 'Southern Tropical Dry Deciduous Forests' as per the classification of forest types of India by Champion and Seth. Within this main type, considerable local variations in the altitude are not considerable, it does not influence the distribution of various

forest species, and however, aspect plays an important part in determining the character of the vegetation in hilly area. Geology, soil type and depth play an important role in determining the composition and quality of the crop.

11.4. FELLING SERIES, CUTTING SECTIONS AND JFM AREAS: Not Applicable.

11.5. BLOCKS, COMPARTMENTS AND JFM AREA: Entire Forest area of the Division.

11.6. SPECIAL OBJECTIVES OF MANAGEMENT

- i. To develop the degraded forest resources by promoting natural and artificial regeneration along with site specific Soil and moisture conservation works with the active participation of the villagers. It also aims to provide effective protection.
- ii. To strengthen and empower local institutions for protection and conservation of forest and wildlife resources through people's participation.
- iii. To explore and evolve strategies to generate sustainable employment to local people

11.6.1. Analysis

JFM concept has been introduced in this Division in the year 1998. The spread of JFM in the Division is large. All the villages that are adjoining to forest areas have been brought under the ambit of Joint Forest Management. A total of 22614 Ha forest land has been allotted to 210 JFMCs for protection and management.

Table 11.1 Range wise Area Distribution under JFM Committees:

Sr. No	Range	No of villages adjoining to forests	No of JFM committee formed	Area Handed over to committee (in
1	Nakadongri	31	28	2642.153
2	Adyal	51	32	3442.037
3	Bhandara	60	2	250.000
4	Jamkandri	16	16	1497.949
5	Pauni	56	37	3806.259
6	Lakhandur	24	20	1467.455
7	Sakoli	33	20	1725.687
8	Lakhani	72	16	2718.101
9	Tumsar	32	32	2426.967
10	Lendezari	11	7	2637.663
Total		386	210	22614.271

11.6.2. Silvicultural system: Not applicable

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11.6.3 Rotation Period: Not applicable

11.6.4 Harvestable Diameter: Not applicable

11.6.5 Reducing factors and Reducing areas: Not applicable.

11.6.6 Felling Cycle: Not applicable

11.6.7 Division into Periods and allotment to Periodic Block (PB): Not applicable.

11.6.8 Calculation of Yield: Not applicable

11.6.9 Table of Felling: Not Applicable.

11.6.10 Method of executing the felling: Not applicable

11.6.11: Subsidiary Silvicultural Operations Cleaning and Thinning: Not applicable

11.6.12 Regeneration:

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.

11.6.13. Associated regulations and measures

11.6.13.1. Degradation of forests is a reality due to various factors such as over exploitation of forest resources due to heavy biotic pressure such as illegal removals from forest, overgrazing, forest fires, loss of top soil due to excessive erosion etc. Rate and magnitude of degradation is directly proportional to the involvement of rural communities in the protection and management of forest resources. In the past, local communities enjoyed free access to the forests. With the bringing of forests under Govt. control through the process of reservation the access to forest resources were substantially regulated. Thus, Forest reservation policy came in conflict with the interest of local communities dependent on these forests to meet their basic needs of forest produce for *bonafide* requirements. 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 neighbourhood 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 resource being common property resource entails participation of communities in protection and management so that, the belongingness of the community acts as a catalyst for long term forest and wildlife conservation. Therefore, the National Forest Policy, 1988 accordingly provided for creating a massive people's movement for the conservation of forest resources.

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 advised the State Governments to adopt the Joint Forest Management (JFM) approach for the protection and rehabilitation of degraded forest. The Govt. of Maharashtra vide Resolution No.SIF-1091/199/F-11, dt.16th March 1992 adopted JFM approach for degraded forest areas. Thereafter, the State Government vide Resolution dt. 25/4/2003, expanded the scope of JFM to Good quality forests also. On 5th October 2011, the JFMCs were provided legal backing by bringing them under the umbrella of Mumbai Gram Panchayat Act 1959. Similarly, to further strengthen the institution of JFM, special schemes have been introduced to reduce the biotic pressure on forest and to improve the success of plantations viz., Distribution of LPG/Biogas, Distribution of improved cattle in lieu of scrub cattle, protection of plantations.

JFM is a concept under which Forest Department 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 Department 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 Department, the challenge to effectively protect forests with limited resources is enormous. The JFM program succeeds where the initiative comes from the people's side and it usually fails where it is forced from FD side as it would only be a Govt. driven and target

oriented program. Villagers themselves are required voluntarily to participate in the program. Forest Protection Committee (FPC) is to be formed in each village through the resolution of Gram Sabha. Each Forest Protection Committee constitutes a Managing Committee consisting of members elected from general body and with local Forest Guard /Forester as the member secretary. The managing committee is responsible to implement the decisions of general body with regard to the execution of JFM works in partnership with Forest Department Memorandum of Understanding (MOU) is signed between Forest Department 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 fulfilment of conditions of MoU.

The members of the FPC will help in protection and development of forests and in turn they will receive share in the usufructs from the forest areas assigned to such committee. The JFM area will be managed as per the Micro plan prepared by the JFMC and approved by the DCF. These micro plans shall contain the details of forest and village development works. 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 factored properly.

Govt. of Maharashtra vide Resolution dated 5th October 2011 and 10th July 2012 has issued revised guidelines for implementation of JFM programme. Important provisions of these Govt. Orders are summarized below:

- a) JFMC will be constituted by the Gram Sabha through a Resolution under the provisions of Section 49 of Mumbai Gram Panchayat Act, 1958. It would consist of 12 to 24 members, of which, at least 50% are women. Representation to SC, ST, VJNT will be as per prevailing Govt. norms.
- b) The ex-officio member secretary of JFMC would be Forest Guard/Forester if the village population is less than 1000 or more than 1000 respectively.
- c) The forest area to be assigned to JFMC would be decided based on parameters such as production potential, available eco-tourist sites etc through consultative process. In general, forest areas within 3 KM of *Gaathan* would be identified for assignment. Apart from degraded forest areas, even dense forest areas can also be assigned to JFMCs.
- d) Memorandum of Understanding (MoU) will be signed in prescribed format by DCF (T) and JFMC.

- e) Micro plan will be prepared by the JFMC and would be approved by the DCF. All JFM activities should be taken up as per the approved micro plan. The micro plans are to be dovetailed with the broad prescriptions of the approved Working Plan of the division.
- f) JFMC is authorized to promote Eco-tourism activities in their assigned areas and can levy Entry Fee & Nuisance Tax from eco-tourists to preserve these sites sustainably and also generate livelihoods to local people.
- g) JFMC is authorized to impose penalties on persons involved in forest and wildlife crimes.
- h) RFO and JFMC have to submit an annual performance report jointly to the DCF *w.r.t.* the responsibilities assigned and achievements of the committee.
- i) The JFMC would be eligible for usufruct sharing from intermediate and final felling as per working plan if the responsibilities thrust on the committee are executed for a period of five years. However, in case of Bamboo, yield from dense areas/degraded areas, the same would be available to JFMC soon after execution of MoU and upon protection of Bamboo for 3 years respectively. All removals would be as per the provisions of approved Working Plan.
- j) In case, the JFMCs do not perform the responsibilities assigned to them, DCF is authorized to dissolve such committees by applying the principles of natural justice.
- k) Non forest land available in the village can be included in the JFM programme if the Gram Panchayat agrees to do so.
- l) To reduce the biotic pressure on forests for fuelwood, Govt. of Maharashtra vide Resolution dated 10th July 2012 has launched schemes for distribution of LPG/Biogas connections on 75% subsidy. Similarly, to reduce grazing pressure, distribution of improved breed of cattle in lieu of disposal of scrub cattle has been introduced on 50% subsidy. To improve the performance of plantations, scheme for plantation protection through financial incentive has been launched.

11.6.13.2: Potential Areas for JFM:

The following areas will be suitable for JFM program.

- i. Areas prescribed under the Afforestation Working Circle.
- ii. Areas under miscellaneous management, especially the Zudpi jungles suitable for afforestation are proposed to be covered under JFM.

iii. Areas under Grass & Fodder resource management Working Circle are also proposed to be included in JFM.

iv. 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.

v. Villages which are adjoining to potential Eco-tourism sites are proposed to be included in JFM programme.

vi. All potential wildlife areas are to be included in either JFM or EDC programme as per provisions contained in Govt. Resolution.

11.6.13.3: 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. So far, only 29 JFMCs are covered under FDA Scheme shown in table 11.2. Therefore, special efforts need to be made to bring more JFMCs under this scheme.

11.6.13.4: Village Forests:

Introduction: “Village forests” or “*Gram Van*” means such part of reserved forests or protected forests in the village as assigned to the Village Panchayat under the Indian Forest Act, 1927 and the Village Forest Rules 2014 and also under the Maharashtra Village Panchayats Act 1959 for management through Joint Forest Management Committee. The JFMC shall manage its village forests on behalf of the Village Panchayat with due reference to the relevant provisions of the Panchayats (Extension to the Scheduled Area) Act, 1996, the Maharashtra Minor Forest Produce (Regulation of Trade) (Amendment) Act, 2006, the Indian Forest Act, 1927, the Wildlife (Protection) Act, 1972, the Biological Diversity Act, 2002, the Maharashtra Village Panchayats Act and rules made thereunder and any other law in force as applicable to the State of Maharashtra.

Maharashtra Village Forest Rules, 2014: In exercise of the powers conferred by sections 26, 28, 30, 32, 34 and 76 of the Indian Forests Act, 1927 (Act No. XVI of 1927), and all other powers enabling it in that behalf, the Government of Maharashtra has notified the Village Forest Rules on 13th May, 2014. The salient aspect of these rules is mentioned below:

- i. JFMCs fulfilling the criteria of Zero encroachment, Positive rate of Natural regeneration, effective control of forest fire (area burnt not more than 5 % in

last three years), Over 60% survival in plantations raised in the said area at the end of fifth year, effective implementation of “charaibandī” and “kurhadbandī” are eligible for assignment of Village Forests if at least three criteria are fulfilled.

- ii. The village forests assigned to the village community or the Village Panchayat shall be managed by a committee called as the “Van Vyavasthapan Samiti” or the Village Forest Management Committee.
- iii. “Van Vyavasthan Samiti” has to prepare “Ten Year Microplan” by dovetailing with the Working Plan of the landscape and, an “Annual Implementation Plan” every year for managing the village forests and place the microplan before the Gram Sabha for ratification and its approval by the ACF or Sub-DFO in charge of independent sub-division and revise it periodically.

Table 11. 2 Area Covered and Committees formed Under FDA:

Sr. No	Range	JFM Village	Total
1.	Pauni	Khokari Dhorapa	105
		Amagaon	100
		Nisti	100.00
		Bhuyar	85.674
		Waigaon	78.940
		Shiagori	74.493
2	Bhandara	Kesalwada	150.00
		Sonegaon	80.00
3	Adyal	Reagola	69.840
		Madagi	189.933
4	Sakoli	Yerandi devi	266.781
		Papda	162.673
		Umarzari	221.968
		Chandori	194.046
		Dhanod	174.110
		Zadgaon	219.781
		Tudmapuri	202.383
		Bardkinhi	173.00
		Malutola	333.562
		Wadsgaon	110.977
5	Jamkandri	Hiwara	172.792
6	Tiroda	Ghoti	61.790
		Khara	193.700
		Majitpur	154.910
		Junewani	125.00
		Gangazari	130.00
7	Tumsar	Temani	203.049
		Chandpur	207.469
		Asalpani	207.756
Total			3876.353

11.6.13.5 General Prescriptions:
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- i. JFM Micro-plans will be prepared for each village through the process of participatory rural approach. Micro plans are to be dovetailed with the prescriptions of the approved Working Plan.
- ii. Silvicultural management, maintenance of forest boundary, removal of forest encroachment and control over illicit cutting, illicit grazing and fire should receive high priority.
- iii. Forest protection cannot be viewed in isolation. The works depicted in the Micro plans should be reflected in the planning process of the Gram Panchayat.
- iv. Wherever required, NGOs be involved for creating awareness programmes.
- v. Documentation of successful initiatives under the JFM approach must receive importance at the Range and Division level. A compilation of works undertaken in JFM villages in a financial year should be done at division level and published. This work should be given wide publicity in print and electronic media.
- vi. JFM programme should be implemented with complete transparency. The accounts of JFMCs shall be annually audited as per Govt. instructions and a copy of such audited statement shall be shared with Gram Panchayat. All payments to JFM members shall be made either through A/c payee cheques or RTGS transfer or depositing directly into respective bank accounts. Payments through Cash shall be strictly discouraged.
- vii. As far as possible, all works are to be executed by JFM members only. Monitoring of JFM activities by supervisory cadres (ACF to CCF) is the key for effective implementation of JFM programme. Periodic reviews at various levels will aid in good implementation.
- viii. Often, there is thinking in the grassroots level functionaries that, JFM has to be implemented only if funds are allotted to a village. This notion is detrimental to the core values of JFM. Therefore, the supervisory officers should strive to bring suitable awareness among the grass root functionaries (FG to RFO) to change attitudes and mindset.
- ix. Dedicated NGOs/Civil society groups can aid the village communities in strengthening JFM institution. Their services can be utilized by the FD in

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areas of capacity building of JFMCs in microplanning, community motivation, eco-tourism initiatives, evolving models for enhancing livelihoods etc.

- x. Periodic evaluation of JFMCs should be done to identify Performers and Non-Performers. While Performing JFMCs should be rewarded, the Non-Performers should be given opportunity for improvement.
- xi. One of the important reasons for forest degradation is the dependence of local people for firewood from forests. Therefore, to reduce such dependence, GoM vide resolution of 10th July 2012 decided to distribute LPG connections to forest fringe villages. JFMC's have played a key role in implementing this scheme. In the division, 938 families spread over 61 JFM villages have benefitted from LPG connections. Efforts should be made to extend this scheme to all JFM villages.
- xii. The JFM villages should also be covered with other source of efficient fuel management like Improved *Chulhas* with help from the Maharashtra Biodiversity Board.
- xiii. The Division should make all efforts to ensure that all JFM Committees have Public Biodiversity Registers as part of the many records to be kept. The State Biodiversity Board should be consulted for the same.

MANAGEMENT FOR CONSERVATION AND ENHANCEMENT OF BIODIVERSITY

12.1:INTRODUCTION: This chapter on Maintenance, Conservation and Enhancement of Biodiversity deals with the importance threats and steps to mitigate those threats to biodiversity in the District of Bhandara.

Biodiversity is defined as variability and variety in life forms including genes, species and ecosystems. Biodiversity conservation seeks to maintain life support systems provided by nature. Adding to the impact of natural processes, human intervention has had an adverse effect on these life support systems and thereby on biodiversity.

India, a mega-diverse nation, is one of the richest nations in terms of biological diversity. India owes this to its position in the tropical and subtropical latitudes. India has a great diversity of natural ecosystems ranging from the cold and high Himalayan regions to the sea coasts; from the wet north-eastern green forests to the dry north-western arid deserts; with different types of forests, wetlands, islands and the oceans. India consists of fertile river plains and high plateaus and several major rivers, including the Ganges, Brahmaputra and Indus. The diverse physical features and climatic situations have formed ecological habitats like forests, grasslands, wetlands, coastal and marine ecosystems and desert ecosystems, which harbour and sustain immense biodiversity. The country is also one of the 12 primary centres of origin of cultivated plants and domesticated animals.

12.2:GENERAL CONSTITUTION OF AREA: Forest area of whole Bhandara division is important from the biodiversity conservation point of view.

12.3:GENERAL CHARACTERISTICS OF VEGETATION AND BIODIVERSITY:

The forests of Bhandara Forest Division belong to the sub-group 5-A, 'Southern Tropical Dry Deciduous Forests' as per the classification of forest types of India by Champion and Seth. Within this main type, local variations in the altitude are not considerable and hence not much influence the distribution of various forest species. However, aspect plays an important part in determining the character of the vegetation in hilly area. Generally, the western and northern slopes are better stocked than the drier eastern and southern slopes. Geology, soil type and depth play important role in determining the composition and quality of the

crop. The biodiversity of the forest is highly eroded in most parts of the Division due to selective treatments in favour of commercially important species over the years.

Documentation of the biodiversity is very important. An effort made by this Office to find out available documents of the biodiversity of the Division and District has shown about 213 species which includes trees, shrubs, herbs, climbers, bamboo and wild animals and birds. It can be argued that the species listed are not specifically of the forest areas of the Division. However, considering the mobile nature of the wildlife and the lack of much diversity of neither ecosystems nor altitudinal change, it can be safely presumed that such species are also spread across the forests. This gives all the more reason for the documentation study of the biodiversity of the Forest Division specifically as prescribed.

12.4:BLOCKS, COMPARTMENTS AND JFM AREA: Entire forest area in the division.

12.5: SPECIAL OBJECTIVES OF MANAGEMENT:

- i. Document, protect and replenish indigenous vegetation and local ecosystems of the Division.
- ii. Protect and restore freshwater ecosystems
- iii. Document and control invasive species
- iv. Minimize impacts of human interference and other disturbance like fire, grazing, etc. on biodiversity
- v. Maintain and record indigenous peoples' ethno-biological knowledge
- vi. Improve scientific knowledge and access to information about biodiversity
- vii. Introduce institutional reforms.
- viii. Sensitize the staff on the issues of Biodiversity for better appreciation and interpretation of the area they work in.

12.6: ANALYSIS OF THE CROP/BIODIVERSITY:

12.6.1: The analysis of forest crop of Bhandara Forest Division is done in this plan in each Working Circles and also in Part-I, Chapter-VI. (Maintenance and Enhancement of Forest Resource Productivity)

The biotic interference like excessive grazing, illicit felling, over dependence on forest for fuel wood, weed infestation and frequent fires has resulted in the

degradation of the forests. The illegal felling is often concentrated on the species most valued for various purposes. Seedling stages are particularly exposed to extermination due to excessive grazing and fires. The species surviving during degradation stages, are resistant ones, which can stand to grazing and fires. These species are often of low utility, tend to become gregarious and do much harm to biodiversity.

12.6.2: As per the IUCN status the following animals and birds are classified as Endangered (EN) – Tiger (*Pantheratigris*), Wild dog (*Cuonalpinus*).

Birds species which are listed as Critically Endangered in IUCN red list version 2013.2 are White backed Vulture (*Gyps bengalensis*), Red-headed Vulture (*Sarcogyps calvus*) and other endangered species like Indian Vulture (*Gyps indicus*) and Steppe Eagle (*Aquila nepalensis*).

12.7: NEED TO CONSERVE BIODIVERSITY:

Biodiversity is essential for maintaining the ecological functions, including stabilizing of the water cycle, maintenance and replenishment of soil fertility, pollination and cross-fertilization of crops and other vegetation, protection against soil erosion and stability of food producing and other ecosystems. Conservation of biological diversity leads to conservation of essential ecological diversity to preserve the continuity of food chains. Biodiversity provides the base for the livelihoods, cultures and economies of several hundred million of people, including farmers, fisher folk, forest dwellers and artisans. It provides raw material for a diverse medicinal and health care systems. It also provides the genetic base for the continuous up-gradation of agriculture, fisheries, and for critical discoveries in scientific, industrial and other sectors. The rapid erosion of biodiversity in the last few decades has impacted on the health of the land, water bodies and people. Biodiversity is a wealth to which no value can be put. In the final analysis, the very survival of the human race is dependent on conservation of biodiversity. It is evident that this invaluable heritage is being destroyed at an alarming rate due to several reasons.

Conservation and sustainable use of biological resources based on local knowledge systems and practices is ingrained in Indian ethos. The country has a number of alternative medicines, like Ayurveda, Unani, Siddha and Homeopathic systems which are predominantly based on plant based raw materials in most of their preparations and formulations. Herbal preparations for various purposes

including pharmaceutical and cosmetic form part of traditional biodiversity uses in India and in Bhandara as well.

The benefits that we derive from the biodiversity are many and a few of them are noted below:

Food provision: Animals, plants, mushrooms, fruits, tubers, flowers etc, you name them and we find their use in some form of food by many people's groups. India's food security, where we are able to have sufficient and surplus grains through the green revolution, was made possible because we were having wild varieties of rice, wheat etc apart from introduction of good irrigation and fertilizers.

Genes: Wild animals and plants are sources of genes for hybridization and genetic engineering. New improved varieties of plants, particularly food grains, are essential to be developed and this would not be possible without the presence of genetic diversity.

Biological control agents: Some species of living things help us control invasive species without the use of poisons. Epidemics in forests and agricultural crop are perpetuated by monocultures and vast plantations. Diversity however, serves to balance nature on its own.

Natural products: Many of the medicines, fertilizers, and pesticides we use are derived from plants and animals. We also get products such as oils, adhesives, and silk from natural sources.

Environmental services: We rely on plants and animals for important processes such as soil aeration, fertilization, and pollination.

Enjoyment: Biodiversity and wildlife are often the subject of aesthetic interest. In India and Bhandara we can see the people are being more and more aware about the value and function of wildlife and biodiversity. The level of appreciation and interpretation of both has also increased for the better.

Scientific interest: The diversity of plants and animals inspires scientific inquiry in many different realms.

Future potential: With new discoveries to come, there will be many more practical reasons to appreciate biodiversity!

12.8: PRESCRIPTION FOR THE MAINTENANCE & ENHANCEMENT OF BIODIVERSITY.

- (i) Identification of Medicinal Plants Conservation Area (MPCA) in the Division by involving the people, the Local medicinal practitioners, institutions, field botanists etc. to get the documentation of not only the medicinal plants available, the parts and method of use but also the local traditions involved with the practice and the folklore that goes with them so that this can become an integral part of the indigenous technical knowledge documentation.
- (ii) Sustainable harvesting of Medicinal Plants should be strictly adhered to.
- (iii) Sensitization of the staff of Bhandara Division to the issues of biodiversity is of utmost importance. The Division shall involve such experts and institutions in consultation with the Maharashtra Biodiversity Board, Nagpur for such trainings and workshops. Our tendency to limit our management practice to only teak and prominent wildlife species should be done away with.
- (iv) The field functionaries of Bhandara forest division shall identify areas of significant biodiversity value and take lead in In-situ conservation and Ex-situ conservation.
- (v) Identification of area of Birds presence in the Division is a must. Area adjoining to Wildlife sanctuary is known to be rich in avi-fauna and needs to be studied for further protection. It should be the endeavour of the Division to explore potential sites/areas that would qualify as IBAs.
- (vi) Identification and documentations of local practices, indigenous technical knowledge and other ethno-biological should be carried by the department.
- (vii) Identification and Conservation of rare /endangered indigenous species of plants in the division.
- (viii) All efforts should be made to control fire and grazing in the forests as these are among the biggest enemies of biodiversity.
- (ix) As per biodiversity Act 2002, Biodiversity Management Committee through the gram panchayat as per the norms decided by the Government needs to be established in all the JFM's villages. The local guard should provide all help and co-operation to the gram sabha for the establishment of the works as and when required.

- (x) Capacity building for local communities, forest personnel at all levels, elected representatives, decision makers, and bureaucrats needs to include the provision of technical skills.
- (xi) All JFM Committees should have Public Biodiversity Registers as part of the many records to be kept. Members from the State Biodiversity Board should be consulted for the same. Necessary Workshops, training etc required for this should be carried out.
- (xii) The forest division in consultation with the local Colleges, anthropological / social science institutions and the Maharashtra State Biodiversity Board should carry out Biodiversity studies on the lesser-known lower life forms of the flora and fauna. It may be seen that as the forest department has concentrated its working in the higher life form of trees and mammals/birds other species have been relegated to oblivion.
- Documentation and studies of herbaceous plants
 - Documentation and studies on the fungi, ferns, algae and Lichen and moss (if any).
 - Carry out entomological studies (particularly butterflies).
 - Carry out herpetological studies.
 - Medicinal plants & practices documentation along with other indigenous technical knowledge.

In all the above studies, proper documentation with distribution of species, the abundance and threats to the species may be included.

ADDENDUM: A NOTE ON THE BIODIVERSITY ACT 2002

Introduction:

India is a party to the United Nations Convention on Biological Diversity signed at Rio de Janeiro on the 5th day of June, 1992. This Convention reaffirms the sovereign rights of the States over their biological resources. Therefore, legislation was enacted by the Indian Parliament in 2002 to give effect to the United Nations Convention.

This Act aims to provide for conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of

the use of biological resources, knowledge and for matters connected therewith or incidental there to.

Important provisions of the Act:

- (a) Section 2(a) defines the term “Benefit Claimers” as; the conservers of biological resources, their by-products, creators and holders of knowledge and information relating to the use of such biological resources, innovations and practices associated with such use and application.
- (b) Section 2(b) defines the term “Biological diversity” as; the variability among living organisms from all sources and the ecological complexes of which they are part, and includes diversity within species or between species and of eco-systems.
- (c) Section 2(c) defines the term “Biological resources” as; Plants, animals and micro-organisms or parts thereof, their genetic material and by-products (excluding value added products) with actual or potential use or value, but does not include human genetic material.
- (d) Section 2(o) defines the term “Sustainable use “as the use of components of biological diversity in such manner and at such rate that does not lead to the long-term decline of the biological diversity thereby maintaining its potential to meet the needs and aspirations of present and future generations.
- (e) Section 3(1) regulates the access to Biological diversity for persons mentioned in section 3(2) who shall, without previous approval of the National Biodiversity Authority (NBA), obtain any biological resource occurring in India or knowledge associated thereto for research or for commercial utilization or for bio-survey and bio-utilization.
- (f) Section 3(2): The persons who shall be required to take the approval of the NBA under section 3(1) are the following, namely: (a) a person who is not a citizen of India; (b) a citizen of India, who is a non-resident as defined in clause (30) of section 2 of the Income-tax Act, 1961; (c) a corporate body, association or organization not registered in India or registered in India under any law for the time being in force which has any non-Indian participation in its share capital or management.

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- (g) Section 4: No person shall, without the previous approval of the NBA, transfer the results of any research relating to any biological resources occurring in, or obtained from, India for monetary consideration or otherwise to any person who is not a citizen of India or citizen of India who is non-resident as defined in clause (30) of section 2 of the Income-tax Act, 1961 or a body corporate or organization which is not registered or incorporated in India or which has any non-Indian participation in its share capital or management.
- (h) Section 6 (1): No person shall apply for any intellectual property right (IPR), by whatever name called, in or outside India for any invention based on any research or information on a biological resource obtained from India without obtaining the previous approval of the NBA before making such application.
- (i) Section 7: No person, who is a citizen of India or a body corporate, association or organization which is registered in India, shall obtain any biological resource for commercial utilization, or bio-survey and bio-utilization for commercial utilization except after giving prior intimation to the State Biodiversity concerned.
- (j) Section 8(1): Central Government for the purposes of this Act, shall appoint a body called the National Biodiversity Authority (NBA).
- (k) Section 21(1): The National Biodiversity Authority shall while granting approvals shall ensure that the terms and conditions subject to which approval is granted secures equitable sharing of benefits arising out of the use of accessed biological resources, their by-products, innovations and practices associated with their use and applications and knowledge relating thereto in accordance with mutually agreed terms and conditions between the person applying for such approval, local bodies concerned and the benefit claimers.
- (l) Section 21(4): NBA shall in consultation with the Central Government frame guidelines for operationalizing section 21(1).
- (m) Section 22(1): For the purposes of this Act, State Government may, by notification in the Official Gazette, establish State Biodiversity Board.
- (n) Section 37(1): Without prejudice to any other law for the time being in force, the State Government may, from time to time in consultation with the local

bodies, notify in the Official Gazette, areas of biodiversity importance as biodiversity heritage sites under the Act.

- (o) Section 37(2): The State Government, in consultation with the Central Government, may frame rules for the management and conservation of all the heritage sites.
- (p) Section 38: Without prejudice to the provisions of any other law for the time being in force, the Central Government, in consultation with the concerned State Government, may from time to time notify any species which is on the verge of extinction or likely to become extinct in the near future as a threatened species and prohibit or regulate collection thereof for any purpose and take appropriate steps to rehabilitate and preserve those species.
- (q) Section 41(1): Every local body shall constitute a Biodiversity Management Committee (BMC) within its area for the purpose of promoting conservation, sustainable use and documentation of biological diversity including preservation of habitats, conservation of land races, folk varieties and cultivars, domesticated stocks and breeds of animals and microorganisms and chronicling of knowledge relating to biological diversity.
- (r) Section 41(2): The NBA and SBA shall consult the Biodiversity Management Committees (BMCs) while taking any decision relating to the use of biological resources and knowledge associated with such resources occurring within the territorial jurisdiction of the BMCs.
- (s) The BMCs may levy charges by way of collection fees from any person for accessing or collecting any biological resource for commercial purposes from areas falling within its territorial jurisdiction.
- (t) Section 55(1): Whoever contravenes or abets the contravention of the provisions of sections 3, 4 or 6 shall be punishable with imprisonment for a term which may extend to five years, or with fine which may extend to ten lakh rupees and where the damage caused exceeds ten lakh rupees such fine may commensurate with the damage caused, or with both.
- (u) Section 58: The offences under this Act shall be cognizable and non-bailable.

(v) Section 59: The provisions of this Act shall be in addition to, and not in
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derogation of, the provisions in any other law, for the time being in force,
relating to forests or wildlife.

MANAGEMENT OF FOREST HEALTH AND VITALITY

13.1: INTRODUCTION: This Chapter on Maintenance and Enhancement of Forest Health and Vitality deals with the general condition of the health and vigour of the forests and steps that are needed to be taken in order to maintain and improve it.

Healthy forests are essential for sustainable forest management, yet forests, like other ecosystems, are subject to a number of threats that can cause tree mortality or reduce their ability to provide a full range of goods and services. The causes of the negative impacts on forest health and vitality vary from place to place, and the magnitude and duration of the impacts are not easy to assess. Causes include, but are not limited to, fire, insects and diseases, overexploitation of wood and non-wood forest products, poor harvesting practices, poor management, uncontrolled grazing, invasive species, air pollution and extreme climatic events (e.g. drought, frost, storms and floods). The complexity and interrelationship of these factors and their impact on the health and vitality of forests are difficult to unravel. Indirect impacts may be far reaching and include social, economic and environmental dimensions (FAO).

13.2: GENERAL CONSTITUTION OF AREA: Forest area of whole division.

13.3: GENERAL CHARACTERISTICS OF VEGETATION:

The forests of Bhandara Forest Division belong to the sub-group 5-A, 'Southern Tropical Dry Deciduous Forests' as per the revised classification of forest types of India by Champion and Seth. Within this main type, local variations in the altitude are not much, it does not influence the distribution of various forest species, however, aspect plays an important part in determining the character of the vegetation in hilly area. Generally, the western and northern slopes are better stocked than the drier eastern and southern slopes. Geology, soil type and depth play an important role in determining the composition and quality of the crop.

13.4: SPECIAL OBJECTIVES OF MANAGEMENT:

To improve the overall health of trees by striving for better composition, normal age distribution, sturdy structure high vigor of the forest which is achievable by:

- i. Improving the regeneration status of the forest by encouraging seedling origin new regeneration.
- ii. Minimizing the occurrence and impact of forest fire on forest.

iii. Detecting and containing pests and diseases from defoliators and skeletonisers to all forms of parasites, fungal attacks.

iv. Ensuring grazing in forest is kept to a minimum.

v. Reducing human interference of all forest, from illegal felling, grazing, hunting etc. by enforcing the law & changing moral perception.

13.5: ANALYSIS OF THE CROP:

The analysis of forest crop of Bhandara Forest Division is done in this plan in each Working Circle and also in Part-I, Chapter-VI. (Maintenance and Enhancement of Forest Resource Productivity)

13.6: REGULATIONS AND MEASURES: The biotic interference like excessive grazing, illicit felling, overdependence on forest for fuelwood, weed infestation and frequent fires has resulted in the degradation of the forests. The illegal felling is often concentrated on the species most valued for various purposes. Seedling stages are particularly exposed to extermination due to excessive grazing and fires. The species surviving during degradation stages, are resistant ones, which can stand to grazing and fires. These species are often of low utility, tend to become gregarious and do much harm to biodiversity.

1) Grazing reduction: Grazing not only destroys the regeneration which is vital for forest health but it also cause compaction of the soil. The presence of grazing also brings with it many menaces like competition with the wild animals for food, destruction of the cover of birds and pheasants, weeds dispersal, possible infections etc. Hence it is essential to contain grazing through:

(i) Stall feeding.

(ii) High milk yielding cows.

(iii) Discard unproductive cattle.

The above cannot be achieved without the active participation of the people. The role of JFMCs and the rapport of the field officers/staff is very important for the success of containing grazing.

Closing of the area of Natural Regeneration from grazing should be strictly followed. This is a neglected part but with the compulsory Aided Natural Regeneration prescribed for post-harvest areas, DCF should take extra steps to ensure total closure of grazing.

2) Fire: 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, 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. Fire also indirectly cause soil erosion by destroying the soil cover as well as the organic matter. Scientific method for estimating loss due to forest fire needs to be evolved so that the frontline staff would take fire prevention more seriously.

(i) Firelines: The creation and maintenance of fire lines as traditionally done, and described here in details under Miscellaneous Regulations, should be carried out. However, there is a need to improve its effectiveness and the DCF should look for ways and means to do so with necessary improvements and/or modifications.

(ii) Fire Blower: The Division has purchased 113 number of fire blowers for extinguishing fire. These blowers are very effective for the clearing the litter from the ground and breaking the spread of fire. The use of these blowers has proven very effective in reducing the labour intensiveness of firefighting and in containing the damage from fire. The blowers should also be used for maintaining the fire lines, as over time the litter and other dry material falling on the fire line area makes the fire line ineffective.

(iii) Fire Alerts: Fire alerts are being sent to the concerned by the FSI Dehra Dun on registration. It shall be mandatory on the part of the DCF to register himself and the RFOs up to the Beat guards for receiving these fire alerts from the FSI. Though, there may be issues of positional accuracy, inability of detection of small fires and probability of false alarms, the system will however keep the fire fighting machinery in alertness.

(iv) Cost estimation and reporting: The practice of fire reporting is very vague and reflects the lackadaisical approach to and indifference or the lack of knowledge on the harm of fire on the forests. The oft-repeated repeating is "*Leaf, litter is burnt. No loss to government*", is to be done away with. Considering the fact what fire does to regeneration, soil organisms, water holding capacity, soil erosion, ground dwelling pheasants & small animals, no forest officer should say that there is no loss to the government.

(v) **Fire-fighting Squad:** It is said that desperate times call for desperate measures. The critical condition of the forests of Bhandara necessitates taking up radical steps to revitalise the forests. It is necessary for the DCF to erect fire watchtowers and establish fire-fighting squads to tackle fire menace in the Division whose duty shall be in line with the squads deployed in the wildlife areas. These squads shall be concentrated in areas where Natural regeneration is being nurtured in the felled coupes and elsewhere in the Division. This measure is independent of the fire-watchers etc that area engaged in plantations areas. The squads shall ensure that no fire incident occurs anywhere in the Division particularly in areas of NR.

3) Aided Natural Regeneration: As it has been observed that there is hardly any regeneration in the forests of the Division, the norm of soil working in the forests of Bhandara which provides for soil working on 400 seedlings/ha in a coupe is being modified. In the forests of Bhandara, Aided Natural Regeneration is a must and a provision for the same is given.

Hence, wherever NR is prescribed (B1 or D areas) and the number of seedlings/saplings being less than 400, the DCF should take up Aided Natural Regeneration by planting miscellaneous species of associates of Teak in Teak areas and any miscellaneous species in non-teak areas. 625 seedlings are prescribed to be raised by ANR in such areas. As the number of regenerations varies from 0 to 350 or more, the treatment should be such that the total number of naturally occurring seedlings and ANR seedlings should be 625 in numbers. It shall be necessary to ensure that the soil working and mulching be carried out meticulously to ensure that whatever natural regeneration exists is nurtured properly.

This is an important step to help the forest regain its health and vitality which has been under much stress from biotic interference and managerial neglect. Reference to the Planning Department GR No.2011/CNO.130/EGS-10A DATED 28.12.2011 for carrying out ANR in the forest areas may be made for preparing estimates.

4) Illegal Felling: Illicit cutting for wood including timber, poles and firewood is observed in the division. It is heavy in areas adjoining to thickly populated towns and villages. Due to increase in the roads, the protection of forests has become more difficult. The demand for fuel wood has also increased tremendously, due to increase in population. Illicit cutting of fuel wood provides an easy employment to local villagers. All these factors have put tremendous pressure on the forests and

have resulted in depletion of growing stock and deterioration of forest health and vitality. All efforts should be made to reduce illegal felling from the forests.

5) Encroachment: There have been large scale clearances of the forests in the past for encroachment with a view to obtain agricultural crops. The state government has issued orders in 1978 and 1979 to regularize all encroachments on forest lands done during the period from 01.04.1972 to 31.03.1978. This increased in 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 enactment of the FRA 2006 has also further fragmented the forest land. Encroachment anywhere irrespective of size should be removed as per law.

6) Improvement in Diversity of forests: To maintain the diversity of forest appropriate measures should be taken up by reducing the percentage of teak in the forests. Teak wherever planted should be from certified seed and seedlings of known source. As maximum area is under teak, the gap planting in such areas should be done with miscellaneous species only. In this Plan it has also been recommended to put the percentage of teak to bare minimum while taking up plantation under Afforestation Working Circle and in other coupes where artificial plantation is carried out.

General: Field staff should be made aware of the diseases and their remedial steps wherever possible. Any diseases or pest seem to have adverse impact on the forest, should be recorded and documented. Photographs of the pest, the affected tree/forest and other evidence should be kept. The sample of the pest (borer, Lepidoptera, fungus etc.) should be collected and sent to institutions like BSI, FSI, ICFRE etc. for further study and remedial steps. The Division should hold workshops to bring awareness among the staff on the importance and the means to maintain Forest health and vitality.

CONSERVATION AND MAINTENANCE OF SOIL AND WATER RESOURCE

14.1: INTRODUCTION: This Chapter on Conservation and Maintenance of Soil and Water resource focuses on the need to put soil and water on an important pedestal as that which is given to wildlife and forests. In the Department, Soil and Water conservation need not necessarily be tagged to the other conservation measures like plantations works etc but needs to be recognized as an important independent activity. Soil and water are two important natural resources that support the existence of all the other beings including humans and forests.

14.2: GENERAL CONSTITUTION OF AREA: Soil and moisture is important in the area of whole division.

14.3: Special objectives of management:

- i. To protect, conserve and improve the forest land forming part of watershed for more efficient water retention and infiltration.
- ii. To protect and enhance the water resource originating from forest lands.
- iii. To check soil erosion and to reduce the effect of sediment yield on the watershed.
- iv. To rehabilitate the deteriorating lands.
- v. To moderate the floods peaks at downstream areas.
- vi. To increase infiltration of rainwater.
- vii. To improve and increase the production of timbers, fodder and other forest resource.
- viii. To enhance the ground water recharge, wherever applicable.
- ix. Improvement and restoration of soil quality and thus, raising productivity rates.
- x. Supply and securing of clean and sufficient drinking water for the population
- xi. To minimize the risks of floods, droughts and landslides.

14.4: ASSOCIATED REGULATIONS AND MEASURES:

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There are always strong links between measures for soil conservation and measures for water conservation. Many measures are directed primarily to one or the other, but most contain an element of both. Reduction of surface run-off by structures or by changes in land management will also help to reduce erosion. Similarly, reducing erosion will usually involve preventing splash erosion, or formation of crusts, or breakdown of structure, all of which will increase infiltration, and so help the water conservation (FAO).

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 stones obtained from the forests including other material from climber cutting, bamboo cleaning and shrub clearance should be used for brushwood check dams to arrest the soil loss.

The major activities to be taken up under this chapter are 1) Treatment of areas near the water bodies 2) Soil Conservation as part of Coupe Work.

(1) Treatment of the Watershed Area Dams in and near Forest Area:

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.

A large proportion of area is adjoining to various protected areas. Hence, deep CCTs should be avoided to avoid damage obstruction to wildlife.

While working on soil and moisture conservation works, the vulnerability of the forest areas to erosion should be kept in mind. Reckless implementation of Soil and Moisture conservation structures in the past has sometimes resulted in more erosions in the slope areas, which should be avoided.

2. Soil Conservation as part of Coupe Work

(i) NalaBunding and Check Dams: The primary objective of nala bunding and check dams is to reduce the run-off water and to arrest the silt. They are prescribed to be made from the loose boulders found in and around the nala bed or from the dug-up soil. No blasting 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 and soil loss and earthen gully plugging (nala bunds) for moisture conservation and water harvesting are prescribed.

The structure and quantum of work will depend upon various factors such as the erosion status, ground conditions, locally availability of suitable materials. However, to narrow the wide variations in implementation, the norm for gully plugging or nala bunding is proposed as 5 meter³/hectare of loose rubble filling or earthwork unless otherwise prescribed in the specific scheme.

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.

The forest tanks are proposed to be taken up in suitable sites without causing damage to the tree crop either during construction or due to submergence.

(ii) Forestry measures: Afforestation of eroded lands is best method of erosion control. The standing vegetation and dried leaves on the floor intercept the rain and reduce the impact of rain drops, thus averting the erosion process. Moreover, the decomposition of fallen dead plant part i.e. leaves and twigs not only increase the fertility of the soil but also improve the soil structure, which resist the soil erosion. Therefore, areas as prescribed in the various Working Circle for raising plantations should be taken in right earnest.

(iii) Other Measures: These include:

- **Gully control:** To check the formation or widening of gullies by constructing bunds, dams, drains or diversions through which excess run off water is channelled.
- **Stream bank protection:** To grow vegetation alongside the river bank, to construct drains, concrete or stone pitching etc. For checking the cutting and caving of river banks.

14.5: Implementation of other schemes: Soil & moisture conservation work under Jalayukta Shivar and other scheme may be taken up in the division. The norms for the SMC work may differ for scheme to scheme.

MANAGEMENT OF THE SPIRITUAL, CULTURAL ASPECT OF FORESTS AND ECOTOURISM

15.1: INTRODUCTION: For the people of India, environmental conservation is not a new concept. Historically, the protection of nature and wildlife was an ardent article of faith, reflected in the daily lives of people, enshrined in myths, folklore, religion, arts, and culture. Some of the fundamental principles of ecology-the interrelationship and interdependence of all life-were conceptualized in the Indian ethos and reflected in the ancient scriptural text, over 2000 years ago. It says, 'This universe is the creation of the Supreme Power meant for the benefit of all his creation. Each individual life-form must, therefore, learn to enjoy its benefits by forming a part of the system in close relation with other species. Let not anyone species encroach upon the other's rights.

The oldest visual image of the human fascination, love, and reverence for nature in India can be found in the 10,000 year-old cave paintings at Bhimbetka in Central India depicting birds, animals, and human beings living in harmony. The Indus Valley civilization provides evidence of human interest in wildlife, as seen in seals depicting images of rhino, elephant, bull, etc. Historically, conservation of nature and natural resources was an innate aspect of the Indian psyche and faith, reflected in religious practices, folklore, art and culture permeating every aspect of the daily lives of people. Scriptures and preachings that exhort reverence for nature and relate to conservation can be found in most of the religions that have flourished in the Indian subcontinent. Hinduism, Buddhism, Jainism, Christianity, Islam; and others place great emphasis on the values, beliefs, and attitudes that relate to the cross-cultural universality of respect for nature and the elements that constitute the universe. The concept of sinning against nature existed in various religious systems. Classical Indian myth is replete with similes of man in unison with the environment. Many of the rituals which to modern society may seem meaningless and superstitious were traditional strategies to preserve the intrinsic relationship between man and nature. The worship of trees, animals, forests, rivers, and the sun, and considering the earth itself as Mother Goddess, were part of the Indian tradition (SM Nair, <http://ccrtindia.gov.in/readingroom/nscd.php>)

Sacred Groves

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One of the finest examples of traditional practices in India based on religious faith which has made a profound contribution to nature conservation has been the maintenance of certain patches of land or forests as 'sacred groves' dedicated to a deity or a village God, protected, and worshipped. While sacred groves are found elsewhere in Maharashtra, no sacred grove is recorded in Bhandara District.

Sacred Plants and Animals

Many plants and animals have from historical times been considered sacred in India by various communities. The most outstanding examples are the peepal tree (*Ficus religiosa*) and to a great extent the banyan tree (*Ficus bengelensis*) have been traditionally revered and therefore never cut. There are a number of other trees and plants considered sacred and grown in temple premises and are protected in other localities. Locally Apta (*Bauhinia racemosa*) is used for Dasserah festivals as exchange of gold though the tree itself is not considered sacred. Likewise, many plants and animals are considered auspicious.

15.2: ECOTOURISM:

Much attention has been paid to the question of what constitutes ecotourism, and numerous concepts and definitions exist (Ballantine and Eagles 1994; Blarney 1995; Bottrill and Pearce 1995; Buckley 1994). The Ecotourism Society, based in the US and the most international of the ecotourism organizations, defines ecotourism as responsible travel to natural areas that conserves the environment and improves the welfare of local people. The Australian National Ecotourism Strategy defines ecotourism as 'A nature-based tourism that involves education and interpretation of the natural environment and is managed to be ecologically sustainable'. Numerous other definitions exist around the world. The FAO uses a definition that is more general as "ecotourism is tourism and recreation that is both nature-based and sustainable". Tourism is also now a day, a recognized industry all over world.

Ecotourism is also recognized, as important industry, by UNWTO (United Nations World Tourism Organization). The World Tourism Day celebration started by UNWTO since 1980 to aware the people about significant role of tourism in social, economic and cultural values.

Ecotourism is now defined as "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves

interpretation and education" (TIES, 2015). Education is meant to be inclusive of both staff and guests.

Principles of Ecotourism: Ecotourism is about uniting conservation, communities, and sustainable travel. This means that those who implement, participate in and market ecotourism activities should adopt the following ecotourism principles:

- i. Minimize physical, social, behavioural, and psychological impacts.
- ii. Build environmental and cultural awareness and respect.
- iii. Provide positive experiences for both visitors and hosts.
- iv. Provide direct financial benefits for conservation.
- v. Generate financial benefits for both local people and private industry.
- vi. Deliver memorable interpretative experiences to visitors that help raise sensitivity to the sites' environmental and social importance.
- vii. Design, construct and operate low-impact facilities.
- viii. Recognize the rights and spiritual beliefs of the local/indigenous People in the community and work in partnership with them to create empowerment.

Ecotourism Policy:

- i) Ministry of Tourism, in Government of India has declared "Eco-tourism in India Policy and guidelines, 1998". This policy has underlined the activities of tourism ought to be environment-friendly having no adverse impact on ecosystem.
- ii) The UNWTO came into force in 1970 on 27th September. To aware the people about the role and impact of tourism on society, the UNWTO started celebrating World Tourism Day on 27th September every year since 1980. Every year a theme is launched on the eve of World tourism Day by UNWTO. Ecotourism, Environment Protection, Climate change, Biodiversity, Community development became theme of World Tourism Day in the year 2002, 1997, 2008, 2010, and 2014 respectively.
- iii) Government of Maharashtra, in Tourism and cultural affairs vide Resolution No. MTC-2005/2/CR-172/ Tourism, Mumbai dated -2006, declared Tourism Policy-2006 having tourism vision 2025. This policy has identified "Ecotourism"

sector. Infrastructure development, public-private partnership, capacity building, creating awareness etc. are high lights of this policy.

iv) Govt. of Maharashtra in Revenue and forest Department vide Resolution No. WLP 1002/C.R.53/F-1, Mumbai dated 20.2.2008 has declared “Eco-tourism Policy 2008”. This policy illustrates the role of stake holders, capacity building of stake holders, Information, Education and communication, selection of eco-tourism centres and operationalization of it, formation of “Maharashtra Eco Tourism Promotion Board” to promote ecotourism. This policy laid down principles of Eco tourism as below,

- i. The Ecotourism activity should be concise and small for operationalization.
- ii. It should be proper in view of environmental, social and cultural aspects.
- iii. It should be proven and worthy of adoption.
- iv. Participation of local community.
- v. It should neither be degrading nor destructive.
- vi. As per tourist demand but definitely with some restrictions.

This policy entrusts Forest Department to prepare management plan of eco-tourism centres’ in pursuance of Forest Conservation Act.1980, Wildlife Protection Act 1972, and guidelines by National Tiger Conservation Authority. The Maharashtra Eco-tourism Board has key role in co-ordination of line departments, granting of permission for infrastructure development, signing of MOU with Forest Department for development of infrastructure and revenue sharing.

v) The Govt. of Maharashtra, in Revenue and Forest Department vide Resolution No.-M-2011/ C.R. 174/F-5, Mumbai, dated 24.11.2011 has issued guidelines for implementing eco-tourism activities in forest areas. Identification of eco-tourism places, preparation of management plan, involvement of stake holders, stay and food facilities, home-stay facilities, capacity building of local people and staff, identification of various types of tourism etc. are important provisions in eco-tourism policy 2008.

15.3: POTENTIAL ECO-TOURISM SITES IN BHANDARA FOREST DIVISION.

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Bhandara Forest Division has its varied flora and fauna ranging from the grasslands, the wetland to the thick forests and has quite few ecotourism sites of potential. They are not properly developed and require immediate attention.

The Division has identified the potential eco-tourism sites and the list is reproduced below **(Appendix No.- XXIX)**. Not much has been developed in these sites. Some of the sites are actually not in the forest area but are included as they can form a circuit that would be linked with the eco-tourism sites for better packages whenever these sites are developed with proper management plan.

The social aspect of forests in the context of ecotourism is very important as it provides the people with employment. The other important social contribution of ecotourism is the exposure to the other cultures and the chance to educate others about one's own culture. It is generally observed that small projects in JFM villages and ecotourism sites not only provides employment to the youths but also gives a boost to their self-confidence.

The eco-sites identified also have lot of spiritual significance and religious sentiments attached to them.

It shall be the duty of the DCF to harness the spiritual and cultural sentiments of the people to woo them back to the traditional conservation values that every Indian is proud of.

Table 13.1 Potential Eco-tourism sites of Bhandara Division

Sr. No.	Range	Eco-Tourism Place	Distance (in Km)
1	Bhandara	Korambi	8 Km. from Bhandara
2	Bhandara	NandoraZiri	7 Km. from Bhandara- Nagpur Road
3	Bhandara	Rawanwadi	18 Km. from Bhandara Pauni
4	Sakoli	BhugaonMendha	35 Km. from Bhandara on Bhandara to Sakoli Road
5	Sakoli	DurgabaiDoh	5 Km. Sakoli - Lakhandur Road
6	Sakoli	GirolaPahadi	Sakoli 12 km.
7	Tumsar	Gaimukh	Tumsar 13 km. Hilly area
8	Tumsar	Ambagad Fort	Tumsar 12 km.
9	Tumsar	Chandpur	Tumsar to Bapera 22 km.
10	Pauni	Ranaitalaw	Paoni 10 km.
11	Jamkandri	Nagthana	Tumsar to Ramtek 25 km.

As these sites are yet to be developed, there is plenty of scope to develop in a manner that is both eco-friendly and beneficial to the communities. The principles of Eco-tourism stated above should be the guide for all such developments.

Apart from keeping in mind the principles of eco-tourism, the Division should take all care that the following area adhered to:

1. While developing above eco-tourism sites, it should be verified that the proposed activities must not attract nor violate provisions under Forest Conservation Act 1980.
2. The Deputy Conservator of Forests shall prepare an Eco-tourism Development Plan for the Division incorporating the above sites and any other potential sites.
3. Local people especially the JFM Committees and EDCs wherever are in existence should be fully involved right from the planning stage.
4. Adequate training and capacity-building of the staff and locals should form part of the development plan.
5. The specialty and uniqueness of each site should be properly documented and should be brought up in attractive brochures keeping in mind the information that tourists would require and the Dos and Don'ts for such tourists.
6. Any local traditional product, crafts, food items/local cuisine, cultural display etc should be encouraged as part of the eco-tourism package
7. The development of the ecotourism sites should go hand in hand with the conservation of the biodiversity, the nurture of environment and the appreciation of nature by the tourists.

While designing the Plan the interests of the forests and wildlife should be of prime importance. The different actors/stakeholders like the community, visitors, businesses, NGOs should no doubt be taken into consideration. A common phenomenon is that ecotourism can generate both symbiosis and conflict between the actors. The potential for ecotourism to result in symbiosis between conservation (e.g., natural areas) and development (e.g., businesses) has been widely touted, but the potential for conflict should not be ignored.

FINANCIAL FORECAST

There has been a steady increase in the funding to the Working Plan activities of the Forest Division in the past three years. This increase is a good sign and needs to be maintained.

Table 16.1 Statement showing the Expenditure of Bhandara Forest Division from 2016 to 2019.

Sr. No.	Scheme/ Fund	Expenditure Statement (in Lakhs)		
		2016-17	2017-18	2018-19
1	Plan	602.77	195.78	236.8
2	Non Plan (Non-Salary)	1997.25	103.383	280.65
3	CAMPA	387.51	213.38	200.34
4	District Plan (DPDC)	313.54	684.6	485.15
5	MNREGA	165.66	223.9	234.23
6	FDA	27.29	21.62	48.45
7	CSS	11.09	8.09	35.79
Total		3505.11	1450.753	1521.41

The sources of funds during the last Plan were Plan Schemes, Non-Plan schemes, CAMPA, District Plan (DPDC), MNREGA etc.

PLAN Funds: From the Plan expenditure statement, as provided by the DCF, for the last 3 years average, the annual Plan funding is Rs. 345.11 lakh. Going by this average, the expenditure that would be required for the implementation of the Plan/Scheme needs to be enhanced.

NON PLAN: The amount received by the division in the last three years under Non Plan averages approximately to Rs. 793.76 lakh. This needs to be enhanced if the plan is to be implemented in full.

CAMPA: The CAMPA is an important source of funding. The amount received by the division in the last three years under CAMPA averages approximately to Rs. 267.07 lakh. This can be increased for the core forestry operations for the implementation of the Plan.

DISTRICT PLAN: The amount received by the division in the last three years under District Plan averages approximately to Rs. 494.43 lakh. The District Plan funding

for the upgradation of Nurseries, the development of Eco-Tourism sites, etc should be explored.

MNREGA: The amount received by the division in the last three years under MNREGA averages approximately to Rs.207.93 lakh. Labour intensive works that can be implemented through MNREGA should be thought of as this is a good source of funding. EGS, which is the original scheme started for employment guarantee as the first such scheme in the country by the Government of Maharashtra, should also be tapped into as done in the past.

NAP(FDA): The National Afforestation Program implemented all over the country with emphasis on people's participation should be made use of for the implementation of the Working Plan prescriptions. The amount received by the division in the last three years under FDA averages approximately to Rs. 32.45 lakh.

SPECIAL PROJECTS: State specific and District-specific projects like Jalayukta Shivar and others should be taken up for the implementation of the Plan. However, it should be noted that the implementation of such projects should be as per the Working Plan and not in conflict with it. A point to be noted is that sometimes the DCF taking the opportunity of the funds available, takes up work on coupes not due even though such work could be carried out on the due coupes. This should be avoided.

APPENDIX NO LXXVI - A
ESTIMATED ANNUAL EXPENDITURE (ABSTRACT) FOR THE WORKING PLAN IMPLEMENTATION IN BHANDARA FOREST DIVISION

Proforma - I															
Sr.No.	Working Circle	Average annual coupe (ha.)	Amount required for coupe working (lakh rupees)	Regeneration area Amount required				Revenue generation					Statutory taxes (lakh Rupees)	Total Revenue	
				Natural regeneration area (ha.)	Plantation area(ha.)	Natural regeneration (lakh Rupees)	Plantation (lakh Rs)	Entire Working Circle (lakh Rs.)	Timber yield cum	Firewood Stacks (2x1.2x1)	Timber rate rupees	Firewood rate			Revenue (lakh rupee)
1	Selection-cum-improvement	1287	48.43	1087	200	18.953	54.21	121.593	3344	1115	7000	700	241.885	48.577	290.262
2	Improvement	1204	45.3	904	300	17.28	65.872	128.452	3128	1048	7000	700	226.296	45.559	271.5552
3	Afforestation	792	29.74	392	400	5.96	109.4	145.01	2058	1104	7000	700	151.788	30.358	182.1456
4	Protection & CAM	517	19.44	417	100	2.15	32.85	54.439	1342	1104	7000	700	101.668	20.234	122.0016
5	Fuelwood, Fodder & Pasture	314	1.44	114	200	1.69	30.4	33.57	0	0	10000	1000	3.37	0.13	4.04
6	Old Teak Plantation	5272.7				97.44		97.44	25.3	8.4			65		78
7	Bamboo (Overlapping)	5161.974							13 Lakh						
	Sub-total														
	Other Prescriptions														
8	Joint Forest Management					97.78		97.78							
9	NFTF(overlapping)					1.23		1.23					1	0.2	1.2
10	Wildlife(overlapping)					22.24		22.24							
11	Demarcation and Forest Protection					9.32		18.2							
12	Staff and Manpower					1200		1500							
13	Maintenance					16		16							
	Total	14549	144.4	2914.0	1200.0	1490.0	292.7	2236.0	9897.3	4379.4	38000	3800	791.0	158.2	949.2

ESTIMATED ANNUAL EXPENDITURE (DETAILS) FOR THE WORKING PLAN IMPLEMENTATION IN BHANDARA DIVISION

Proforma - II

Sr. No.	Particulars of work	Quantum of work	Unit	Mandays / unit	Rate/unit (Rupees)	Annual (lakh Rs.)	Expected expenditure during the plan period (lakh rupees)										Average (Lakh Rs.)
							Year1	Year2	Year3	Year4	Year5	Year6	Year7	Year8	Year9	Year10	
Selection-cum-improvement																	
1	Demarcation and marking	1287	Ha.	4.5	460	5.92	11.84	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92
2	Coupe working																
2a	Timber harvesting	3344	m3	9.5	1104	36.91	36.91	36.91	36.91	36.91	36.91	36.91	36.91	36.91	36.91	36.91	36.91
2b	Firewood extraction	1115	Stacks	4.5	502	5.5973	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.6
3	Natural Regeneration																
	Nursing of naturally occurring seedling and coppice management etc. in understicked patches	1087	Stacks (2x1x11.20)	3.5	391	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.253
4	Soil and moisture conservation works	1287	Ha.	1.01	97	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
5	Cutback operation	1287	Ha.	6	580	7.46	0.00	7.46	7.46	7.46	7.46	7.46	7.46	7.46	7.46	7.46	7.46
6	Plantation(Teak)																
6a	PPO/PYO(Pre-planting works)	100	Ha.	77.88	7533	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53
6b	FYO(First year operations)	100	Ha.	77.17	8756	8.76	0.00	8.76	8.76	8.76	8.76	8.76	8.76	8.76	8.76	8.76	7.89
6c	SYO(Second year operations)	100	Ha.	42.2	4003	4.00	0.00	0.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.2
6d	TYO(Third year operations)	100	Ha.	17.6	1637	1.64	0.00	0.00	0.00	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.15
6e	4th YO(Forth year operations)	100	Ha.	15.6	1451	1.45	0.00	0.00	0.00	1.45	1.45	1.45	1.45	1.45	1.45	1.45	0.87
6f	5th YO(Fifth year operations)	100	Ha.	15.6	1451	1.45	0.00	0.00	0.00	0.00	1.45	1.45	1.45	1.45	1.45	1.45	0.72
7	Plantation(Mix)																
7a	PPO/PYO(Pre-planting works)	100	Ha.	130	12555	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56
7b	FYO(First year operations)	100	Ha.	114	13094	13.09	0	13.09	13.09	13.09	13.09	13.09	13.09	13.09	13.09	13.09	11.79
7c	SYO(Second year operations)	100	Ha.	55	5268	5.27	0	0	5.27	5.27	5.27	5.27	5.27	5.27	5.27	5.27	4.21
7d	TYO(Third year operations)	100	Ha.	41	3840	3.84	0	0	0	3.84	3.84	3.84	3.84	3.84	3.84	3.84	2.69
7e	4th YO(Forth year operations)	100	Ha.	16	1451	1.45	0	0	0	1.45	1.45	1.45	1.45	1.45	1.45	1.45	0.87
7f	5th YO(Fifth year operations)	100	Ha.	16	1451	1.45	0	0	0	0	1.45	1.45	1.45	1.45	1.45	1.45	0.73
	Total																
8	Cleaning	1287	Ha.	8	744	9.58					9.58	9.58	9.58	9.58	9.58	9.58	4.79
9	Fire protection	1287	Ha.	1	93	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.2

Estimated Annual Expenditure (details) for the Working Plan Implementation in the Bhandara Division															
Sr. No.	Particulars of work	Quantum of work	Unit	Mandays/unit	Rate/unit (Rupees)	Annual (lakh Rs.)	Expected expenditure during the plan period (lakh rupees)								Average (lakh Rs.)
							Year1	Year2	Year3	Year4	Year5	Year6	Year7	Year8	
Improvement WC															
1	Demarcation and marking	1204	Ha.	4.5	460	5.54	11.10	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54
2	Coupe working														
2a	Timber harvesting	3128	m3	9.5	1104	34.53	34.53	34.53	34.53	34.53	34.53	34.53	34.53	34.53	34.53
2b	Firewood extraction	1042	Stacks	4.5	502	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23
3	Natural Regeneration														
	Nursing of naturally occuring seedling and coppice management etc. in understicked patches	904	Ha.	3.5	391	3.53	3.530	3.530	3.530	3.530	3.530	3.530	3.530	3.530	3.53
4	Soil and moisture consercation works	1204	Ha.	1.01	97	1.17	1.170	1.170	1.170	1.170	1.170	1.170	1.170	1.170	1.17
5	Cutback operation	1204	Ha.	6	580	6.98	0.000	6.980	6.980	6.980	6.980	6.980	6.980	6.980	6.98
6	Plantation(Teak)	100	Ha.												
6a	PPO/ PYO(Pre-planting works)	100	100		77.88	0.078	0.078	0.078	0.078	0.078	0.078	0.078	0.078	0.078	0.078
6b	FYO(First year operations)	100	100		77.17	0.077	0.000	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.069
6c	SYO(Second year operations)	100	100		42.2	0.042	0.000	0.000	0.042	0.042	0.042	0.042	0.042	0.042	0.034
6d	TYO(Third year operations)	100	100		17.6	0.018	0.000	0.000	0.018	0.018	0.018	0.018	0.018	0.018	0.013
6e	4th YO(Forth year operations)	100	100		15.6	0.016	0.000	0.000	0.000	0.016	0.016	0.016	0.016	0.016	0.01
6f	5th YO(Fifth year operations)	100	100		15.6	0.016	0.000	0.000	0.000	0.000	0.016	0.016	0.016	0.016	0.008
	Total														
7	Plantation(Mix)	200													
7a	PPO/ PYO(Pre-planting works)	200		130	12555	25.11	25.10	25.10	25.10	25.10	25.10	25.10	25.10	25.10	25.1
7b	FYO(First year operations)	200		114	13094	26.19	0.00	26.19	26.19	26.19	26.19	26.19	26.19	26.19	23.57
7c	SYO(Second year operations)	200		55	5268	10.54	0.00	0.00	10.54	10.54	10.54	10.54	10.54	10.54	8.43
7d	TYO(Third year operations)	200		41	3840	7.68	0.00	0.00	0.00	7.68	7.68	7.68	7.68	7.68	5.37
7e	4th YO(Forth year operations)	200		16	1451	2.90	0.00	0.00	0.00	0.00	2.90	2.90	2.90	2.90	1.74
7f	5th YO(Fifth year operations)	200		16	1451	2.90	0.00	0.00	0.00	0.00	2.90	2.90	2.90	2.90	1.45
	Total														
8	Cleaning	1204	Ha.	8	744	8.96					8.96	8.96	8.96	8.96	4.48
9	Fire protection	1204	Ha.	1	93	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12

Estimated Annual Expenditure (details) for the Working Plan Implementation in the Bhandara Division

Sr. No.	Particulars of work	Quantum of work	Unit	Mandays/unit	Rate/unit (Rupees)	Annual (lakh Rs.)	Expected expenditure during the plan period (lakh rupees)										Average (lakh Rs.)
							Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	
Afforestation WC																	
1	Demarcation and marking	792	Ha.	4.5	460	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64
2	Coupe working																
2a	Timber harvesting	2058	cum	9.5	1104	22.72	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7
2b	Firewood extraction	686	Stacks	4.5	502	3.44	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
3	Natural Regeneration																
	Nursing of naturally occurring seedling and coppice management etc. in understicked patches	392	Ha.	3.5	391	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.5
4	Soil and moisture conservation works	792	Ha.	1.01	97	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
5	Plantation(Teak)																
6a	PPO/PYO (Pre-planting works)	100	Ha.	77.88	7533	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53
6b	FYO(First year operations)	100	Ha.	77.17	8756	8.76	0	8.76	8.76	8.76	8.76	8.76	8.76	8.76	8.76	8.76	7.88
6c	SYO(Second year operations)	100	Ha.	42.20	4003	4.00	0	0	4	4	4	4	4	4	4	4	3.2
6d	TYO(Third year operations)	100	Ha.	17.60	1637	1.64	1.64	0	0	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.15
6e	4th YO(Forth year operations)	100	Ha.	15.60	1451	1.45	1.45	0	0	0	1.45	1.45	1.45	1.45	1.45	1.45	0.87
6f	5th YO(Fifth year operations)	100	Ha.	15.60	1451	1.45	1.45	0	0	0	0	1.45	1.45	1.45	1.45	1.45	0.73
7	Plantation(Mix)																
7a	PPO/PYO(Pre-planting works)	300	Ha.	130	12555	37.67	37.67	37.67	37.67	37.67	37.67	37.67	37.67	37.67	37.67	37.67	37.67
7b	FYO(First year operations)	300	Ha.	114	13094	39.28	0.00	39.28	26.19	26.19	26.19	26.19	26.19	26.19	26.19	26.19	24.88
7c	SYO(Second year operations)	300	Ha.	55	5268	15.80	0.00	0.00	15.80	15.80	15.80	15.80	15.80	15.80	15.80	15.80	12.64
7d	TYO(Third year operations)	300	Ha.	41	3840	11.52	0.00	0.00	0.00	11.52	11.52	11.52	11.52	11.52	11.52	11.52	8.06
7e	4th YO(Forth year operations)	300	Ha.	16	1451	4.35	0.00	0.00	0.00	0.00	4.35	4.35	4.35	4.35	4.35	4.35	2.61
7f	5th YO(Fifth year operations)	300	Ha.	16	1451	4.35	0.00	0.00	0.00	0.00	4.35	4.35	4.35	4.35	4.35	4.35	2.18
	Total																
8	Cleaning	792	Ha.	8	744	5.89	0	0	0	0	5.89	5.89	5.89	5.89	5.89	5.89	2.95
9	Fire protection	792	Ha.	1	93	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74

Estimated Annual Expenditure (details) for the Working Plan Implementation in the Bhandara Division																	
Sr. No.	Particulars of work	Quantum of work	Unit	Mandays / unit	Rate/unit (Rupees)	Annual (lakh Rs.)	Expected expenditure during the plan period (lakh rupees)										Average (Lakh Rs.)
							Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	
Protection & Catchment Area Management WC																	
1	Demarcation and marking	517	Ha.	4.5	460	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38
2	Coupe working																
2a	Timber harvesting	1342	cum	9.5	1104	14.82	14.82	14.82	14.82	14.82	14.82	14.82	14.82	14.82	14.82	14.82	14.82
2b	Firewood extraction	447	Stacks	4.5	502	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24
3	Natural Regeneration																
	Nursing of naturally occurring seedling and coppice management etc. in understicked patches	417	Ha.	3.5	391	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63
4	Soil and moisture conservation	517	Ha.	1.01	97	0.50	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
6	Plantation(Misc including Bamboo depending upon suitability of site)																
6c	PPO/PYO(Pre-planting works)	100	Ha.	129.81	12555	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56
6d	FYO(First year operations)	100	Ha.	114.47	13094	13.09	0	13.09	13.09	13.09	13.09	13.09	13.09	13.1	13.09	13.09	11.78
6e	SYO(Second year operations)	100	Ha.	55.00	5268	5.27	0	0	5.27	5.27	5.27	5.27	5.27	5.27	5.27	5.27	4.22
6f	TYO(Third year operations)	100	Ha.	41.29	3840	3.84	0	0	0	3.84	3.84	3.84	3.84	3.84	3.84	3.84	2.69
6g	4 th YO(Forth year operations)	100	Ha.	15.60	1451	1.45	0	0	0	0	1.45	1.45	1.45	1.45	1.45	1.45	0.87
6h	5 th YO(Fifth year operations)	100	Ha.	15.60	1451	1.45	0	0	0	0	0	1.45	1.45	1.45	1.45	1.45	0.73
	Total																
8	Cleaning	517	Ha.	8	744	3.85	0.00	0	0	0	0	3.85	3.85	3.85	3.85	3.85	1.92
10	Fire protection	517	Ha.	1	93	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48

Estimated Annual Expenditure (details) for the Working Plan Implementation in the Bhandara Division																	
Sr. No.	Particulars of work	Quantum of work	Unit	Mandays / unit	Rate/unit (Rupees)	Annual (lakh Rs.)	Expected expenditure during the plan period (lakh rupees)										Average (Lakh Rs.)
							Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	
Fuelwood, Fodder & Pasture WC																	
1	Demarcation	314	Ha	4.5	460	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	
	Total																
2	Natural Regeneration																
	Protection, Weed extraction and Removal of woody growth to encourage growth of natural grasses	114	Ha.	10	967	1.10	1.1	1.10238	1.1	1.1024	1.10238	1.102	1.102	1.102	1.102	1.1	
	Total																
3	Soil and Moisture Conservation	314	Ha.	1.01	97	0.30	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
3	Grass & Fodder Plantation																
3a	PPO/PYO (Pre-planting works)	200	Ha.	88.81	8259	16.50	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	
3b	FYO (First year operations)	200	Ha.	36.58	3402	6.80	0	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.12	
3c	SYO (Second year operations)	200	Ha.	17.69	1645	3.29	0	0	3.29	3.29	3.29	3.29	3.29	3.29	3.29	2.63	
3d	TYO (Third year operations)	200	Ha.	15.89	1478	2.96	0	0	0	2.96	2.96	2.96	2.96	2.96	2.96	2.07	
3e	4th year operation	200	Ha.	15.14	1408	2.82	0	0	0	0	2.82	2.82	2.82	2.82	2.82	1.69	
3e	5th year operation	200	Ha.	15.14	1408	2.82	0	0	0	0	0	2.82	2.82	2.82	2.82	1.41	
	Total																
4	Fire Protection	314	Ha	1	93	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	

Estimated Annual Expenditure (details) for the Working Plan Implementation in the Bhandara Division													
Sr. No.	Particulars of work	Quantum of work	Unit	Mandays / unit	Rate/unit (Rupees)	Annual (Lakh Rs.)	Expected expenditure during the plan period (lakh rupees)						
							Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
1	Training for collection method	39	Round	30	3150	1.2285	1.23	1.23	1.23	1.23	1.23	1.23	1.23
NTFP (Overlapping)													
1	Habitat improvement	39	Round		24065	9.38535	9.39	9.39	9.39	9.39	9.39	9.39	9.39
2	Regulatory compensation	50	Cases		3000	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
3	Compensation for Human Casualty	25	Cases		40000	10	10	10	10	10	10	10	10
	Compensation for Cattle Killed	50	Cases		2500	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
	Compensation for Crop Damage	10	Cases		1000	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Demarcation and Protection												
1	Fixing boundary pillars	1193	km		781	9.31733	9.32	9.32	9.32	9.32	9.32	9.32	9.32
2	Intelligence network & court case		Divison			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
3	Collection of wind-fallen and illegally-cut material	50	cum		1104	0.552	0.55	0.55	0.55	0.55	0.55	0.55	0.55
4	Reaward to informants and staff	25			5000	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
5	Fire protection	2526	Km		629	15.88854	15.9	15.9	15.9	15.9	15.9	15.9	15.9
	Staff and Manpower												
1	Salary, travel, diesel and other office expenses		Divison			1200	1200	1200	1200	1200	1200	1200	1200
2	Roads, bridges, buildings & other maintenance		Divison			15	15	15	15	15	15	15	15
3	Thematic training to staff		Divison			1	1	1	1	1	1	1	1
Average (Lakh Rs.)							1.23	1.23	1.23	1.23	1.23	1.23	1.23

Schedule operations prescribed in the working plan for the Bhandara Division

Sr. No.	Particulars of Work	Quantum of work	Unit	Mandays/unit	Rate/unit(Rupees)	Annual (lakh Rs.)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Average (Lakh Rs.)
Bamboo (Overlapping)																	
1	Demarcation and marking	5161.974	Ha.	4.5	460	23.75	47.49	23.75	23.75	23.75	23.75	23.75	23.75	23.75	23.75		23.75
2	Bamboo harvesting	5161.974	Ha.	0.18	20.1	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
3	Cleaning	5161.974	Ha.	8	744	38.41	38.41	38.41	38.41	38.41	38.41	38.41	38.41	38.41	38.41	38.41	38.41
4	Fire protection	5161.974	Ha.	6.5	629	32.47	32.47	32.47	32.47	32.47	32.47	32.47	32.47	32.47	32.47	32.47	32.47
Joint Forest Management																	
1	Awareness generation 1st year	210	Villages	12	36000	75.60	75.6	75.6	75.6	75.6	75.6	75.6	75.6	75.6	75.6	75.6	75.6
2	Microplan preparation 2nd year	210	Villages	88	10560	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18
Old Teak Plantation																	
	Cleaning	5272.7	Ha.	8	744	39.23	39.23	39.23	39.23	39.23	39.23	39.23	39.23	39.23	39.23	39.23	39.23
	Thinning	5272.7	Ha.	9.5	1104	58.21	58.21	58.21	58.21	58.21	58.21	58.21	58.21	58.21	58.21	58.21	58.21

Note : Supplementary Developments in JFM will take place in SCI, IWC, AFF, P&CAM and FFP working circles.

Average Annual Amount Required For Working Plan Implentation in Bhandara Forest Division

Sr. No.	Working Circle	Average Amount Required (in lakh)
1.	Selection-cum-improvement	337.98
2.	Improvement	430.73
3	Afforestation	463.86
4	Protection & CAM	164.28
5	Fodder & Pasture	119.59
6	Old Teal Plantation	312.72
7	Bamboo (Overlapping)	335.53
8	Joint Forest Management	325.5
9	NTFP (Overlapping)	3.939
10	Wildlife (Overlapping)	421.2
11.	Demarcation and forest Protection	138.89
12	Staff and Manpower	3600
13	Maintenance	48
Total		6702.219

MISCELLANEOUS REGULATIONS

17.1: BOUNDARY DEMARCATION

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.
- Zudpi Jungle transferred to the Division.
- Disforested areas against various projects.
- Forest areas where exact boundaries are not shown on the forest maps.

17.1.1: 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 undemarcated 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.

17.1.2: 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 Zudpi 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.

17.1.3. 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 No.- XXV-A** shows the methods of using a Garmin-72 GPS instrument.

17.1.4: Demarcation of Zudpi Jungle: The Zudpi 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 Zudpi 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.

17.1.5: 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 disforesting the requisite area of the reserved forest of the respective compartments. These details are given in the **Appendix No. – 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.

17.1.6: 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, Zudpi 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 No.– 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 No.-XXV**) and **Appendix No.-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.

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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:** 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, the Principal Chief Conservator of Forests has approved a revised forest boundary demarcation and erection of permanent boundary marks in January 2020. **Appendix No.-XCIII** to have a 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 m high, and have 1.20 m top diameter and 1.80 m 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 and updating the length 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 topo-sheets will be maintained. The length of the boundary pillars also should be updates.

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.

17.2. DEMARCATION, PREPARATION OF TREATMENT MAP AND MARKING OF COUPES:

17.2.01 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 **PDF Compressor Free Version** marking register in, the following, **Form No. 21.2**.

Form No 21.2

List of trees on the coupe boundary

Sr. No.	Name of species	GBH (OB)	Remarks

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.

17.2.02 Treatment Map:
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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.

17.2.03 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.

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. 17.01 Nail Marking:

For Tree no. 210	XX (Hammer mark)
	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.17.02 (Form No.19.3) Format for Marking of Trees for Harvesting:
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Sl.No.	Tree No. Digit No.	Serial No. In Coal tar	Name species	of 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.

17.3 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.

17.3.01 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.

17.3.02 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.

17.3.03 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.

17.3.04 Nala-Bund 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.

17.3.5: 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 this information to the Working Plan Officer before preparation of next PWPR- II of Bhandara Dn.

17.4 GUIDELINES FOR REGENERATION: Regeneration process is extremely important to restore the health and overall 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 (50mX50m) 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.

17.4.01: 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.

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- **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 girth 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.

17.4.02 Artificial Regeneration: It has been observed that the soil depth in some areas, covered under plantation programme in the Division, is shallow and

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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 understocked 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.

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. 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 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.

17.4.03: 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 ¾th. 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.

17.4.04: 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 species:** 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.

17.4.05: 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.

17.4.06: 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.

17.4.07: 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.

17.4.08: 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.

17.4.09: 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).

17.4.10: 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.

17.5: Thinning: Details of thinning guidelines are in **Appendix No. –LIII.**

17.5.01 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.

17.5.02 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.

17.5.03 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.:

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- 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 No. - LIII.**

17.5.04 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.

17.5.05 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.

17.5.06 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:
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- 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 sqmts), 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 No. - L

17.5.07 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 it 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 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.

17.6 ROADS, CART TRACKS AND CULVERTS:

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. The extent of forestry operations and gravity of forest protection concerns should determine the priority for maintenance of the forest roads. Unwarranted up-gradation of the forest roads should be discouraged, but required culverts may be constructed in stretches useful for the forest protection

17.7 HARVESTING AND DISPOSAL:

17.7.01 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.

17.7.02 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.

17.7.03 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 be informed to the Taluka Panchayats and the material left unused for three months will be sold through open auction.

17.8 IRREGULAR HARVESTING:

17.8.01 Restriction on Irregular Harvesting: Irregular harvesting of timber, firewood, Bamboo and other NTFPs is prohibited, except in the following cases:

17.8.02 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.

17.8.03 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.

17.8.04 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

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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-Patruk* or directed by the government from time to time.

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.

17.9 MAINTENANCE OF FOREST LAND RECORDS:

17.9.01 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 and updated annually in the Form No 1-Register during the month of June.

17.9.02 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.

17.9.03 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.

17.10: PERMANENT NURSERY AND CENTRAL DEPOT:

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 all 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.

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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.

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.

17.11.1. Petty Felling and extraction

Petty Felling and extraction for research and training needs should be allowed. It is necessary to emphasize the fact that experimental, preservation and sample plot, seed stand and their demarcated surrounds, etc. are excluded from all operations prescribed in the working plan. Special grants in exceptional circumstances for maintenance of these may be allowed, which do not cause much deviation.

17.11.2. Rights and Concessions

Govt. of India passed the Provisions of the Panchayat (Extension to the Scheduled Areas) act 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 vide which ownership of 33 MFP specified in the scheduled, found in the Govt. land has been transferred to the Panchayats. The Hon'ble Governor of Maharashtra had modified the existing act and has given ownership of all MFP to gram sabha vide notification dated 19.08.2014.

There are some burad communities in the division, whose livelihood depends on bamboo. The department distributes bamboo to these communities and also, they acquire from nearby forest areas. There is no sizable population of grazing community in the district. However, livelihood of local community depends upon forest for grazing their cattle. The range wise grazing units are formed and every year the grazing passes are issued to the local community people for grazing purpose.

CHAPTER -18
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SUMMARY OF PRESCRIPTION

18.1 NAME AND SITUATION

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.

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 Division) in the West, Chandrapur District (Bramhapuri Division) in the South and artificial boundary line between Bhandara and Gondia districts (Gondia Division) in the East.

Table No. 18.1 Boundary of the Bhandara Division:

Sr. 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

Optimization of Forest Resource Utilization

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During the plan period from 2009-10 to 2018-19 the division has harvested coupe annually as per prescriptions mention in the plan. The following table shows the actual yield of timber, firewood, poles and bamboo.

Working Circle	Total area of the coupe in Ha.	Area Felled in Ha.	Expected Yield		Actual Yield			
			Timber (Cum.)	Fire Wood Stacks (2x1.2x1 M.)	Timber (Cum.)	Poles (Cum.)	Fuel Wood (Cum.)	Actual Timber Production Per ha.
SCI	11543.377	4060.467	3344.00	1115	8180.881	0.00	41940.8	0.708
IWC	10923.21	1443.113	3128.00	1048	1931.576	0.00	16236.4	0.176
AWC	8179.908	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P&CAM WC	10335.424	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F&P WC	6277.468	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bamboo (OL) WC	5161.974	1382.00	13 Lakh	0.00	1203251 (LB)	13748 (BB)	0.00	0.00
Old Teak Plantation (OL) WC	5272.70	0.00	25.3	0.00	0.00	0.00	0.00	0.00
Total		6885.58	6497.3 cum.	2163	10112.46 cum.	13748 (BB)	5817.2	0.00
			13 Lakh Bamboo		1203251 (LB)			

(LB: Long Bamboo; BB: Bamboo bundles)

18.2:DISTRIBUTION OF AREA TO VARIOUS WORKING CIRCLES: After reconciliation of area as per A to O The allocation of forest areas under various working circles of the proposed working plan is as under.

Proposed working plan area allocation to different Working Circles

Sr. No.	Name of Working Circle	Area allocated (Ha)
1	Selection-Cum-Improvement Working Circle	25682.084
2	Improvement Working Circle	24901.163
3	Afforestation Working Circle	25929.35
4	Catchment & Protection Working Circle	9828.961
5	Fodder and Pasture Working Circle	6236.659
	Total	92578.217
6	Bamboo (Overlapping) Working Circle	20670.316
7	Old Teak Plantation (Overlapping) Working Circle	5018.90
8	Wild Life (Overlapping) Working Circle	Entire Area
9	Non-Timber Forest Produced (Overlapping) Working Circle	Entire Area

18.3: THE WORKING CIRCLE WISE SUMMARY OF PRESCRIPTION:

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1. Selection-Cum-Improvement Working Circle:

Coupe Demarcation & Treatment Map:

1. Demarcation and Marking: One year in advance
2. Treatment Map to be prepared as prescribed
3. A type: Protection area (A1: Steep slopes, A2: 20 M wide strips along streams, A3: excessively erosion prone areas)
4. B-type: Understocked and Blank areas (density <0.4)
 - a. B1-Area with rootstock and NR,
 - b. B2-Area without NR
5. C-type: Pole crop and plantations
6. D-type: Well stocked areas (density >0.4)

Marking:

1. A type area: No marking
2. B type: Dead and diseased trees, live high stumps
3. C type: Thinning marking
4. D type: Enumeration of trees in Approach girth class and above is prescribed. Trees above selection girth as per regulation of Smythie's safeguarding principle. Dead & malformed trees, live high stumps are to be marked.

Silvicultural System:

1. Selection-cum-Improvement system
2. Trees above Selection Girth are prescribed for felling as per principles of safeguarding future yield.
3. Openings created by felled trees would promote NR of light demander species
4. Hygienic operations (removal of dead, malformed, live high stumps) will improve the existing crop.

Regeneration:
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1. Natural Regeneration: NR of seed origin of valuable species to be preferred and managed through cultural operations in D areas and B1 areas.
2. Artificial Regeneration: Only in B2 type area if site is suitable.
3. Strict protection from fire and grazing
4. Tending of natural regeneration of valuable species in B Type area.

SMC Works:

1. Gully plugging and other SMC works, as described in the chapter of Miscellaneous Regulations shall be taken up in the A3 type area.
2. SMC works will be along with marking operation and completed before onset of monsoon.
3. SMC Working are to be based on the requirement of site.

Subsidiary Operation:

1. CBO works: Subsequent year of main felling
2. CBO works like cutting left over marked trees, removal of damaged trees, singling of multiple coppices shoots, etc
3. NR or ANR should compulsorily be carried out immediately after CBO in the same year in D- areas. This is necessary to regenerate the area felled as per Hon. SC orders
4. Cleaning operations: 6th Year

2. Improvement Working Circle:

Coupe Demarcation & Treatment Map:

1. Demarcation and Marking: One year in advance
2. Treatment Map to be prepared
3. A type: Protection area (A1: Steep slopes, A2: 20 M wide strips along streams, A3: excessively erosion prone areas)
4. B-type: Understocked areas (density <0.4)

5. C-type: Congested Pole crop
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6. D-type: Well stocked areas (density >0.4)

Marking:

1. A type area: No marking
2. B type: All dead trees, live high stumps
3. C type: The congested pole crop shall be marked for thinning.
4. D type: All fruit bearing species shall be reserved.

All dead & malformed trees retaining 2 trees per ha. and all live high stumps shall be marked for felling. Matured trees that have developed hollowness and show visual sign of decay will be marked for felling.

Silvicultural System:

1. Hygienic operation of improvement felling.
2. Adequate growing space is provided to trees of valuable species.
3. The improvement felling supplemented by tending of naturally generated crop & root stock will aid in transition of middle-aged stem to maturity.
4. The species whose population in the 'stand' dynamics is less than 1% shall be retained till they reached the rotation age.

Regeneration:

1. Natural Regeneration: NR of seed origin of valuable species to be preferred and managed through cultural operations.
2. Artificial Regeneration: Only in B type area if site is suitable.
3. Strict protection from fire and grazing
4. Tending operation for Natural regeneration in the 'D' type area & Root stock management in the 'B' type shall be taken up.

SMC Works:

SMC works, as described in the chapter of Miscellaneous Regulations are prescribed in A & B type area.

Subsidiary Operations:
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1. Cleaning operations: 6th Year
2. Thinning is proposed to be carried out in the patches of Dense pole crop
By maintaining average spacing of one third of the crop height.

3. Afforestation Working Circle:

Coupe Demarcation & Treatment Map:

1. Demarcation and treatment map will be prepared one year in advance.
2. Treatment map would show A, B, C, D areas
3. A type: Protection area (A1: Steep slopes, A2: 30 M wide strips on both side of streams.
4. B-type: Understocked areas (density <0.4)
5. C-type: Congested Pole crop
6. D-type: Well stocked areas (density >0.4)

Silvicultural System:

1. Only hygienic fellings prescribed (Dead, live high stumps)
2. Plantation work in B type areas.
3. Planting of Tall seedlings prescribed.
4. Not more than 50 ha. plantation per coupe.
5. JFMCs to be actively involved.

Regeneration:

1. Tending of Natural regeneration & existing root stock is prescribed to be given preference over planation.
2. Cultural operations for natural regeneration in 'D' type areas Root stock management in 'B' type areas are prescribed.

SMC Works:

1. SMC works will be done as prescribed in the relevant paras under Miscellaneous Regulation.
2. No specific quantum of such works has been prescribed.

4. Catchment & Protection Working Circle:

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Coupe Demarcation & Treatment Map:

1. Demarcation and Marking: One year in advance
2. Treatment Map to be prepared

A type: Protection area (A1: Steep slopes, A2: 20 M wide strips along streams, A3: excessively erosion prone areas)

B-type: Understocked and Blank areas (density less than 0.3)

C-type: Group of naturally green poles.

D-type: Well stocked forest patches.

Treatment:

1. A type area: Harvesting of standing trees is strictly prohibited.

2. B type: No. harvesting.

All seedling & saplings of valuable species more than 1 mtr.in height will be nursed as future crop.

3.C type: Group of pole crop will be thinned by maintaining average spacing. No planting will be done.

4. D type: No harvesting of green trees & Plantation is not prescribed.

Silvicultural System:

1. Silviculture system is proposed on the pattern of watershed management.
2. Harvesting of green trees is prohibited.
3. Removal of dead trees by retaining two dead trees per ha. as snags is permitted.

Regeneration:

1. Natural Regeneration: All seedlings and saplings of valuable species more than 1 meter height will be nursed as future crop.
2. Strict protection from fire and grazing

SMC Works:
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Soil & Moisture conservation works to prevent soil erosion siltation.

5. Fodder and Pasture Working Circle:

Coupe Demarcation:

The coupe due for closure to grazing will be demarcated one year in advance.

Treatment:

1. Removal of invasive weeds.
2. SMC work as per site requirement.
3. In suitable blank areas, regeneration of grass through seed broadcasting, area closure through enclosures is prescribed.
4. JFMCs to be actively involved.

6. Bamboo (Overlapping) Working Circle:

Prescription:

Method of Harvesting (Bamboo clump management)

- i. Demarcation:** The coupe due for working will be demarcated before the onset of monsoon, in the year in which they become due for harvesting.
- ii. Estimation of Clumps:** Most of the areas included in this working circle contain planted Bamboos at 6m x 6m spacing. The growth of Bamboos differs from compartment to compartment and even in the same compartment. In natural Bamboo growth, the clump size varies.
- iii. 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.
 - a) No harvesting works should be permitted from 15th June to 30th September.
 - b) 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).
 - c) It is prescribed to first mark the bamboo culms in a clump. The man-days required for marking per culm should be decided by Dy.C.F in

consultation with Chief Conservator of Forests, (T) Nagpur Circle after
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under taking sample plot estimate.

- d) No culms below the age of two years will be felled.
- e) Following culms shall be removed from all clumps.
- f) In a matured clump the following type of culms (green and living) will be retained:
- g) The cutting height of culms will be between 15 cm to 45 cm above ground level i.e. above the first internode above the ground. The cut shall be made with a sharp instrument.
- h) In case of any flowering, no Culm from flowered clumps shall be felled in the year of flowering.
- i) 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.
- j) Only when such a distinction is not possible, two clumps within one meter distance will be considered as one.
- k) 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.
- l) 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.

iv. Management of Congested, Crooked and stunted bamboo clumps:

Observation from the field shows majority of the bamboo clumps are congested, crooked, and stunted in growth.

Subsidiary Silvicultural Operations Cleaning and Thinning:

Cleaning Operations:

All clumps will be cleaned during the coupe working. Cleaning operations in

Bamboo clumps will include following elements:

- i. Climbers infesting Bamboo clumps will be removed.
- ii. All dead, decayed and dry culms will be removed.
- iii. All culms, cut high above the ground, will be cut above the first inter-node.
- iv. Twisted culms will be removed.
- v. Top-broken culms, with more than half of the top damaged and malformed culms will be removed.

Regeneration:

Natural regeneration should be given preference over artificial regeneration since the forest area has mixed species.

7. Old Teak Plantation (Overlapping) Working Circle:

Prescription:

- i. 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.
- ii. 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.
- iii. 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.
- iv. 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.

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- v. 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 is 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.

- Non-Teak coppice trees (except any rare tree) are first to be marked.
 - Teak coppice trees are marked.
 - Non-Teak trees of seed origin are marked. However, trees of *Haldu*, *Bija*, *Shisham*, *Semal*, *Tiwasand* all trees of NTFP will be retained even if the number is more than desired number.
 - Sound Teak trees of seed origin to be marked for felling only in the last.
- vi. 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.

Subsequent thinning 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 thinning will be according to prescriptions in paras 1 to 5 above.

8. Wildlife (Overlapping) Working Circle:

Prescription:

1. Standing Order of PCCF (WL) to be scrupulously implemented.

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2. Habitat improvement works like waterhole development, meadow development to be taken up in suitable areas.

2. Creation of database w.r.t. riparian zones, saltlicks, natural wallows, resting places etc to be created.

4. Vaccination of livestock to be monitored

5. Intelligence gathering to check wildlife trade

6. Secret service fund to be effectively used.

7. Regular Sensitization of staff

- 8 During marking, at least 2 dead trees per ha is to be kept as snags.

9. No fruit tree to be marked.

10. Tendu Phadis / labour camps should not be close to waterholes.

11. Compensation as per Govt. orders to be dispersed immediately and transparently.

12. Effective control on forest fires.

13. Eco-development works to be started either through EDCs or JFMCs in wildlife rich areas

14. Massive awareness creation in village communities, schools, colleges, civil society, public representatives etc.

9. Non-Timber Forest Produce (Overlapping) Working Circle:

Prescription:

1. Documentation of NTFP collection.

2. JFMCs to be actively involved in NTFP collection and processing.

3. Scientific method for Gum tapping as per rules suggested by FRI to be used.

4. Regular trainings for JFMCs to be conducted for capacity building in NTFP collection and processing.

10. Miscellaneous Regulation:

1. Boundary demarcation of all undemarcated areas (Entire Zudpi jungle

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area, Acquired Private Forest & Non-Forest land taken over for C.A.) to be accomplished in first three years of the Plan.

2. Boundary pillar which is not easily vulnerable to damage.
3. Three years Survey and Demarcation Programme
4. Boundary demarcation is necessary due to honeycombing.
5. Up dation of area registers
6. Where claims are finally rejected, removal of such encroachments.

CHAPTER-19

TREE COVER OUTSIDE FOREST AREA

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19.1: INTRODUCTION: This Chapter deals with the important aspect of tree presence and its contribution to the tree cover of the District and Forest Division of Bhandara.

Trees outside the forest are defined by default, as all trees excluded from the definition of forest and other wooded lands. Trees outside the forest are located on "other lands" mostly on farmlands and built-up areas, both in rural and urban areas. A large number of TOF consist of planted or domesticated trees. TOF include trees in agroforestry systems, orchards and small woodlots. They may grow in meadows, pastoral areas and on farms, or along rivers, canals and roadsides, or in towns, gardens and parks. Some of the land use systems include alley cropping and shifting cultivation, permanent tree cover crops (e.g. coffee, cocoa), windbreaks, hedgerows, home gardens and fruit-tree plantations (FAO).

The Tree Outside Forests (TOF) / Plantation for State of Maharashtra, according to the India State of Forest Report 2017, is 9,831 sq.km. This area adds 3.19% to the tree cover of the State. However, no specific figure for the Bhandara District is available.

The Social Forestry Department (SFD) of the State has the mandate for the forestry outside forest area. Since the early 1980s the SFD has carried innumerable plantation and plantation-drives across the state. It has not only conducted such plantations but has backed-up with good awareness and extension efforts which have borne fruits in many ways. The SFD has been carrying out plantations in the private areas since 1982 in the District which include block plantations, agricultural bund planting and road-side plantations which form a substantial quantity and forest cover in the areas outside forest

The Trees Outside Forests need to be assessed by the Social Forestry Division of the District. There is a need to design a model for the survey of trees outside forest at the state level so that a realistic figure of the TOF could be arrived at.

The Forest Survey of India, Ministry of Environment and Forests has come up with the field manual on assessment of trees outside forest (urban) (tof-u) which may be taken as a guide for the assessment of the TOF in the urban areas of the District.

The tree outside forests in the state of Maharashtra has not been assessed yet as per the requirement of the Code and as carried out by the Forest Survey of

India. However, the Social Forestry Department (SFD) of the State has assessed the trees that are available from the years of plantation that it has carried out in the District which forest area. It has also assessed the quantity and forest cover in the areas outside forests. The SFD has been carrying out plantations which include block plantations and road-side plantations.

Trees Outside Forests planted under Social Forestry Bhandara Division during the period 2009-10 to 2018-19

A) Block Plantation	
Total Beneficiaries	1689
Total Area in ha.	628.7
B) Road - Side Plantation	
Total Sites	211
Total Length in Km.	459.14

As per the assessment made by Social Forestry Division, Bhandara, on an average of 62.87 Ha Block Plantation and 46 km of road side plantation shall be carried out annually for the extension of forestry outside the forest.

19.2: REALISING THE DREAM OF 33% FOREST/TREE COVER

In tune with the objectives of our national forest policy'1988 we have to achieve a national target of bringing 33% of landmass of our country under forest and tree cover for ensuring ecological security and environmental balance. However, forest cover and Tree cover in India has over the years stabilized at around 23 % of geographical area. The area under forest and forest land is difficult to increase, in fact, lot of diversion of forest land take place from year to year. As such there is hardly any scope to increase the recorded forest area in Bhandara or in the country in general.

The only way left for the increase of forest cover and tree cover has to be through afforestation activities in non-forest areas. The areas outside forests comprises mainly of private farm forestry, canal bank areas, Road side strips, Railway line side strip, blank and degraded land, wasteland etc. Apart from increasing the tree cover, extension of forestry in non-forest areas especially as agro-forestry and farm forestry has tremendous potential to increase production of timber and other wood products and reduce the pressure on natural forests. We are going to explore the following means of bringing more Trees outside Forest.

19.3: AGROFORESTRY

According to FAO, Agroforestry is a collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence. In agroforestry systems there are both ecological and economical interactions between the different components. Agroforestry can also be defined as a dynamic, ecologically based, natural resource management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels. In particular, agroforestry is crucial to smallholder farmers and other rural people because it can enhance their food supply, income and health. Agroforestry systems are multifunctional systems that can provide a wide range of economic, socio-cultural, and environmental benefits.

There are three main types of agroforestry systems:

Agri-silvicultural systems are a combination of crops and trees, such as alley cropping or homegardens.

Silvo-pastoral systems combine forestry and grazing of domesticated animals on pastures, rangelands or on-farm.

The three elements, namely trees, animals and crops, can be integrated in what are called **agro-silvo-pastoral** systems and are illustrated by home-gardens involving animals as well as scattered trees on croplands used for grazing after harvests. (Extract from [http:// www.fao.org/forestry/agroforestry/80338/en/](http://www.fao.org/forestry/agroforestry/80338/en/))

Agroforestry is a low-input system which combines trees with crops in various combinations or sequences. Agroforestry also has the potential to reduce risk through diversification of a variety of products, including food, fuelwood and animal fodder. Agroforestry combines agriculture and forestry technologies to create more integrated, diverse, productive, profitable, healthy and sustainable land-use systems (Ujjwal Ghosh: Agroforestry: Key for achieving one third area under forest and tree cover, TERI, here and elsewhere).

The Social Forestry Department of the State and the Department of Agriculture/ Horticulture in collaboration with the Forest Department should work towards the possibility of bringing this huge area under some form of forestry and agroforestry.

19.4: MODELS AND PLANTATIONS:

The following types of Agroforestry possibilities should also be explored as per the site conditions and the requirement of the people.

- a. Boundary/Bunds Plantation: Trees on boundary + crops
- b. Block plantation: Trees + Crops
- c. Energy plantation: Trees + crops during initial year
- d. Alley cropping: Shrubs + crops
- e. Agri-horticulture: Fruit trees + crops
- f. Agri-horti-silviculture: Trees + fruit trees + crops
- g. Horti-pasture: Fruit trees + pasture/animals
- h. Shelterbelts: Trees +/- crops
- i. Windbreaks: Trees +/- crops
- j. Homesteads: Multiple combination of trees, fruit trees etc.

19.5: SUGGESTIVE STEPS FOR THE INCREASE OF AREA UNDER AGROFORESTRY

- i. The area under community land should be given priority for plantations. Drawing up appropriate time specific action plan is essential, which will require the involvement of the Social Forestry Department and the Agriculture Department along with the Forest Department
- ii. Farmers must be encouraged and motivated by way providing them technical assistance and cooperation by forest department and SFD for taking up planting trees
- iii. Land laws, if any, should be so modified wherever necessary so as to facilitate and motivate individuals and institutions to undertake tree-farming and grow fodder plants, grasses and legumes on their own land.
- iv. Wherever possible, degraded lands should be made available for this purpose either on lease or on the basis of a tree-patta scheme. Steps necessary to encourage them to do so must be taken. Appropriate regulations governing the felling of trees on private holding should be appropriately relaxed.
- v. High quality planting stock including clonal planting stock supported with improved silvicultural management practices can usher in a second green revolution in India this time in respect of tree crops for timber and fuel-wood/fodder production. This critical requirement of genetically improved high-quality planting stock should not be neglected, which will impact productivity and quality improvements.

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- vi. People's support in forest conservation is to be recognized by the state forest departments. Appropriate extension programmes are to be undertaken to bring the people to the consciousness of the value of trees, wildlife and nature in general. This can be achieved through the involvement of educational institutions, Krishi Vigyan Kendras, mass media, audio-visual aids and the extension machinery, Trainers Training Centres to learn agri-silvicultural and silvicultural techniques to ensure optimum use of their land and water resources.
 - vii. The wood-based industries have important role to play in development of agroforestry. They should consider making appropriate arrangements with farmers and play a facilitative role in arranging quality planting material and enter into buyback arrangements.
 - viii. Preferred Tree and bamboo species under agro forestry by farmers and not naturally available in neighbouring forests may be exempted from the transit permit and felling regulations.
 - ix. The possibility of a Public-Private Partnership in regenerating the culturable wasteland and barren unculturable wastelands of about 260 sq. km should be explored. This can also be explored for raising the improved planting material for supply to the farmers.

CHAPTER-20

SCIENCE AND RESEARCH

During the process of writing of this Plan the following papers, articles, reports and documents were referred and used for the writing of the Plan.

Table No.20.1: list of papers, articles, reports and documents

Sr. No.	Department	Subject
1	FSI (Forest Survey of India)	
	i) SFR 2011	1) The condition of the forests & forest cover over the last decade during the implementation of the plan based on the FSI satellite data.
	ii) SFR 2015	
	iii) SFR 2017	2) The Plantation Tree outside forest for the State of Maharashtra (SFR 2017)
	iv) Carbon Statistics of India	Carbon & Forest Eco-system Methodology for the assessment of Forest Carbon, accounting of Forest Carbon Stock.
2	Ground water survey & Development Agency (GSDA)	1) Assessment of Dynamic Ground Water Resources of the Maharashtra & Aquifer Parameters. 2) Taluka wise Ground Water Resources in Bhandara District.
3	Control Ground Water Board (CGWB)	Water level data with the long-term trend (2001 to 2010) Ground Water Recharge, Ground Water Development.
4	Preliminary survey of Reptile Fauna of Vidhabha Region, Maharashtra, (Central India) Presented By: Parag	List of Reptiles found in Bhandara Forest Division.

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Dandge & Ashish Tiple.
The 8th Indian Symposium of
Odonatology & Biodiversity
2014 Nagpur.

- | | | |
|----|---|--|
| 5 | iucnredlist.org | IUCN Status of animals. |
| 6 | Social Forestry Bhandara | Information regarding Tree Cover outside forest area. |
| 7 | National Bureau of Soil Survey & Land use Planning (NBLSS) | 1) Soil erosion classes & their areal extent & expected Soil Loss. (Soil Resources Atlas Bhandara District.)
2) Slope, Soil erosion, soil texture maps. |
| 8 | C.J. Patel College of Science, Tirora | Diversity of Wild Macro fungi in forests of Bhandara District. (List of Algae and Fungi.) |
| 9 | Geological Survey of India (GSI) | Rock Formation in Bhandara District. |
| 10 | DFO, Silvicultural Scientist, Nagpur | Information regarding preservation plot in Bhandara Division. |
| 11 | Maharashtra Remote Sensing Application Centre (MRSAC) | Village Boundary & Survey No. Data of Bhandara District. |
| 12 | An Account of Preservation plots in Central India by B.N.Gupta & N.G.Totey, Tropical Forest Research Institute, Jabalpur. | Information on the Preservation plots in Maharashtra |

RESEARCH GAPS:

Because of the lack of any research works/paper related to the Division and the Vidarbha region, the many chapters that involve specific information on the Forest Division of Bhandara could not be written with accurate data. The research gap is in almost every aspect of the Working Plan as our writing of the Plans in early years has not looked into the new aspects that the need of our present times require, like

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Biodiversity and all its components, Climate change and Carbon sequestration, NTFP research, ITK, Trees outside forests, Social and cultural aspects of forests, Ecosystem Services etc. However, areas in which the research gap is felt most area:

Biodiversity: Apart from a few mammals, trees and a few major herbs and shrubs, the Department does not have record of the whole gamut of biodiversity of the Divisions. It is clear that a Biodiversity Assessment study is very much required for the documentation of the richness of our forests.

Carbon sequestration: Carbon sequestration is an important aspect of the contribution of forests towards Climate Change. However, since we do not have base data, it would be difficult to monitor the increase/decrease in sequestration levels. Also, the methodology for the assessment of the different pools of Carbon should be very clear to the SOFR units so that information will be more accurate. The research that will be required for the Tier-III level measurements of the key C-stock components over time.

NTFP Research: NTFP is integral to the health and productivity of the forests. Though we have data on the major NTFP tree species and few prominent medicinal plants, it is known that the people around forests use many more variety of species than we ever know. The list is appended at Introduction part of the Plan and the number of species used is far more than earlier known. There is a need for research to be done for the documentation of all the species that are being used by the people and also to devise the best methods for the harvest of the species through experimentation.

20.1: PRESERVATION PLOTS:

The following are the excerpts from the paper 'An account of Preservation Plots in Central India' by BN Gupta and NG Totey, Indian Forester, 1994 relevant for the subject in discussion.

20.1.1: Introduction

Preservation plots, the miniature nature reserves, are demarcated forest areas set aside for the preservation of the forest in perpetuity permitting only such human interference as is necessary for their protection and maintenance. Following the recommendations of the IIIrd All India Silvicultural Conference (Anon, 1929), preservation plots in the representative areas of Chief Forest Types were marked. By

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1939, about 112 preservation plots were established throughout the country, when concept of preservation of both climatic and seral types was generated (Anon., 1939). In 1961, during the Xth All India Silvicultural Conference emphasis was laid on preservation of fine specimens of forests i.e. groups of out-standing trees, rare types of forests of botanical curiosity and patches of relict vegetation, specimens of managed forests (stable sub-climax stages) and climax forests.

20.1.2: Preservation Plots in Maharashtra

Preservation plots in Maharashtra have been established as early as 1955 and as of 1993, there are 23 preservation plots in Maharashtra covering an area of 517.32 ha. Out of these, 48-50% plots fall in dry deciduous forests, 30% in moist deciduous forests and about 20-22% in subtropical hill forests. There are 36 forest types as per Champion and Seth (1968) in Maharashtra spread over 44044 Km² (Anon. 1991) but preservation plots have been identified only in 5-8 types like 3B/C1, 3B/C2, 5A/C1, 5A/C3, 8A/C2 etc. The remaining forest types though important from the point of view of biodiversity are not covered.

In Bhandara Forest Division no such Preservation Plot was established.

20.1.3: Recommendation for the Bhandara Division:

The following are the forest types found in Bhandara District.

Table No20.2: Forest Types of Bhandara Forest Division

Type	Notation	Type description
Sub-group I. Climax types	5 A	Southern Tropical Dry Deciduous Forests.
	5A/C ₁	Dry teak bearing forests
	5A/C ₃	Southern dry mixed deciduous forests
II. Degradation stages	5/D S1	Dry deciduous scrub.
III. General serial type	5/ISI	Dry tropical riverain forest

While as per the above research document 'An account of Preservation Plots in Central India' by BN Gupta and NG Totey, Indian Forester, 1994, the Preservation Plots are found to have been established in the Sub-group 5-A Southern Tropical Dry Deciduous Forests, there is a need to have such plots also in the rest of the Forest types found in Bhandara Division namely, 5/D S1-Dry deciduous scrub and 5/1SI-Dry tropical Riverain forest. The work for the identification, plot size, demarcation and data

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collection should be done with the help and collaboration with the Silviculturist, Pune and his subordinate office at Nagpur.

- 1) The DCF Bhandara should survey the area of the Division and identify the area under the above forest types namely, 5/D S1-Dry deciduous scrub and 5/1SI-Dry tropical Riverain forest.
- 2) In India it is recorded that the size of the Preservation plot varies from 0.1 ha to 4000 ha. The DCF shall lay plots of the size of not less than 4.0 ha and to a maximum of 20 ha. for each of the forest types mentioned above.
- 3) The plot should be well-demarcated on the ground, geo-referenced and plotted on a GIS-based map. The trees on the border should be demarcated with such demarcation as were marked in the other Preservation Plots in the country/state.
- 4) These plots shall be spared from all human interference including harvesting operations, if prescribed in the Plan. Activities shall be limited to those that would ensure protection and maintenance.
- 5) A total enumeration of the plot shall be taken up taking into account all the tree species of the forests (Species, Age-class distribution, height, etc)
- 6) The forest shall also be described in a proper manner as to its species composition, forest storey's, condition of the crop, health and vitality, presence of pests etc.
- 7) The shrubs and herbs present in the Plot should be well-documented. This shall include the lower life-forms.
- 8) The fauna available in the area should also be surveyed and documented.
- 9) The recordings for the Preservation Plots should be maintained properly for future reference.

20.2: SAMPLE PLOTS

For the preparation of this Working Plan a total of 1590 sample plots were laid and the relevant detailed information was recorded. These are distributed in different Working Circles under different ranges and are well-distributed throughout the

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Division. A total of 70 number of representative plots were chosen taking 7 from each range and the details are shown below:

Selection of Plots: The different Working Circles stands as a representative of the density and composition of the forest; hence the choice of 7 sample plots from each range is selected. The seven sample plots chosen are the most representative for each of the range in terms of species distribution, age, density and other factors. The lists of the Sample plots are given below:

Table No.20.3: List of sample plots

Sl.No.	Working Circle	Beat	Compt.No.	Latitude	Longitude
Adyal Range					
1	SCI	Kithadi-1	299	20:56:27.5 N	79:46:27.5 E
2	SCI	Rengoda	206	20:58:32.5 N	79:48:02.5 E
3	IWC	Purkabodi-1	290	21:00:12.5 N	79:46:27.5 E
4	IWC	Chalana-1	291	21:01:27.5 N	79:47:17.5 E
5	AWC	Pilandri	302	20:55:12.5 N	79:46:52.5 E
6	FFP	Devri H.	301	20:53:32.5 N	79:49:47.5 E
7	PRO	Purkabodi-1	293	20:58:32.5 N	79:47:42.5 E
Bhandara Range					
1	SCI	Pahela	192	21:01:02.5 N	79:43:07.5 N
2	SCI	Madgi 2	288	21:02:17.5 N	79:43:57.5 N
3	IWC	Malipar	214	21:04:22.5 N	79:43:32.5 N
4	AWC	Dongargaon	195	20:58:32.5 N	79:48:57.5 E
5	AWC	Malipar	169	21:05:12.5 N	79:41:27.5 N
6	FFP	Dawdipar	175	21:03:57.5 N	79:41:02.5 N
7	PRO	Dongargaon	194	21:00:12.5 N	79:41:02.5 N
Jamkandri Range					
1	SCI	Mangrali - 1	38	21:26:52.5 N	79:27:17.5 E
2	SCI	Mandekasa - 2	44	21:24:47.5 N	79:29:22.5 E

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3	SCI	Pitesur - 2	47	21:26:27.5 N	79:32:42.5 E
4	SCI	Rampur	357	21:27:17.5 N	79:38:07.5 E
5	IWC	Mangrali - 4	41	21:28:32.5 N	79:30:12.5 E
6	PRO	Sorna	53	21:27:17.5 N	79:34:22.5 E
7	PRO	Pagdi H.	54	21:27:42.5 N	79:35:12.5 E
Lakhandur Range					
1	SCI	Dandegaon	273	20:48:07.5 N	79:53:07.5 E
2	SCI	Dandegaon	273	20:48:57.5 N	79:53:32.5 E
3	IWC	Antargaon-1	271	20:47:17.5 N	79:52:17.5 E
4	IWC	Antargaon-2	270	20:47:17.5 N	79:53:57.5 E
5	AWC	Dahegaon	331	20:48:07.5 N	79:51:52.5 E
6	AWC	Puyar	320	20:43:07.5 N	79:56:27.5 E
7	AWC	Puyar	318	20:45:37.5 N	79:56:52.5 E
Lakhani Range					
1	SCI	Baradkinhi	118	21:01:52.5 N	79:54:47.5 E
2	SCI	Baradkinhi	118	21:01:52.5 N	79:55:37.5 E
3	SCI	Umrazari	100	21:12:17.5 N	79:56:02.5 E
4	IWC	Lakhani	106	21:08:32.5 N	79:50:12.5 E
5	IWC	Chandori	101	21:02:42.5 N	79:53:32.5 E
6	IWC	Jhamhali	185	21:05:37.5 N	79:56:27.5 E
7	FFP	Sonegaon	104	21:11:02.5 N	79:51:52.5 E
Lendezari Range					
1	SCI	Mangarali-1	32	21:28:57.5 N	79:29:47.61 E
2	SCI	Lendezari-2	49	21:29:22.5 N	79:33:32.07 E
3	SCI	Lendezari-1	48	21:28:57.5 N	79:34:22.94 E
4	IWC	Rondha-2	30	21:31:02.5 N	79:31:52.46 E
5	IWC	Lendezari-4	51	21:29:22.5 N	79:35:12.69 E
6	AWC	Mangaarli-2	36	21:29:22.5 N	79:28:57.27 E

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7	PRO	Rondha-1	31	21:30:12.5 N	79:32:17.41 E
Nakadongri Range					
1	SCI	Asoalpani East	63	21:30:37.5 N	79:38:57.5 N
2	SCI	Asoalpani East	14	21:30:12.5 N	79:39:22.5 N
3	IWC	Ambagad	358	21:27:17.5 N	79:39:22.5 N
4	IWC	Pawnar	84	21:26:52.5 N	79:40:37.5 N
5	AWC	Ambagad	24	21:26:27.5 N	79:37:17.5 N
6	AWC	Pawankhari - 1	360	21:32:42.5 N	79:42:17.5 N
7	PRO	Pangdi	55	21:28:32.5 N	79:37:42.5 N
Paoni Range					
1	SCI	Amgaon-2	239	20:44:47.5 N	79:33:07.5 N
2	SCI	Kanhalgaon	247	20:42:17.5 N	79:40:37.5 N
3	IWC	Nistti-1	393	20:44:47.5 N	79:35:37.5 N
4	IWC	Bhuyar-2	320	20:41:52.5 N	79:36:27.5 N
5	AWC	Mandawgota-2	394	20:42:42.5 N	79:38:57.5 N
6	AWC	Chanewada	253	20:39:47.5 N	79:41:02.5 N
7	PRO	Kormnbi	216	20:51:27.5 N	79:36:52.5 N
Sakoli Range					
1	SCI	Kesalwada	208	20:57:17.5 N	79:59:47.5 E
2	SCI	Sangadi-1	207	20:58:07.5 N	80:00:12.5 E
3	IWC	Mahalgoan	204	20:59:47.5 N	80:01:02.5 E
4	IWC	Khanba	148	21:11:02.5 N	80:03:07.5 E
5	AWC	Tumndapuri	159	21:07:42.5 N	80:00:12.5 E
6	AWC	Kesalwada	132	20:57:42.5 N	80:01:27.5 E
7	FFP	Pathari	161	21:06:27.5 N	80:00:37.5 E
Tumsar Range					
1	SCI	Chulardoh	72	21:28:07.5 N	79:44:47.5 E
2	SCI	Zanzeriya	74A	21:27:17.5 N	79:45:37.5 E

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3	SCI	Sonegaon-3	70A	21:29:47.5 N	79:46:27.5 E
4	IWC	Bhondki-1	77	21:28:07.5 N	79:43:32.5 E
5	IWC	Chicholi N.	78	21:29:22.5 N	79:45:37.5 E
6	AWC	Zanzeriya	363B	21:26:52.5 N	79:44:22.5 E
7	PRO	Chandpur	69	21:30:37.5 N	79:48:32.5 E

These plots shall be monitored and data collected on a yearly basis. The normal prescriptions that are prescribed in the Plan area allowed to be carried out in these plots and the impact of the implementation of such prescriptions should be recorded and monitored.

20.3: REGENERATION PLOTS:

Selection of Plots: The sample Plots have been surveyed as per the Working Plan Code 2014 and have in them the four numbers of 3 x 3 m sub-plots recorded for the regeneration too. These plots will also be the plots where regeneration will also be studied. This will make the monitoring and data collection easier as well.

Data to be collected: Regeneration plots are established to study the regeneration status of important species.

- Data should be collected on population dynamics of seedlings, saplings and young trees.
- Each seedling and sapling should be marked individually
- The marked seedlings should be measured and monitored periodically
- The status of growth, their health and conditions should be measured in detail.
- The conditions of soil (depth, humus content etc), presence of litter, the canopy opening level, should be recorded properly
- The incidences of pest should be recorded.
- Any threat and outside interference like fire, grazing etc should be removed.
- The monitoring should be done periodically, the period of which should be decided in consultation with the SOFR unit and the Research wing.

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- The role of mycorrhizae and litter cover management should be considered.

The aim of the monitoring of the regeneration is to find out under what conditions the regeneration of a particular species comes up best and under what conditions they grow best. In knowing these, the next step would be to create those conditions that are most suitable for the regeneration of the forests.

20.4: NTFP PLOTS:

The sample Plots have been surveyed as per the Working Plan Code 2014 and the same sample plots will serve the purpose of NTFP's. This will make the monitoring and data collection easier as well.

20.5: OTHER RESEARCH AND EXPERIMENTAL PLOT

In 1970, Mohagatta research plot was established under Research wing. An area of 438.80 Ha was allotted for research activities in Sakoli range. The experiment for progeny testing especially for teak, teak seed orchard, teak progeny trials, teak clonal plantation etc. is being conducted here.

CONTROL AND RECORDS

Control and Records:

The following records will be maintained in the Bhandara Forest Division Office:

Control Forms.

Compartment History.

Plantation and Natural Regeneration Registers.

Seed and Nursery Register

Divisional Note Book

Boundary Registers

21.1: 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, Dated. 30.11.1967).

The records of all harvesting, subsidiary cultural operations, regeneration works and soil and moisture conservation work 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 No.- LXXXVI.**

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 scrutinize 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.

21.2: Compartment History: **PDF Compressor Free Version**

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 No - LXXXVII** of this plan.

Form №I: Description of the Compartment.

Form № II: Records of plantations and changes in growing stocks.

Form № III: Records of operations and out-turns.

Form № IV: Records of observations.

Form № V: Records of injuries.

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.

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.

21.3 Plantation and Nursery Registers: Plantation registers will be maintained for all the areas regenerated artificially in the Form № 1 to Form № 9 as given below. **Appendices - LXXXVIII & LXXXIX**

21.4: 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 No. - XC**

21.5 Fire Records: They should be maintained as per the latest orders from State Government from time to time.

21.6 Other Records: List of amendments to the working plan and list of area changes will be maintained in prescribed forms.

Office of The Chief Conservator of Forests
(Working Plan-East), Nagpur

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Near G.P. & Boys School, Ravi Nagar, Civil Lines, Nagpur
Telephone No. (0712-2565059) Fax No. (0712) 2565059

By email

No. Desk-14/WP/SCC/Meeting/ 161 /2019-20

Nagpur 444 001, Dated- 04/05/2020

Sub :- Minutes of the Standing Consultative Committee meeting held on 27/04/2020 for Approval of DWPR.

The minutes of the Standing Consultative Committee meeting held at Command Control Room, Van Bhavan, Nagpur on dated 27/04/2020 for approval of DWPR of Bhandara and Bhamaragarh Forest Division is enclosed herewith for information and necessary action.


Member Secretary
Standing Consultative Committee
&
Chief Conservator of Forests
(Working Plan – East) Nagpur

To,

1. CCF (T) Gadchiroli
2. CCF (T) Nagpur



Copy submitted with compliments along with enclosure to :,

1. The Principal Chief Conservator of Forests (HoFF) M.S. Nagpur & Chairman, SSC.
2. The Principal Chief Conservator of Forests (Wildlife) M.S.
3. The Principal Chief Conservator of Forests (Production & Management) M.S.
4. The Principal Chief Conservator of Forests and Member Secretary, State Biodiversity Board, Nagpur
5. The Principal Chief Conservator of Forests (Information Technology & Policy) M.S.
6. The Principal Chief Conservator of Forests (Budget, Planning & Development) M.S.
7. The Additional Principal Chief Conservator of Forests (Central) Regional Office, Nagpur
8. The Additional Principal Chief Conservator of Forests (Conservation) M.S.
9. The Additional Principal Chief Conservator of Forests (H.Q.) Social Forestry M.S. Pune (Guardian APPCCF of Kolhapur Circle).

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10. The Additional Principal Chief Conservator of Forests (Protection) M.S. (Guardian APPCCF of Nagpur Circle).
11. The Additional Principal Chief Conservator of Forests (Working Plan-West) Pune
12. The Additional Principal Chief Conservator of Forests (CAMP) M.S. Nagpur
13. The Additional Principal Chief Conservator of Forests (Nodel Officer) M.S. Nagpur
14. The Additional Principal Chief Conservator of Forests (Bamboo Board)
15. The Regional Director Forest Survey of India, Nagpur
16. Director, Tropical Forest Research Institute, Dakghar, R.F.R.C. Mandala Road Jabalpur.

**Minutes of Meeting of the Standing Consultative Committee
for the State of Maharashtra
held on Dt. 27/04/2020 for Approval of DWPR & PWPR**

Government of Maharashtra, vide G.R.No. FDM-2015/CR-95/F-2 dated 29/04/2015 has constituted a Standing Consultative Committee (S.C.C.) for approval of Draft Working Plan Reports (DWPR) and Preliminary Working Plan Reports (PWPR) of various Forest Division of Forest Department in Maharashtra, before its submission to Government of India for approval.

In this connection, a meeting of Standing Consultative Committee was organized on 27/04/2020 at Command Control Room, Vm Bhavan, Nagpur. Dr. S.C. Gairola, PCCF (HoFF), M.S. Nagpur chaired the meeting. The following members of the Committee were present in the meeting.

Sr. No.	Name	Designation
1	Dr. S.C. Gairola	PCCF (HoFF), Maharashtra State, Nagpur
2	Shri. Praveen Shrivastava	PCCF (P & M), Maharashtra State, Nagpur
3	Shri. Nitin Kakodkar	PCCF (Wildlife), Maharashtra State, Nagpur
4	Shri. G.Saiprakash	PCCF (Budget, Planning and Development), M.S. Nagpur
5	Shri. M.K.Rao	PCCF (ITP) M.S. Nagpur
6	Shri. Maheep Gupta	Member Secretary & CCF, Working Plan (East), Nagpur
7	Shri. Mohan Karnat	APCCF (Protection) M.S. Nagpur
8	Shri. S.G.Tembhurnikar	APCCF (Conservation) M.S. Nagpur
9	Shri. Sanjeev Gaur	APCCF (Nodel Officer) M.S. Nagpur
10	Shri. T.S.K.Reddy	APCCF & Member Secretary, Maharashtra State Bamboo Board, Nagpur
11	Shri. P. Kalyankumar	CCF (T) Nagpur
12	Shri. Kishor Mankar	Dyef (RU) Nagpur
13	Shri. Chandrasekaran Bala N	Dy.C.F.(Working Plan), Yavatmal
14	Shri. R. Dhabekar	DFO (GIS Cell) Nagpur
Joint through V.C.		
15	Shri. Ramarao	CCF (T) Gadchiroli
16	Shri. Praveen Chawan	CCF (T) Amaravati
17	Shri. Vivek Hoshing	DCF (T) Bhandara
18	Shri. Umesh Varma	C.F. WP, Gadchiroli
19	Shri. G.R. Madhavrj	C.F. WP, Amaravati

Shri. Praveen Srivastava, PCCF (P&M) welcomed the members and briefed about the GIS web portal and its usage in preparation of Working Plan.

Dr. S.C.Gairola, PCCF (HoFF) addressed the members and directed the WPO's to focus on the guidelines issued under Working plan code 2014 and the new prescriptions for the different working circle while presenting their Plan.

Bhandara Forest Division DWPR

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Resource person: Chandrasekaran Bala N, Dy.CF, WP, Nagpur

Shri. S.C.Gairela, PCCF (HoFF), M.S. Nagpur

1. The harvestable girth seems to be on higher side.
2. The production per Ha should be compared with the previous plan in order to assess the changes over the period.
3. The usage of word 'crops' in IWC shall be replaced with Forest plantations.
4. In Fodder & Pasture Working Circle, the word 'malformed trees' should be deleted.
5. The approved Grass cultivation models issued by PCCF (HoFF) office should be incorporated in B-type area.
6. In Old Teak Plantation (Overlapping) Working circle, the prescription of mechanical thinning should be removed and the first silvicultural thinning should be in between the 6th and 11th year.
7. In Bamboo (Overlapping) Working Circle, 'Plus method' should be prescribed instead of 'horse shoe' method for treating congested and crooked bamboo clumps.
8. A committee should be formed under the chairmanship of PCCF (P&M) and MD, MSBB, CCF(I) Nagpur, Chandrapur and Gadchiroli as members for suggesting appropriate method for treating congested and crooked bamboo and specific rate structure for this operation.

Shri. Nitin Kakodkar, PCCF (WL), M.S. Nagpur

1. In Wildlife (Overlapping) Working Circle the irrelevant legal mandates should be deleted.
2. Incorporating the concept of 'Protection camps' to tackle the Human animal conflicts in the division.
3. The list of medical equipments and kits for treating wild animals prescribed should be consulted and verified with the resource person in TTC, Seminary Hills, Nagpur.
4. The information regarding Eco-sensitive zones should be incorporated.

Shri. G.Saiprakash, PCCF (BPD), M.S. Nagpur

1. In C & D type area of Fodder & Pasture Working Circle, apart from planting fodder trees, grass tussocks should also prescribed.

Shri. S.G.Tembhurnikar, APCCF (Conservation), M.S. Nagpur

1. The revised specifications regarding boundary pillars approved by PCCF (HoFF) office should be incorporated in the Plan.
2. The length of the boundary pillars should be updated.
3. Form No.1 should be updated.
4. The database of IFR and CFR should be updates as per the guidelines issued in 2019.

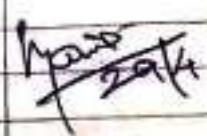
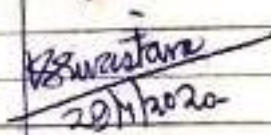
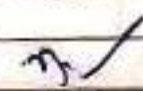
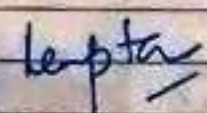
Shri. Sanjeev Gaur, APCCF (Nodal), M.S. Nagpur

1. The guidelines issued by FDCM in 1999 related to thinning operations should be referred and necessary prescriptions should be incorporated in Old Teak Plantation (Overlapping) Working Circle.

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जोती कमांड केंद्रात न.म. वनअवन
नागपूर जेणे वनाधी 11.00 वा. प. म. व. व. (वन वन प्रमुख)
म. रा. आंचे अहमदनगरातील TWP / PWP बांधणी रसायनी
खालाधार समितीची बैठक 4.0 वीर आयोजित करण्यात
आली आहे.

सदर सभेस नागपूर जेणे वन अहमदनगर तैयारीत
व नागपूर वाहेरील अधिकारी / कार्यकारी 4.0 वीर
खालाधार उपायगा होणे.

क्र. क्र.	अधिकारी आंचे नाव व पदनाम	दवाखरी
1)	डॉ. एरा. सी. गैरोला, प्रधान मुख्य वनसंरक्षक (वन वन प्रमुख) म. रा.	
2)	श्री. पवित्रा श्रीवास्तव, प्रधान मुख्य वनसंरक्षक (उ. व. वन) म. रा.	
3)	श्री. नितीन कोकोडकर, प्रधान मुख्य वनसंरक्षक (वन्यजीव) म. रा.	
4)	श्री. जी. वार्धपकाळ, प्रधान मुख्य वनसंरक्षक (बी. पी. डी) म. रा.	
5)	श्री. महिष धुला, अपर प्रधान मुख्य वनसंरक्षक (कार्य) म. रा.	
6)	श्री. मोहन वर्गाटे, अपर प्रधान मुख्य वनसंरक्षक (वसंरक्षण) म. रा.	
7)	श्री. एस. जी. टेंडुलीकर, अपर प्रधान मुख्य वनसंरक्षक (वसंरक्षण) म. रा.	
8)	श्री. एम. के. नाव, अपर प्रधान मुख्य वनसंरक्षक (ITP) म. रा.	

क्र.सं.	अधिकारी यांचे नाव व पदनाम	PAGE NO. DATE
१)	श्री. संजीव गोड. अवर प्रधान मुख्य वनसंरक्षक (मोडक) म.रा.	स्वाक्षरी [Signature]
२)	श्री. पी. कल्याणकुमार - मुख्य वनसंरक्षक (प्रा.) नागपूर	
३)	श्री. टी. लस. के. रेड्डी - जयलक्ष्मीय वनसंरक्षक म. स्टे. वा. डोड, म. रा.	
४)	श्री. किशोर मानकर, उपवनसंरक्षक (संसाधन उपयोग) नागपूर	
५)	विठ्ठल आंडकर	
६)	श्री. आपटे	
७)	श्री. वासुदेवन	
८)	श्री. के. वेंकट रेड्डी	
९)		



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भारत सरकार
GOVERNMENT OF INDIA
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
MINISTRY OF ENVIRONMENT, FORESTS
& CLIMATE CHANGE

Regional Office (WCZ)
Ground Floor, East Wing
New Secretariat Building
Civil Lines, Nagpur - 440001
E-mail: apccfeentral-ngp-mef@gov.in

F.No. 12-31/1997 (FOR)/6448

Date: 27.04.2020

To,

The Principal Chief Conservator of Forests (P & M)
Maharashtra State,
Van Bhawan, Ramgiri Road, Civil Lines,
Nagpur - 440001.

Sub: Submission of DWPR of Bhandara Forest Division for the period 2019-20 to 2028-29 -
Regarding.

Sir,

The undersigned is directed to refer to Chief Conservator of Forests (Working Plan-East), Nagpur letter No. Desk-14/WP/SCC/988/2019-20 dated 04.03.2020 on the above mentioned subject and it is to inform that after examination of DWPR of Bhandara Forest Division, following shortcomings were observed:

- I. It is mentioned in the Working Plan that certain areas of Forest has been diverted under Section 3 (2) of Forest Rights Act, 2006 for individuals and Communities. Proper justification for diversion of Forest area of around 1303.72 ha in 2850 cases under individual rights and 4325.82 ha in 110 cases under Community Rights shall be submitted (Pg. 141, Part- I).
- II. A committee for identification of land banks for CA was constituted as per par 2.7 of Ministry's guideline. Accordingly, Working Plan Officer shall identify lands suitable to carry out Compensatory Afforestation and the same shall be incorporated as Section- 2.9 under Chapter- II, Part- I while writing Working Plan of the Division.
- III. Working Circle wise area in Old Working Plan and Current Working Plan is not mentioned in the Working Plan. A table including the above information Working Circle wise shall be included in the Working Plan.
- IV. In Chapter- 2.2, Part- I, it is mentioned that the area of earlier plan was 92779.051 ha. Out of which 4372.46 ha has been transferred to Wildlife, so total area of the Division comes to 88406.589 ha. But at page 64, it is mentioned that area as per A to O form comes to 88701.73 ha. Exact area (Working Circle wise) to be covered under this plan should be mentioned.
- V. Information on Other Chapter i.e. list of Lichens, Algae, Fungi etc. Available in the Division is not included in the Working Plan.
- VI. Information on below mentioned Sections are not written as per contents mentioned in National Working Plan Code, 2014:
 - a. Tree cover outside Forest area.

PA
CCF(WP)
Nagpur
for MHA
BL
27/4/2020

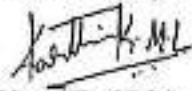
cc: CCF(WP) Nagpur
CCF(WP) Bhandara
CCF(WP) Nagpur

- b. Status of Biodiversity conservation in forests.
- c. Growing Stock of wood
- d. Growing Stock of Bamboo.
- e. Carbon sequestration and mitigation
- VII. Title of Sub-section i.e. Harvestable Girth in all Working Circles should have been Harvestable Diameters.
- VIII. Title of Sub-section i.e. Method of executing the treatment in all Working Circles should have been Method of executing the felling.
- IX. Information of Section- 11.3 (Special Works of improvement undertaken) and Section- 11.4 (Past yield, revenue and expenditure) is not included in the Working Plan.
- X. Information on Section- 4.6.13 (Associated regulations and measures) in Afforestation Working Circle is not included in Working Plan.
- XI. General information w.r.t Miscellaneous regulations chapter containing below mentioned section is not incorporated in the Working Plan:
 - a. Petty felling and extraction.
 - b. Rights and Concessions.
- XII. General information w.r.t Science and Research chapter containing below mentioned section is not incorporated in the Working Plan:
 - a. Preservation Plots.
 - b. Sample Plots.
 - c. Regeneration Plots.
 - d. NTFP plots.
 - e. Other Research and experimental plots.
- XIII. Title of Chapter- 18 should have been Tree Outside Forests (TOF) instead of Tree Cover Outside Forest Area.
- XIV. Information on Section- 11.3 (Special works of improvement undertaken) and Section- 11.4 (Past yield, revenue and expenditure) is not included in the Working Plan.
- XV. Title of Section 7.6.1 should have been Analysis of the crop instead of Analysis of Wildlife in the District.
- XVI. Stock map of the division is not submitted along with the Working Plan.
- XVII. Soft copy of KML/ Shape files w.r.t. boundary of the division is not submitted.

Therefore, you are requested to submit the requisite information and make necessary corrections in the Working Plan, so that further necessary action may be taken in the matter.

This issues with the approval of DDGF (Central), Regional Office (WCZ), MoEF & CC, Nagpur.

Yours faithfully,


(Karthik, M.L.)
Technical Officer

The compliance report of conditions raised by GOI vide letter no.
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F.No.12-31/1997 (FOR)/7238 dated 22/09/2020

Sr. No.	Condition	Compliance
1.	The currency of working Plan Shall be for a period of 10 years i.e. from the year 2020-21 to 2029-30. Period of last Working Plan was up to the year 2018-19, the present Working Plan is approved from the year 2020-21. Intervening period i.e. 2019-20 will be considered as per the prescription of last working plan and whatever work has been carried out may be got regularized/will be considered as part of last working plan, after taking approval of the competent authority wherever needed. In case there has been any work carried out in 2019-20; State Government has to submit proposal for regularization of same.	Dycf Bhandara vide letter No/desk-8/S./cn-102-669 dated 15/09/2021 has submitted that the no work has been done during the year 2019-20
2.	The orders of Hon'ble Supreme court in the matter of Godavarman Thirumulkpad Vs Union of India in W.P. (Civil) No.202/95 and related interlocutory applications shall be strictly adhered to. Any prescription or operation at variance with the Hon'ble Supreme Court's order shall be kept in abeyance till the order is in force or otherwise modified.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
3.	Further, in compliance with order to Hon'ble Supreme Court's Order dated 22.09.2000, the Government of Maharashtra shall ensure that regeneration of forests is commensurate with felling carried out under this Working Plan.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
4.	No felling shall be carried out without allocating necessary fund for implementation of regeneration operation so as to make 489 regeneration commensurate with felling. In the events 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.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
5.	Following the directions issued by MoEF&CC vide letter dated 23.02.2018, Regional Offices of MoEF&CC under the chairmanship of Deputy Director General of Forests (Central) of the Regional Office of this Ministry will be competent authority for deciding the extent of harvesting that could be permitted under approved Working Plans for ensuring regeneration to be commensurate with felling. Instruction/direction of the Central Government that may be issued in future in this regard shall be strictly complied with. Felling is to be done by State Government only after seeking permission	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.

	from REC, RO(WCZ), Nagpur.	
6.	Fruits bearing naturally grown trees shall not be clear felled for any purpose whatsoever.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
7.	Standard thinning and silvicultural operations under the strict supervision of Assistant Conservator of Forests and above will be allowed as per norms to improve the health of growing stock while executing the prescription of the Working Plan.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
8.	Prescriptions of micro plans for JFM (if made) should not deviate from the broad framework/guidelines of the Working Plan and shall be in accordance with various orders of Hon'ble Supreme Court.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
9.	Felling carried out on forest land after seeking approval of the Central Government under Forest (Conservation) Act, 1980 will not be treated as deviation. However, proposed felling in the forest division shall be restricted proportionately in the current/ future years to compensate this removal.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
10.	No deviations shall be made from the prescriptions of Working plan without prior approval of the Central Government under Forest (Conservation) Act, 1980. However, deviation of positive nature i.e voluntary plantations carried out outside the working area under any project, schemes and compensatory afforestation may be approved by the competent authority of the State Government from time to time.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
11.	The exploitable girth of tree species and period of felling cycle shall not be lower than what was approved in previous working plan.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
12.	In the vicinity of Nalas and water bodies felling shall not be undertaken. Further felling shall not be undertaken near the known resting/nesting places of wild animals and birds.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
13.	No commercial felling shall be carried out along the 2 km strip of all perennial Rivers of State; further, no commercial felling shall be carried out along the strip of 500 meters of all seasonal Rivers; only eco-restoration work shall be carried out.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
14.	Removal of dead and diseased trees will be undertaken under the supervision of an officer not below the rank of Assistant Conservator of forests.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
15.	Volume details of all kinds of fellings viz; dead and diseased trees, grants of right and concession and all illicit felling should be compiled along with the estimation of their standing volumes as per the same volume table used for the assessment of growing stock.	Dycf Bhandara, will be taken necessary action during the implementation of sanction Working Plan.

	This report shall be prepared annually working circle and compartment wise by the territorial Sub-DFO and shall be submitted to the CF, Working Plan for this purpose within 02 months of the end of control year. Such removal shall be accounted vis-à-vis prescribed felling yield of the relevant year.	
16.	To ensure sustainable management of Non Timber Forest Produce (NTFP), scientific assessment of estimated quantity has to be done before their removal as per the prescription of Working Plan. Proper mechanism has to be in place for the collection of NTFPs in sustainable manner	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
17	Status of rare, endangered and near extinct species shall be monitored closely and adequate measure will be taken for their protection and conservation.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
18.	Execution of working Plan shall be in conformity with the National Forest Policies, 1988	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
19.	No regularizations of existing encroachment should be done without following due procedure. And an Appendix may be added giving details of the encroachment of the forest area in the division. A definite plan has to be made to remove encroachment and vacated area shall be planted with suitable local species as per Government of India and Hon'ble Supreme Court Orders/Guidelines in the matter.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan. The details encroachment of forest area should be incorporate in Volume-II, Appendix No .LXVIII As well as Dycf Bhandara vide letter No/desk-8/S./cn-102-669 dt. 15/09/2021 has submitted the proposal of eviction of encroachment in Forest area.
20.	Eco-tourism shall/may be undertaken on sustainable basis. No permanent structures shall be allowed at such sites. Temporary structures made up of local forest produce may be allowed for public. Such sites will be declared as Plastic Free Zones. These eco-tourisms sites will be managed by the forest department as per the prescriptions of the working plan and after taking prior approval of Central Government under Section-2 of Forest (Conservation) Act, 1980	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
21.	Demarcation and consolidation of Forest Boundaries will be done adequately. Identification of Land Bank in the form of degraded forest areas in the Division to be explored for CA plantations.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
22.	Gregarious flowering of bamboo, if any, must be reported to ICFRE and other institutes as mandated and the situation be dealt with standard protocol.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
23.	Proper mechanism has to be put in place to control illegal felling, grazing and fire. Proper fire management plan shall be prepared and executed meticulously.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.

24.	Only 50% of normal yield, if silviculturally available, will be allowed for removal in case of Teak, Dhawada, Bhirra, Lendia, Chichawa, Mowai, Rohan, Shiwan, Shisham, Surya, Karai, Mokha, Palas, Dhaman, Bhilawa, etc. In case if Haldu, Ain, Bija, Tiwas, Kalam, Salai, Garadi, Khair it shall be 20% if silviculturally available.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
25	Efforts should be made to undertake artificial regeneration of local species along with 10-15% RET species in such a way that it serves the purpose of biodiversity conservation as well as meeting the demand of fuel wood, fodder and the timber. Planting of exotic species should be avoided.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
26.	Lac cultivation, if any, will be practiced as per the provisions of forest (Conservation) Act, 1980.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
27	Documents and appendices mandated in National Working Plan, 2014 Code will be incorporated in the Working Plan.	National Working Plan, Code 2014 the Documents and appendices has been incorporated in the Working Plan.
28.	Attempts shall be made to grow trees outside forest areas to meet the local demand of small timber, fuel wood and fodder as well as to achieve the 33% forest cover as envisaged in National Forest Policy, 1988.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
29.	Socio- economic survey is to be conducted within first year of implementations of plan and the same appended with Working Plan.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
30.	Cutback operation shall be undertaken as per standard norms and grassland will not be expanded at the expense of natural tree cover.	Dycf Bhandara, will take necessary action during the implement of sanction Working Plan.
31	While managing forests, provisions of the Biological Diversity Act, 2002 and wildlife Protection Act, 1972 shall be fully complied.	Dycf Bhandara, will take necessary action during the implementation of sanction Working Plan.
32.	Prescriptions on wildlife Management should be vetted by the CWLW and a certificate of the same be attached to the plan at the time of final printing.	Chief Wildlife Warden (PCCF Wildlife) was the member of Standing Consultative Committee. Hence the prescription on wildlife management have been vetted by CWLW
33.	Grazing to be properly regulated and grazing fee should be levied	Dycf Bhandara, would be taking necessary action during the implementation of sanction Working Plan.
34.	Annual Plan of Operations under Compensatory Afforestation Fund Act, 2016 and Compensatory Afforestation Fund Rules, 2018 shall be in conformity with Working plan prescriptions.	Dycf Bhandara, would be taking necessary action during the implementation of sanction Working Plan.
35.	All the Unclassed Forest, acquired CA areas and acquired Private Forests should be notified as RF/PF in	Dycf Bhandara, would be taking necessary action during the

	time-bound manner at the earliest.	implementation of sanction Working Plan.
36.	Midterm review of Working Plan shall be undertaken after five years so as to review the compliance of conditions as laid down in this approval. Modification/addition in some conditions may be made to meet the objectives, with the approval of Regional Office, Nagpur.	The necessary action would be taken in due course of time.
37	The Central Government reserves the right to review, modify, withdraw, this approval at any time if any of the conditions of approval are not implemented. Relevant modification in the working plan are required to be carried out so as to keep it in conformity with the orders, circulars and guidelines issued by the Central Government or the Apex Court under Forest (Conservation) Act 1980 or any other statute and National Forest Policy from time to time.	This condition is agreed to by the Division.

Compliance Report of Shortcomings communicated by Government Of India, Ministry Of Environment, Forests & Climate Change office letter No. F.No.12-31/1997 (FOR)/7238 dated 22/09/2020

Sr. No.	Condition	Compliance
1.	Compliance report to shortcomings communicated vide Regional Office, Nagpur letter dated 27.04.2020 has not been submitted along with the Working Plan.	Compliance report is being submitted herewith (Annexure-I)
2.	Compliance report w.r.t. suggestions/ recommendations made by Standing Consultative Committee is not submitted along with the Working Plan	Compliance report has been submitted to GOI vide letter no. Dycf/ W.P./ RS/10 dated 18.05.2020 A copy of the same is being attached herewith (Annexure -II)
3.	Information on section -11.4 (Past yield, revenue and expenditure) is not included in the Working Plan	Information on section 11.4 has been included at Sr.no. 09 in the compliance report submitted with respect to GOI letter dated 27.04.2020 (Annexure- I)
4.	Summary of prescriptions chapter is not included in the Working Plan.	Summary of prescriptions chapter has been included in the working plan as Chapter 18 (pg.451 to pg. 463)
5.	Year of Working plan in the covering page shall be changed from 2019-20 to 2028-29 to 2020-21 to 2029-30.	Compliance has been done on the covering page. The year of working plan has been changed to 2020-21 to 2029-30


 Aditi Bhardwaj, IFS
 Deputy Conservator of Forest
 Working Plan Nagpur

Annexure-II

The Compliance Report of Shortcomings of communicated by Regional Office vide Letter No.F No.1231/1997 (FOR)/6448 dated 27/04/2020

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Sr. No.	Condition	Compliance
1.	It is mentioned in the Working Plan that certain areas of Forest have been diverted under section 3 (2) of Forest Right Act, 2006 for individual and Communities. Proper justification for diversion of Forest area of around 1303.72 ha 2850 cases under individual right and 4325.82 ha in 110 cases under Community Right shall be submitted (Pg. 141, Part -I)	Dycf Bhandara vide this letter no. desk-8/s/cr-102/669 dated 15/09/2021 was inform that the Forest Right Act. 2006 Section – 3 The District level committee has been given the power to determine the individual and community Forest Rights, as per section-6(4) the district level committee is constituted under the chairmanship of district collector Bhandara. District level committee has finalized the individual and community Forest Rights, as per section 3(1) A total of 2850 individual rights over an area 1303.72 ha. and 110 community right over an area of 4325.82 ha. Have been finalized.
2.	A committee for identification of land banks for CA was constituted as per par 2.7 of Ministry's guideline. Accordingly, Working Plan Officer shall identify lands suitable to carry out Compensatory Afforestation and the same shall be incorporated as Section- 2.9 under Chapter- II, Part-I while writing Working Plan of the Division.	CA land has been finalized in Bhandara district. The same is incorporated in Volume –I Part –I Chapter No. 2 Section 2.9 (Table 2.7) Page No. 70
3.	Working Circle wise area in Old Working Plan and Current Working Plan is not mentioned in the working Plan. A table including the above information Working Circle wise shall be included in the Working Plan.	Working Circle wise area in old and Current Working Plan is included in Volume –I Part –I Chapter No. 2 Table No .2.3-page No. 64
4.	In chapter- 2.2, Part-I, it is mentioned that the area of earlier plan was 92779.051 ha. Out of which 4372.46 ha has been transferred to wildlife, so total area of the Division comes to 88406.589 ha. But at page 64, it is mentioned that area as per A to O form comes to 88701.73 ha. Exact area (Working Circle wise) to be covered under this plan should be mentioned.	Area statement as per Dr. F. S. Jafry's plan comes to 92,779.157 Ha after reconciliation during this plan period an area of 4,371.346 Ha was transferred to Wildlife wing. 69.10 Ha. Area was transferred to Gondia forest division, 4422.41Ha area was received from Gondia forest Division. And final reconciliation of 182.904Ha. Area was done. Therefore, as per A to O form the net forest area of Bhandara forest division is 92578.217 Ha. and this same area is being covered under various Working Circles as mentioned on pg 64 table no.2.3
5.	Information on Other Chapter i.e., list of Lichens, Algae Fungi etc. Available in the Division is not included in the Working Plan.	It is Compiled in Volume –I, Introduction, Page No. 46.

6.	Information on below mentioned Sections are not written as per contents mentioned in National Working Plan Code, 2014: a. Tree cover outside Forest area. Page no. 66 b. Status of Biodiversity conservation in forest. c. Growing Stock of wood. d. Growing Stock of Bamboo. e. Carbon sequestration and mitigation.	Necessary information has been compiled as per the available information and the same incorporated in Volume –I Part –I Chapter No. 2 Para no.2.7 page No.69, Chapter No.3 Para No.3.3 page No. 74, Chapter No. 6 Para No. 6.1, 6.2 and 6.6 Page no. 107,108 and 121 to 122 .
7.	Title of Sub-section i.e., Harvestable Girth in all Working Circles should have been Harvestable Diameters.	Necessary suggestion has been incorporated in all Working Circles. (Section 2.6.4 Page No. 250,254,256 &258. Section 3.6.4 Page No. 281; Section 4.6.4 Page No. 297; Section 5.6.4 – Page No. 308 Section 6.6.4 – Page No. 317) and whatever necessary.
8.	Title of Sub-section i.e., Method of executing the treatment in all Working Circles should have been Method of executing the felling.	Necessary suggestion has been incorporated in all Working Circles. (Section 2.6.10 Page No. 266; Section 3.6.10 – Page No. 284; Section 4.6.10 Page No. 297; Section 5.6.10 – Page No. 308; Section 6.6.10 – Page No. 317)
9.	Information of section- 11.3 (Special work of improvement undertaken) and Section-11.4 (Past yield, revenue and expenditure) is not included in the Working Plan.	It is compiled in Volume –I, Part –I Chapter no. 11 Para No. 11.3 and table No. 11.15, 11.16, 11.17 and Page No. 214 to 216.
10.	Information on Section- 4,6,13 (Associated regulation and measure) in Afforestation Working Circle is not Included in Working Plan.	It is compiled in Volume –I, Part –II, Chapter No.-4, Para No. 4.6.13 Page No. 302.
11.	General information w.r.t Miscellaneous regulation chapter containing below mentioned section is not incorporated in the Working Plan: a. Petty felling and extraction. b. Right and Concession.	It is compiled in Volume –I, Part –II, Chapter No. 17 Para No. 17.11.1 and 17.11.2 Page No. 450.
12.	General information w.r.t Science and Research chapter containing below mentioned section is not incorporated in the Working Plan: a. Preservation Plots. b. Sample Plots. c. Regeneration Plots. d. NTFP Plots. e. Other Research and experimental Plots.	It is compiled in Volume –I, Part –II, Chapter No. 20, Para No. 20.1, 20.2, 20.3, 20.4- and 20.5-Page No. 471 to 478.
13.	Title of chapter 18 should have been Tree outside forest (TOF) instead of tree cover outside forest area.	It is compiled in Volume –I, Part –II, Chapter No.19 Page No. 464.
14.	Information on Section- 11.3 (Special works of improvement undertaken) and Section – 11.4 (Past yield, revenue and expenditure) is not included in the Working Plan.	It is compiled in Volume –I, Part –I, Chapter No.11 Para No. 11.3 and table No. 11.15,11.16, 11.17 Page No. 214 to 216

15.	Title of Section – 7.6.1 should have been Analysis of the crop instead of Analysis of wildlife in the District.	Necessary suggestion has been complied to in Volume –I, Part –II, Chapter No.7 Para No. 7.6.1 Page No. 323
16.	Stock map of the division is not submitted along with the Working Plan.	Soft copy of stockmap of Bhandara Forest Division is being submitted vide letter no. DYCF/RS/ 79, Dated 18.05.2023 in pen drive
17.	Soft copy of KML/Shape files w.r.t boundary of the division is not submitted.	Soft copy of KML file w.r.t. boundary of the division is being submitted vide letter no. DYCF/RS 79, Dated 18.05.2023 in pen drive


 Aditi Bhardwaj, IFS
 Deputy Conservator of Forest
 Working Plan Nagpur

उपवनसंरक्षक, कार्य आयोजना,
नागपूर यांचे कार्यालय
दूर संचार विभाग लिमिटेड, १ ता मजला,
कास्तूरबाई साई जयरा, नागपूर-४४०००१
दुतावरी क्रमांक ०७१२-२५०२९६६



O/o THE DY. CONSERVATOR OF FOREST,
WORKING PLAN, NAGPUR
BSNL Building 1st floor, Nagpur-440001
Near Kasturchand Park,
Ph.No.0712-2560968
E-Mail :- cfwnggp@yahoo.co.in

Sub: Minutes of the Standing Consultative Committee
held on 27/04/2020 for approval of DWPRs/PWPRs
No. Desk ३४२/काजला/२२/ १० /2020-21
Dt. 18/05/2020

To,

The Member Secretary,
Standing Consultative Committee &
Chief Conservator of Forests (Working Plan - East)
Ravi Nagar, Nagpur

Ref: Member Secretary, Standing Consultative Committee & Chief
Conservator of Forests (Working Plan - East) Nagpur, No. Desk-
14/WP/SCC/Meeting/161/2019-20 Dt 04/04/2020.

The Standing Consultative Committee meeting was held at Command Control room, Van Bhavan, Nagpur on 27/04/2020 for approval of DWPR of Bhandara Forest Division. The following members of the committee have given various suggestions/modification to be incorporated in DWPR of Bhandara Forest Division.

After incorporating all the suggestions/modification the final DWPR of Bhandara Forest Division is re-submitted herewith for its approval.

Compliance of suggestions/ modifications suggested by the Standing Consultative Committee in the meeting held on 27th April 2020 for the DWPR of Bhandara Forest Division.

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No.	Suggestions/ modifications	Compliance
3.1	Shri. Gairola PCCF (HoFF)	
1	The harvestable girth seems to be on higher side for SCL. Curve of CAI/MAI intersection be verified to assertion its veracity	The stem analysis was carried out during the preparation of previous plan in the compartment No. 63 PF of Tiroda range and the results were applied for Bhandara division. 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. (Vol-I Part I, Chapter no. 6 para no. 6.1 Page no. 96)
2	The production per Ha should be compared with the previous plan in order to assess the changes over the period.	The timber production per Ha was compared with Nandakishore's plan (1996-97 to 2005-06) and Dr. Jafry's Plan (2009-10 to 2018-19). It was found that, for SCL WC, the production per Ha was 0.51(Nandakishore's plan) as compared to 0.71 (Dr. Jafry's Plan). It seems the production per Ha was on higher side in the previous plan. For IWC the production per Ha was 0.27(Nandakishore's plan) as compared to 0.18 (Dr. Jafry's Plan). It seems the production per Ha was on lower side in the previous plan. The difference is very minimal in range w.r.t change in production per Ha over the period.
3	The usage of word 'crops' in IWC shall be replaced with Forest plantations	It is compiled in Vol-I, Part-II, Chapter no. 3 Para no. 3.6 Page no.
4	In Fodder & Pasture Working Circle, the word 'malformed trees' should be deleted. Silvicultural pasture model should be adopted	It is compiled in Vol-I, Part-II, Chapter no. 6 Para no. 6.6.11 Page no.278
5	The approved Grass cultivation	It is compiled in Vol-I, Part-II,

No.	Suggestions/ modifications	Compliance
	models issued by PCCF(HoFF) office should be incorporated in B-type area	Chapter no. 6 Para no. 6.6.11 Page no.278
6	In Old Teak Plantation (Overlapping) Working circle, the prescription of mechanical thinning should be removed and should be replaced by silvicultural thinning. The first silvicultural thinning should be in between the 6 th and 11 th year.	It is compiled in Vol-I, Part-II, Chapter no. 9 Para no. 9.6.11 Page no.304
7	In Bamboo (Overlapping) Working Circle, 'Plus method' should be prescribed instead of 'horse shoe' method for treating congested and crooked bamboo clumps	It is compiled in Vol-I, Part-II, Chapter no. 8 Para no. 8.6.10.2.v. Page no.299
3.2	Shri. Nitin Kakodkar PCCF (WL)	
1	In Wildlife (Overlapping) Working Circle the concept of 'Protection camps' to tackle the Human animal conflicts in the division may be incorporated	It is compiled in Vol-I, Part-II, Chapter no.7 Para no.7.6.14.4.v. Page no.290
2	The list of medical equipments and kits for treating wild animals prescribed should be consulted and verified with the resource person in TTC, Seminary Hills, Nagpur	As per suggestions, the resource person was consulted and the kits are updated accordingly in Vol-I, Part-II, Chapter no. 7 Para no. 7.6.14.5(4) Page no.292.
3	The information regarding Eco-sensitive zones should be incorporated	It is compiled in Vol-I, Part-II, Chapter no. 7 Para no.7.6.15 Page no.294.
4	Spelling mistakes, if any, may be duly corrected	The spelling mistakes are checked and corrected.
3.3	Shri. Salprakash PCCF (BPD)	
1	In C & D type area of Fodder & Pasture Working Circle, apart from planting fodder trees, grass tussocks should also prescribed	It is compiled in Vol-I, Part-II, Chapter no. 6 Para no. 6.6.11 Page no.278
3.4	Shri. Tembhurnikar APCCF (Conservation)	

No.	Suggestions/ modifications	Compliance
1	The revised specifications regarding boundary pillars approved by PCCF (HoFF) office should be incorporated in the Plan	It is compiled in Vol-I, Part-II, Chapter no. 17 Para no. 17.1.6(7) Page no.354.
2	The length of the boundary pillars should be updated	It is compiled in Vol-I, Part-II, Chapter no. 17 Para no. 17.1.6(9) Page no.355
3	Form No.1 should be updated.	It is compiled in Vol-I, Part-II, Chapter no. 17 Para no. 17.9.01 page no.373.
4	The database of IFR and CFR should be updates as per the guidelines issued in 2019	It is compiled in Vol-I, Part-I, Chapter no. 8 Para no. 8.8.2 page no.122.
3.5	Shri Sanjeev Gaur APCCF (Nodal)	
1	The guidelines issued by FDCM in 1999 related to thinning operations should be referred and necessary prescriptions should be incorporated in Old Teak Plantation (Overlapping) Working Circle	It is compiled in Vol-I, Part-II, Chapter no. 9 Para no. 9.6.11 page no.304.

(Chandrasekaran Bala, N)
Deputy Conservator of Forest
Working Plan, Nagpur



भारत सरकार
GOVERNMENT OF INDIA
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
MINISTRY OF ENVIRONMENT, FORESTS
& CLIMATE CHANGE

Regional Office (WCZ)
Ground Floor, East Wing
New Secretariat Building
Civil Lines, Nagpur - 440001
E-mail: apccfocentral-ngp-mef@gov.in

F.No. 12-31/1997 (FOR)/1238

मुख्य वनसंरक्षक

Date: 22.09.2020

1/2

The Secretary (Forests),
Revenue and Forest Department,
Government of Maharashtra,
Mantralaya,
Mumbai-400032.

गर्व आयोगना

यांचे कार्यालय

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30/9/2020

कक्ष

Sub:- Approval of Working Plan of Bhandara Forest Division for the period 2020-21 (Proposed 2019-20) to 2029-30 (Proposed 2027-28)- regarding.

Sir,

I am directed to refer to the PCCF (P&M), Maharashtra office letter No. Desk-14/WP/C.No.163/(20-21)/566 dated 02.09.2020 on the above subject seeking prior approval of the Central Government under Forest (Conservation) Act, 1980 and to say that DWPR of Bhandara Forest Division has been examined in the Regional Office in light of relevant provisions of the Forest (Conservation) Act, 1980, Rules and Guidelines framed there under.

After careful examination of the DWPR of Bhandara Forest Division written by Shri Chandrasekaran Bala. N, IFS; the Central Government hereby accords approval to the said Working Plan for the period of 2020-21 to 2029-30 in accordance with the powers vested under Forest (Conservation) Act, 1980 and subject to the following conditions:

1. The currency of Working Plan shall be for a period of 10 years i.e. from the year 2020-21 to 2029-30. Period of last Working Plan was up to the year 2018-19, the present Working Plan is approved from the year 2020-21. Intervening period i.e. 2019-20 will be considered as per the prescription of last working plan and whatever work has been carried out may be got regularized and will be considered as part of last working plan, after taking approval of the competent authority wherever needed. In case there has been any work carried out in 2019-20, State Government has to submit proposal for regularization of same.
2. The orders of Hon'ble Supreme Court in the matter of Godavari Thirumulpad Vs Union of India in W.P. (Civil) No. 202/95 and related interlocutory applications shall be strictly adhered to. Any prescription or operation at variance with the Hon'ble Supreme Court's order shall be kept in abeyance till the order is in force or otherwise modified.
3. Further, in compliance with order to Hon'ble Supreme Court's Order dated 22.09.2000, the Government of Maharashtra shall ensure that regeneration of forests is commensurate with felling carried out under this Working Plan.
4. No felling shall be carried out without allocating necessary fund for implementation of regeneration operation so as to make regeneration commensurate with felling. In the events 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.

5. Following the directions issued by MoEF&CC vide letter dated 23.02.2018, Regional Offices of MoEF&CC under the chairmanship of Deputy Director-General of Forests (Central) of the Regional Office of this Ministry will be competent authority for deciding the extent of harvesting that could be permitted under approved Working Plans for ensuring regeneration to be commensurate with felling. Instructions/directions of the Central Government that may be issued in future in this regard shall be strictly complied with. Felling is to be done by State Government only after seeking permission from RBC, RO (WCZ), Nagpur.
6. Fruits bearing naturally grown trees shall not be clear felled for any purpose whatsoever.
7. Standard thinning and silvicultural operations under the strict supervision of Assistant Conservator of Forests and above will be allowed as per norms to improve the health of growing stock while executing the prescriptions of the Working Plan.
8. Prescriptions of micro plans for JFM (if made) should not deviate from the broad framework/guidelines of the Working Plan and shall be in accordance with various orders of Hon'ble Supreme Court.
9. Felling carried out on forest land after seeking approval of the Central Government under Forest (Conservation) Act, 1980 will not be treated as deviation. However, proposed felling in the forest division shall be restricted proportionately in the current/future years to compensate this removal.
10. No deviations shall be made from the prescriptions of Working Plan without prior approval of the Central Government under Forest (Conservation) Act, 1980. However, deviations of positive nature i.e. voluntary plantations carried out outside the working area under any project, schemes and compensatory afforestation may be approved by the competent authority of the State Government from time to time.
11. The exploitable girth of tree species and period of felling cycle shall not be lower than what was approved in previous working plan.
12. In the vicinity of Nallas and water bodies felling shall not be undertaken. Further felling shall not be undertaken near the known resting/nesting places of wild animals and birds.
13. No commercial felling shall be carried out along the 2 km strip of all perennial Rivers of State; further, no commercial felling shall be carried out along the strip of 300 meters of all seasonal Rivers; only eco-restoration work shall be carried out.
14. Removal of dead and diseased trees will be undertaken under the supervision of an officer not below the rank of Assistant Conservator of forests.
15. Volume details of all kinds of fellings viz. dead and diseased trees, grants of right and concession and all illicit felling should be compiled along with the estimation of their standing volumes as per the same volume table used for the assessment of growing stock. This report shall be prepared annually working circle and compartment wise by the territorial Sub- BFO and shall be submitted to the CF, Working Plan for this purpose within 02 months of the end of control year. Such removal shall be accounted vis-a-vis prescribed felling yield of the relevant year.
16. To ensure sustainable management of Non Timber Forest Produce (NTFP), scientific assessment of estimated quantity has to be done before their removal as per the prescription of Working Plan. Proper mechanism has to be in place for the collection of NTFPs in sustainable manner.

17. Status of rare, endangered and near extinct species shall be monitored closely and adequate measures will be taken for their protection and conservation.
18. Execution of Working Plan shall be in conformity with the National Forest Policies, 1988.
19. No regularization of existing encroachment should be done without following due procedure. And an appendix may be added giving details of the encroachment of the forest area in the division. A definite plan has to be made to remove encroachment and vacated area shall be planted with suitable local species as per Government of India and Hon'ble Supreme Court Orders/Guidelines in the matter.
20. Eco-tourism shall/may be undertaken on sustainable basis. No permanent structures shall be allowed at such sites. Temporary structures made up of local forest produce may be allowed for public. Such sites will be declared as Plastic Free Zones. These eco-tourism sites will be managed by the forest department as per the prescriptions of the working plan and after taking prior approval of Central Government under Section-2 of Forest (Conservation) Act, 1980.
21. Demarcation and consolidation of Forest Boundaries will be done adequately. Identification of Land Bank in the form of degraded forest areas in the Division to be explored for CA plantations.
22. Gregarious flowering of bamboo, if any, must be reported to ICFRE and other institutes as mandated and the situation be dealt with standard protocol.
23. Proper mechanism has to be put in place to control illegal felling, grazing and fire. Proper fire management plan shall be prepared and executed meticulously.
24. Only 50% of normal yield, if silviculturally available, will be allowed for removal in case of Teak, Dhawada, Bhitra, Lendia, Chichawa, Mowal, Rajun, Shiwan, Shisham, Surya, Karai, Motia, Palas, Daman, Bhatwa, etc. In case of Haldia, Ain, Raja, Tiwas, Kalam, Salai, Garadi, Khair it shall be 20% if silviculturally available.
25. Efforts should be made to undertake artificial regeneration of local species along with 10-15% MIF species in such a way that it serves the purpose of biodiversity conservation as well as meeting the demand of fuel wood, fodder and the timber. Planting of exotic species should be avoided.
26. Lac cultivation, if any, will be practiced as per the provisions of Forest (Conservation) Act, 1980.
27. Documents and appendices mandated in National Working Plan, 2014 Code will be incorporated in the Working Plan.
28. Attempts shall be made to grow trees outside forest areas to meet the local demand of small timber, fuel wood and fodder as well as to achieve the 33% forest cover as envisaged in National Forest Policy, 1988.
29. Socio-economic survey is to be conducted within first year of implementation of plan and the same be appended with the Working Plan.
30. Cutover operation shall be undertaken as per standard norms and grassland will not be expanded at the expense of natural tree cover.
31. While managing forests, provisions of the Biological Diversity Act, 2002 and Wildlife Protection Act, 1972 shall be fully complied.
32. Prescriptions on Wildlife Management should be vetted by the CWLW and a certificate of the same be attached to the plan at the time of final printing.
33. Grazing to be properly regulated and grazing fee should be levied.

34. Annual Plan of Operations under Compensatory Afforestation Fund Act, 2016 and Compensatory Afforestation Fund Rules, 2018 shall be in conformity with Working Plan prescriptions.

35. All the Unclassed Forest, acquired CA areas and acquired Private Forests should be notified as RF/PF in time-bound manner at the earliest.

36. Midterm review of Working Plan shall be undertaken after five years so as to review the compliance of conditions as laid down in this approval. Modification/addition in some conditions may be made to meet the objectives, with the approval of Regional Office, Nagpur.

37. The Central Government reserves the right to review, modify, withdraw, this approval at any time if any of the conditions of approval are not implemented. Relevant modifications in the working plan are required to be carried out so as to keep it in conformity with the orders, circulars and guidelines issued by the Central Government or the Apex Court under Forest (Conservation) Act, 1980 or any other statute and National Forest Policy from time to time.

NOTE: The above mentioned approval is subject to attending shortcomings as communicated by Regional Office, Nagpur vide letter No. 13.31/1997 (AIFP) dated 27.04.2020 and also inclusion of following information and submission of final Working Plan within 6 months:

1. Compliance report to shortcomings communicated vide this office letter dated 27.04.2020 has not been submitted along with the Working Plan.
2. Compliance report w.r.t suggestions/ recommendations made by Standing Consultative Committee is not submitted along with the Working Plan.
3. Information on Section- 11.4 (Past yield, revenue and expenditure) is not included in the Working Plan.
4. Summary of prescriptions chapter is not included in the Working Plan.
5. Year of Working Plan in the covering page shall be changed from 2019-20 to 2028-29 to 2020-21 to 2029-2030.

This issues with the approval of AIGF (Central), Regional Office (WCZ), MoEF & CC, Nagpur.

Yours faithfully,

(C.B. Tashildar)
AIGF (Central)

Copy to:

1. The Additional Director General of Forests (FC) Ministry of Environment, Forest & Climate Change, Indira Paryavaran Bhawan, Jor Bagh, New Delhi-110003.
2. The Principal Chief Conservator of Forests (HoFF) Govt. of Maharashtra, Van Bhawan, Ramghat Road, Civil Lines, Nagpur-440001.
3. Guard File.

(C.B. Tashildar)
AIGF (Central)