



Government of Maharashtra

The Working Plan of Wardha Forest Division (Nagpur Circle)

VOLUME – I

**Period
2017-18 to 2026-27**



**By
P. Kalyan Kumar, IFS
&
W. I. Yatbon, IFS**

**Office of the Conservator of Forests (Working Plan)
Zero Mile, Civil Lines, Nagpur**





Government of Maharashtra

**The
Working Plan
of
Wardha Forest Division
(Nagpur Circle)**

Volume – I

Period

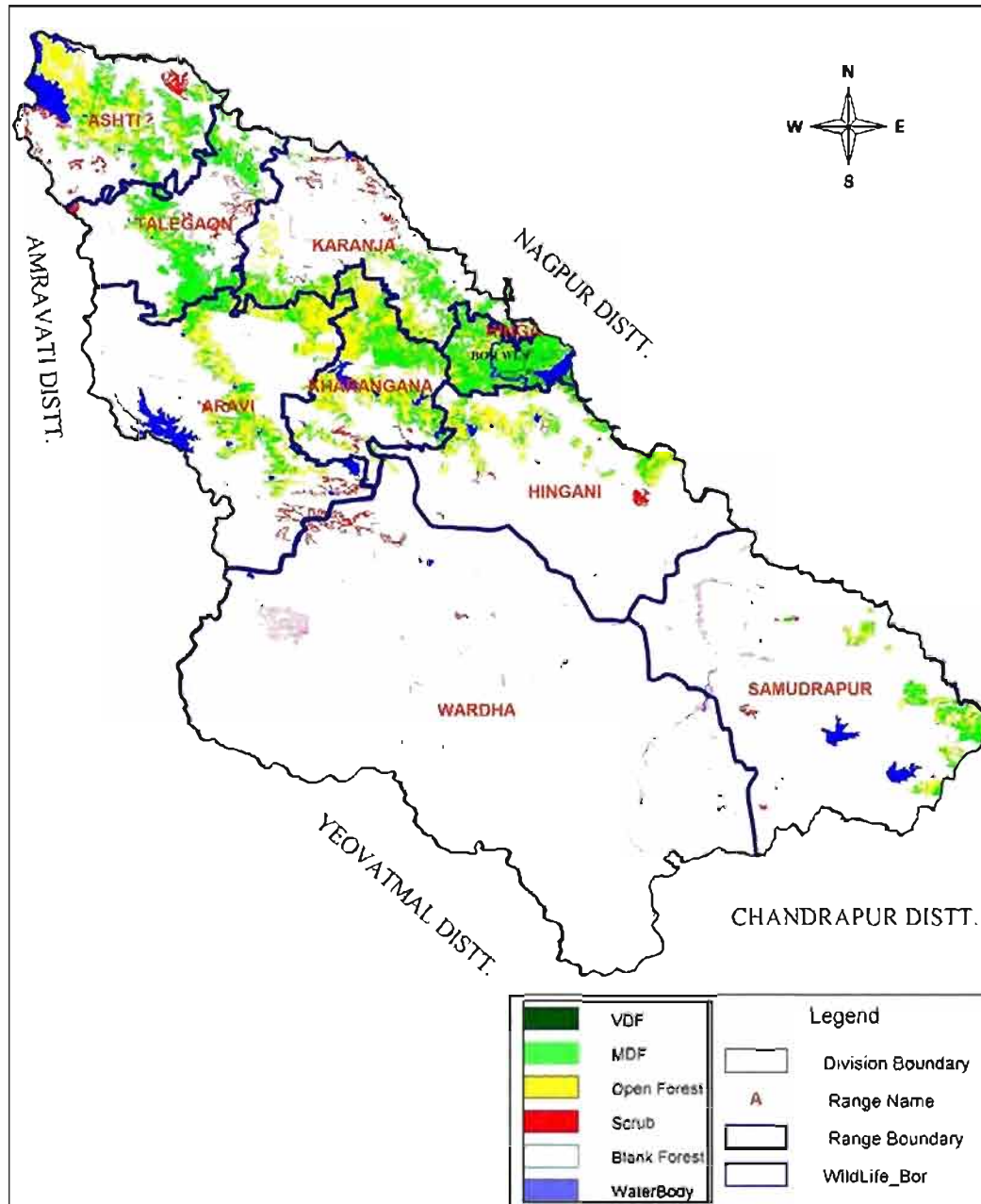
2017-18 to 2026-27

By

**P. Kalyan Kumar, IFS
&
W. I. Yatbon, IFS**

&

VEGETATION MAP OF WARDHA FOREST DIVISION





भारतसरकार
GOVERNMENT OF INDIA
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
MINISTRY OF ENVIRONMENT, FORESTS
& CLIMATE CHANGE E-mail: moefregionalofficenagpur@gmail.com

Regional Office (WCZ)
Ground Floor, East Wing
New Secretariat Building
Civil Lines, Nagpur - 440001

F.No. 12-8/2002 (FOR)/ 1697

Date: 02 May, 2017

To,

The Secretary,
Revenue and Forest Department,
Government of Maharashtra,
Mantralaya,
Mumbai-400032

मुख्य वनसंरक्षक
कार्य आयोजना निदेशक
आवक क्र. 346
दिनांक 02.05.2017
दस्तावेज

Sub:- Approval of Working Plan of Wardha Forest Division for the period 2017-18 to 2026-27- regarding.

Sir,

I am directed to refer to the PCCF (P&M), Maharashtra office letter No. Desk-14/WP/Wardha/571/2016-17 dated 20.08.2016 on the above subject seeking prior approval of the Central Government under Forest (Conservation) Act, 1980 and the PCCF (P&M), Maharashtra vide letter no Desk-14/Beed-1345/2017-18 dated 14.03.2017 forwarding additional information as sought by the Regional Office, vide its letter of even number dated 25.01.2017 and to say that DWPR of Wardha 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.

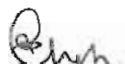
After careful examination of the DWPR of Wardha Forest Division written by P. Kalyan Kumar, IFS and W. I. Yatbon, IFS; the Central Government hereby accords approval to the said Working Plan for the period of 2017-18 to 2026-27 in accordance with the powers vested under Forest (Conservation) Act, 1980 and subject to the following conditions:

1. The currency of the Working Plan shall be for a period of 10 years i.e. from 2017-18 to 2026-27. Necessary corrections may be made in the final copy of the Plan.
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.
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.

[Signature]

21/5/17
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5. Following the directions of the Hon'ble Supreme Court in their order dated 22.09.2000, a Core group has been constituted under the Chairmanship of the Director General of Forests and Special Secretary for deciding the extent of harvesting that could be permitted under approved Working Plans for ensuring regeneration to be commensurate with felling. Instruction/ directions of the Central Government that may be issued in future in this regard shall be strictly complied with. Felling to be done by State Government only after seeking permission from Core Group constituted by the MoEF, New Delhi.
6. Period of last Working Plan was upto 2012-13. Present Working Plan is approved from 2016-17. Intervening period 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.
7. No forests bearing naturally grown trees shall be clear felled for any purpose whatsoever.
8. 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.
9. 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.
10. 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.
11. No deviations shall be made from the prescriptions of Working Plan read with the conditions stipulated herein without prior approval of the Central Government under Forest (Conservation) Act, 1980. However, deviations of positive nature i.e. out of turn plantation carried out outside the worked area under any project, schemes and compensatory afforestation may be approved by the competent authority of the State Government to time.
12. Midterm review of Working Plan shall be undertaken after five years so as to make any changes, if needed to meet the objectives, with the approval of Regional Office, Nagpur.
13. The exploitable girth of tree species and period of felling cycle shall not be lower than the approved in previous working plan.
14. In the vicinity of Nalas and water bodies felling shall not be undertaken.
15. Felling shall not be undertaken near the known resting/nesting places of wild animals.
16. Removal of dead and diseased trees will be undertaken under the supervision of an officer not below the rank of Assistant Conservator of forests.
17. All kind of felling including that of dead and diseased trees and for granting of right and concession as well as all illicit felling should be compiled along with the estimation of their stand volumes as per the same volume table use for the assessment of growing stock. This report shall be prepared annually working circle and compartment wise by the territorial Sub-DFO and shall be submitted to the C.F, Working Plan for this purpose within 02 months of the end of control year. Such removal shall be accounted for against the prescribed felling yield of the relevant year.



18. 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.
 19. Status of rare, endangered and near extinct species shall be monitored closely and adequate measures will be taken for their protection and conservation.
 20. Execution of Working Plan shall be in conformity with the National Forest Policies.
 21. A definite plan has to be made to remove encroachment and plant the vacated area by planting suitable local species as per Government of India and Hon'ble Supreme Court Orders/Guidelines in the matter.
 22. 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 Plastic free zones and these eco-tourisms sites will be managed by the forest department as per the prescriptions of the working plan and without violating FC Act.
 23. Demarcation and consolidation of Forest Boundaries will be done adequately.
 24. Gregarious flowering of bamboo, if any, must be reported to ICFRE and other institutes as mandated and the situation be dealt with standard protocol.
 25. Exotic species should not be planted in Plan areas.
 26. Proper mechanism has to be put in place to control illegal felling, grazing & fire. Proper fire plan shall be prepared and executed meticulously.
 27. Only 50% of normal yield, if silviculturally available, will be allowed for removal in case of Teak, Dhawada, Bhirra, Chichawa, Salai, Mowal, Rohan, Shiwan, Shisham, Surya, Karai, Mokha, Palas, Dhaman, Bhilawa, etc. In case of Haldu, Ain, Bija, Tiwas, Kalam, Lendia, Garadi, Khair it will be 33% if silviculturally available.
 28. Efforts should be made to undertake artificial regeneration of local species in such a way that it both serve the purpose of biodiversity conservation of meeting the demand of fuel wood, fodder and the timber.
 29. Babul Ban will not be expanded at the cost of local species.
 30. Lac cultivation, if any, will be practiced as per the provisions of Forest (Conservation) Act, 1980.
 31. Documents and appendices mandated in National Working Plan Code will be incorporated in the working plan.
 32. Attempts shall be made to grow trees outside forest areas to meet the local demand of small timber, fuel wood & fodder.
 33. Proper mechanism is to be place in an adequate manner that such case NTFPs are collected in sustainable manner.
 34. Socio-economic survey is to be conducted within first year of implementation of plan and the same be appended with the Working Plan.
 35. Grassland will not be expanded at the expense of natural tree cover.
 36. While managing forests provisions of the Biodiversity Act, 2002 shall be fully complied.
 37. Cutback operation shall be undertaken as per standard norms.
-

38. 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.
39. 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.
40. Grazing to be properly regulated and grazing fee should be levied.
41. All the Unclassed Forest, Acquired CA areas and Acquired Private Forests should be notified as RF/PF in time-bound manner and be carried out at the earliest.
42. 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.

Yours faithfully,


(Charan Jeet Singh)
Scientist - C

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, Ramgiri Road, Civil Lines, Nagpur-440001.
3. Guard File

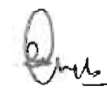

(Charan Jeet Singh)
Scientist - C

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FOREWORD

Anurag Chaudhary I.F.S.
APCCF (Working Plan-East), Nagpur

Wardha forests have been under scientific management since the Dobbs' Working Plan of 1895 – 1912. In order to ensure the continuity of management, the present Working Plan of Wardha Forest Division is being revised by Shri P. Kalyan Kumar and Shri W.I. Yatbon. The Wardha Forest Division Working Plan has been prepared with the application of the present technology available and the inclusion of the latest concepts of management. The forest area has been divided into 5(five) area-specific and 3 Overlapping Working Circles. The area specific working circles are-

- Selection cum Improvement Working Circle,
- Improvement Working Circle
- Afforestation Working Circle,
- Protection Working Circle
- Grass and Fodder Resource Management

As the Working Plan is as per the New Code of 2014, apart from the conventional write-up, much importance has been given to water and soil conservation, forest health and vitality and conservation & documentation of biodiversity, among others. Different new Chapters have been added so as to ensure a holistic management of forests as per the need of the hour. It is a good effort that has been specifically done in order to comply with all the different aspects of forest management as laid out in the Code.

I congratulate Shri P. Kalyan Kumar, IFS and Shri W.I. Yatbon who have contributed whole heartedly in writing this Working Plan and the highly motivated team for accomplishing this assignment in the shortest possible time.

Anurag Chaudhary I.F.S.
APCCF (Working Plan-East), Nagpur



PREFACE

W.I. Yatbon, IFS
Conservator of Forests (Working Plan),
Nagpur

This Working Plan of Wardha Forest Division replaces the Working Plan of Shri. S.D. Sontakke, IFS and Shri. Jarnail Singh, IFS for the period 2006-07 to 2015-16. The PWPR-I was prepared by Shri. S.G. Tembhurnikar, the then C.C.F Nagpur Circle and was approved by the State level Committee on 24/9/2014. On the basis of the recommendations made by the SLC, the Draft Working Plan has been prepared and submitted by Shri P. Kalyan Kumar, then CF Working Plan, Nagpur.

The State Consultative Committee has given its approval subject to many improvements in its meeting held on 16.03.2016. 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, Trees Outside Forests and other chapters were added to the 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. 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 Wardha 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 Wardha 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 Shri. A.S.K. Sinha, IFS, PCCF (P & M) while preparing this plan. I am also thankful to Shri. M. Karunakaran, IFS and Shri. Anurag Chaudhary both APCCF (Working Plan-East), Nagpur for their valuable guidance from time to time. My thanks are also due to Shri. Tembhurnikar, IFS and Shri T.S.K. Reddy, IFS both CCF (T) Nagpur for the cooperation extended to W.P. staff from time to time.

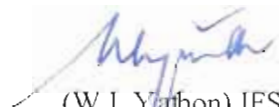
My words of appreciation to my team of Officers, Surveyors and support staff who relentlessly worked and extended their wholehearted support for timely completion of this Plan. I am thankful to Shri. V.B.Patil, ACF, Shri. V.H. Malghane, RFO, Shri. Sandeep Kshirsagar, RFO, Shri. M.B. Thote, Ranger Surveyor, Shri. Gopichand Nanore, Surveyor, Shri. H.R. Nasre, Surveyor, Shri. Nitin.W. Rewatkar, 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. M.C. Ganatra, IFS and Shri P.W. Pagar, IFS, DCFs, Wardha Forest Division for providing information required for preparation of this Plan and Shri. A.R. Waghmare, Ex-ACF, Wardha Forest Division for liaising with this Office. I am also thankful to the field units of Wardha 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 Shri. R.V. Deotale, Shri. Y.M. Rewatkar, Ku. V.D. Shende and Ku. A.P. Uikey, all 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.P.P.Shrikhande, Head Cleark, Smt.V.S.Chavre, Acct., Smt. M.R.Humane, Clerk, Shri.J.S.Itankar,Clerk, Shri.D.U.Khobragade, Peon, Shri. V.Uikey, Peon, Smt. Jambale, Peon, Shri. A.S.Mokhare, Driver.


(W.I. Yabon) IFS
Conservator of Forests (Working Plan),
Nagpur

Dated, 6th July, 2016

WORKING PLAN OF WARDHA FOREST DIVISION

EXECUTIVE SUMMARY

1. THE TRACT DEALT WITH

Introduction: Wardha district lies in the valley of river Wardha and the district derives its name from this river. According to General Cunningham, it is "Wardha" or "Wadtha", the river of banyan trees, as the entire valley was lying beautifully with rows of banyan (Wad) trees. The district is predominantly agricultural except for a few Textile and Oil mills. There are many places of historical importance out of which few are mentioned below:

- i) **Sewagram:** It is an important village 6 km from Wardha. Its original name was Shegaon. Many decisions of national importance were taken here and deliberations were held during the struggle for national independence when it was visited almost by all leading leaders of freedom struggle
- ii) **Pavnar:** It is 10 km from Wardha. It is situated on the bank of Dham river. There is a Gandhi Kuti and Param Dham Ashram of Vinoba Bhawe, Sarvodaya leader who had launched the Bhudan Movement.
- iii) **Vipassana Centre at Bor Dharan:** Vipassana centre was established by Trilokkya Buddha Mahasangha, 30 km from Wardha where meditation and Buddha's preaching is taught.
- iv) **Girad:** There is a Tomb of Saint Sufi Shekh Farid and it has religious significance. Situated at a distance of 60 km from Wardha.
- v) **Kelzar:** There is a Varad Vinayak (Lord Ganesh) temple at Kelzar which is also known as one of the Ashtavinayak Ganesh temple from Vidarbha region. This place has religious importance.

The total forest area in-charge of Wardha forest division extends over 926.92 Sq. Km. The total forest area included in this working plan is 926.92 Sq. Km, out of which 440.46 Sq. Km is Reserved Forest, 317.28 Sq. Km. Protected Forest, 153.40 Sq. Km. Zudpi Jungle, 2.4912 Sq. Km. Acquired private Forest and 13.27 Sq. Km. Non forest land taken over for Compensatory Afforestation.

Wardha Forest Division is situated between 20° 18' to 21°21' North latitude and between 78° 30' to 79° 15' East longitude. The boundary of the Wardha Division is conterminous with the boundary of the Wardha district. The forest areas of Wardha Division occur in compact blocks and some scattered patches. The forest type belongs to the Sub group Southern Tropical Dry Deciduous Forest. The boundaries of the tract dealt with are as shown in following table.

Sr. No.	Direction	Name of Forest Division / District
1	North and North-East	Nagpur Division/Nagpur District
2	East and South-East	Chandrapur Division/Chandrapur district
3	South and South-West	Yavatmal Division/Yavatmal district
4	West	Amravati Division/Amravati district

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

Area of forests under different legal classes (RF, PF, UF and other):The total forest area as per Form No. 1 is 1026.08 Sq. Km. Out of this, 99.16 Sq.Km is handed over to Wildlife wing. Hence, net area incharge of Wardha forest division is 926.92 Sq. Km. This Working Plan covers management prescriptions for 926.92 Sq. Km. The area details is summarized in the Table given below

Sr.No.	Ranges	RF (in ha)	PF (in ha)	Zudpi Jungle (in ha)	Pvt. aquired Forest (in ha)	Non Forest land (in ha)	Total Area (in ha)
1	Wardha	0	82.04	5971.84	0	0	6053.88
2	Samudrapur	4550.89	1182.52	2962.04	84.91	0	7780.36
3	Hingni	3124.34	4626.48	1560.39	37.01	40.89	9383.17
4	Kharangna	7935.34	6622.20	254.79	0	136.78	14949.11
5	Arvi	8999.17	4301.56	988.63	53.21	377.58	14720.15
6	Ashli	5146.73	7581.36	828.70	0	772.64	14329.43
7	Talegoan	6565.76	3738.00	994.94	64.16	0	11362.86
8	Karanja	7723.88	3594.09	1779.35	15.77	0	13113.09
	Total	44046.11	31728.25	15340.68	249.12	1327.89	92692.05

Administrative units: For administrative convenience the ranges, rounds and beats were reorganised in year 2006 and the entire division has been divided into 8 Ranges, 39 Rounds and 187 Beats.

Land use, land use change and forestry (LULUCF): The total geographical area of the District is 6309.00 sq. km. of which 1090.99sq. km. is forest. 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:

SFR Year	Geographical area in sq.km.	Very dense area	Mod.de nse area	Open forest	Total	% of G.A.	Scrub
2005	6309	12	415	428	855	13.55	57
2009	6309	10	419	430	859	13.62	62
2015	6309	10	419	430	859	13.62	62

There is a decrease in the Very Dense forests in the District but overall there is an increase of the forest area by 4 sq.kms.

The threats to the forests from land use and land use change and forestry (LULUCF) is real and affects large areas as pressure on land for habitation, agriculture, industries, developmental works and other activities mount up as the population increases and the accompanying wants expand.

The Plantation/ Tree Outside Forests (TOF) for State of Maharashtra according to the State of Forest Report 2015 is 1,232.17 sq kms adding 2.38% to the forest cover of the State. However no specific figure for the District is available.

3. MAINTENANCE, CONSERVATION AND ENHANCEMENT OF BIODIVERSITY

Status of Biodiversity Conservation in forests: The forests of Wardha are rich in Biodiversity and areas close to the Bor Wildlife Sanctuary are particularly noteworthy. However, in view of the presence of large areas under teak, the repeated fires over the years, preferential treatment to commercial species; the enhancement of biodiversity in the forests as a whole needs to be addressed. The plant diversity and faunal richness of the area needs to be maintained and enhanced with sincere effort of the Department, the help of the public, the initiative for formation of Biodiversity Committees, reducing the threats to the wildlife etc.

Among the important Schedule I species found in the area of the Division are Tiger, Panther, Leopard cat, Indian White Backed Vulture and Peafowl.

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.

(1) Fodder resource plot has been taken up in Compartment no.165 Near Chandani village of Kharangana Range.

(2) As per information received from DFO Silvicultural Scientist, Nagpur, Preservation plots situated in Wardha Forest Division is as under:

Division	Range	Comptt. No.	Year	Area in ha.	Name of Plot
Wardha	Kharangana	216	2001-02	10.00	Kharangana

(3) There is no identified Medicinal Plant Conservation Area in the Division of Wardha.

(4) Preservation plots where valuable species are found, where local bioclimate has brought about different crop composition and any area of biological or silvicultural significance should be identified for creation of Preservation Plots in Wardha.

4. MAINTENANCE OF FOREST HEALTH AND VITALITY

Status of Regeneration: Data on regeneration status is collected along with enumeration of the crop in four 3x3 sub-plots in the enumeration plots. The seedlings are enumerated in the following three categories as given in the Table below. The data is analysed and used to devise prescriptions for regeneration of forest areas by both the natural and artificial means. The focus is on tending of existing natural regeneration (NR) and rootstock. Plantation is proposed only as a supplementary activity limited to the extent to fill the deficiency in NR, on the degraded and blank areas.

The health and vitality of the forests depends on the availability of the regeneration as it ensures the capacity of the forests to rejuvenate in the event of any calamity. This is one of the best indicator of the health of the forests. Though the total number of seedlings across the ranges appears to be uniform, the absence of saplings in the higher size R3 is a matter of concern as it appears that the seedlings are not able to establish properly. The regeneration of the forests in the Division is overall not very encouraging except for Hingni and Arvi Ranges. Incidences of fire, grazing and other human interferences are the root cause of the poor regeneration.

Seedlings and saplings per ha.in overall area

Range	R1	R2	R3	Total
Arvi	101.47	26.23	1.14	128.85
Ashti	19.70	18.95	1.79	40.44
Hingni	33.04	27.83	0.84	61.74
Karanja	27.97	23.05	3.39	54.41
Kharangana	37.23	41.08	3.54	81.85
Samudrapur	38.93	11.79	0.36	51.07
Talegaon	31.51	44.15	4.53	80.19
Average	41.85	28.63	2.40	72.88

The data presents us with a grim picture. There are many reasons that may be attributed to this calamity.

- a. One of the prime reasons for the lack of regeneration is fire. The menace of fire has been recognized by everyone, but the impact is yet to be fully analysed and understood. The seriousness with which the Department is taking on fire requires a rethink.

- b. The soil condition in the forest of Wardha has been dealt with under the chapter Soil and Moisture Conservation. It is clearly seen that the soil depth in the forest of the Division is less than 10cm in most of the areas. In fact most of the areas are exposed with rocks. Under these conditions, tender seedlings exposed to the rigours of heat and drought and fire are most unlikely to succeed to survive.
- c. The overabundance of teak is to be blamed for the many of the ills of the forests health. There is little biodiversity, ground cover is scarce, the ground is made very vulnerable to heat and fire in the dry seasons.
- d. Grazing is another menace that has adversely affected the regeneration in the area, which needs to be addressed earnestly.

5. CONSERVATION AND MAINTANANCE OF SOIL AND WATER RESOURCES

Area treated under Soil and Water Conservation measures soil erosion: The effective rainfall and run-off during the south-west monsoon has important implications for the forests in the district. The effective rainfall for the south-west monsoon is computed to be around 533mm and its distribution is 110, 162, 175, and 85 mm, respectively, for the months of June, July, August, and September. On integrating the effective rainfall of the district with the water-holding capacity of the soils of the district, which is around 100–150 mm per metre depth, the run-off water is estimated to be 355 mm or 3,550 cubic metre of rain water per hectare per annum. The run off takes away the fertile top soil, leading to severe soil erosion in the district.

6. MAINTENANCE AND ENHANCEMENT OF FOREST RESOURCE PRODUCTIVITY

Growing Stock of Wood: Mostly site quality IV is found in Wardha Division. Very few patches of site quality III are found. As Karanja Range is adjoining to Kondhali Range (Nagpur Division), Hingni Range to Hingna Range (Nagpur Division), Wardha Range to South Umrer Range (Nagpur Division), therefore, the stem analysis of teak, trees (2 in number) in quality III / IV areas, in the RF of South Umred Range is done and its results applied for Wardha division and reproduced in the table 6.1 CAI and MAI curve intersect at 117 years corresponding to a GBH (OB) 125 cms.

Growth statistics of teak (Site Quality III / IV)

Age in Years	Ht. in mts.	DBH(OB) in cm.	GBH (OB) in cm.	Volume in cum.	CAI cum.	MAI cum.
10	3.70	3.40	10.70	0.0049	0.00049	0.00049
20	7.10	10.20	32.03	0.0250	0.0020	0.0012

30	10.70	14.80	46.47	0.0650	0.0040	0.0022
40	13.20	18.60	58.40	0.1350	0.0070	0.0034
50	14.90	22.40	70.34	0.2400	0.0105	0.0048
60	16.60	25.20	79.13	0.3600	0.0120	0.0060
70	18.20	29.10	91.34	0.5000	0.0140	0.0071
80	19.70	31.90	100.17	0.6450	0.0145	0.0081
90	20.30	34.20	107.39	0.7860	0.0141	0.0087
100	20.80	36.40	114.30	0.9050	0.0119	0.00905
110	21.20	38.50	120.49	0.9900	0.0085	0.0090
120	21.40	40.25	126.38	1.0700	0.0080	0.0089

The periodic CAI and MAI curves intersect at 117 years. The girth(OB) corresponding to this exploitable age is 125 cm. The exploitable girth is, hence, fixed as 120cm.

Growing stock of bamboo: Bamboo is almost absent in Wardha Forest Division

Carbon Stock (Carbon Sequestration): Forests play an important role in combating climate change. In addition, it has the potential to provide ecosystem services, such as carbon storage. Carbon sequestered in the forests of Wardha has been derived by extrapolating from the Growing Stock calculated from the Enumeration data. The Working circle wise estimation of Carbon Stock is given below.

Working Circle Wise Carbon Stock

Sr. No	Working Circle	Total Area in Ha.	Avg. Growing Stock per ha (m ³ /ha.)	Total Growing Stock (m ³)	Total Carbon Stock (Metric tone)
1	SCI	32852.96	44.68442	1468015.508	440404.65
2	IWC	19239.01	31.27167	601635.971	180490.791
3	Afforestation	21929.61	63.8296	1399758.234	419927.4703
4	Protection	12320.57	26.7739	329869.7091	98960.912
5	G&FRM	6349.9	5.7969	36803.37382	11041.01
6	Misc.	0	0	0	0
Total		92692.05		3836082.796	1150824.833

Soil Carbon Analysis: Quantum of soil carbon is a good indicator of nutrient status of soil. During the enumeration exercise, SOFR unit collected soil samples (50) and they were analysed for Soil Carbon. The range of soil carbon varied from 0.4% to 4.4%.

Carbon Sequestration and Mitigation: This plan proposed to put a minimum 4000 ha. under Afforestation WC and during the period of implementation of

the Plan. It is expected that during the plan period an area of 12400 ha. would 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.

7. OPTIMISATION OF FORESTS RESOURCE UTILISATION

The forests of Wardha are known to be having predominance of teak consisting of mostly medium sized trees. The table below shows the removal of timber and fuelwood from the forests of Wardha over the Plan period.

Working Circle wise Estimated, Obtained Yield (Coupe No. I to IX)

Sr. No.	Work ing Circle	Total area of the coupe	Area Felled in Ha.	Estimated Yield				Actual Yield			
				TMR (Cum.)	Poles (Cum.)	FW Beat	Total (Cum.)	TMR (Cum.)	Poles (Cum.)	FW Beat	Total (Cum.)
1	SCI	16102.35	9950.456	15219.510	3670.400	13818.00	32707.910	12591.459	3963.950	18760.00	35315.409
2	IWC	9757.258	4861.966	3835.519	774.650	3860.00	8470.169	2361.447	991.425	4538.00	7890.872
3	AFF & RSM	3984.542	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.00	0.00
4	P&CAM	5723.308	1084.98	1.470	0.24	0.89	2.590	1.06	0.64	1.22	2.915
5	G&FRM	10379.83	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.00	0.00
Total		45947.29	15897.4	19056.5	4445.29	17678.89	41180.669	14953.966	4956.015	23299.220	43209.196

Note: 1) Fuel Beat = 1.0 cum. 2) Pole = 0.025 cum.

The extraction of other NTFP and MAPs is also done though the quantity is not very significant. The extraction of tendu is an important activity in the Division yielding employment to rural poor and revenue to the Department to the tune of Rs. 6.39 crore during the last 10 years.

8. MAINTENANCE AND ENHANCEMENT OF SOCIAL ECONOMIC CULTURAL AND SPIRITUAL BENEFITS

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 are 185 and all these villages are covered under JFM and JFM Committees are in place. 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.

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.

Use of indigenous knowledge: The Department has made its effort in documenting the indigenous technical knowledge of the people in the District. The Wardha Division had organized an important workshop regarding Medicinal Plants & their uses. The detail of the workshop and the proceedings could not be incorporated in this Working Plan due to lack of space. However an abstract brought out below shows that the number of villages that participated were 33 in all and there were 36 local medicinal practitioners or Vaidhyas that have taken part in the workshop apart from all the staff of the Division. The number of participants Range wise details are in given below.

Range	Total Village	Total *Vaidhya	No. of Medicinal Plants used	Total Diseases Treated	Total Forest staff participated
Talegaon	6	7	14	17	6
Hingni	1	1	5	7	1
Ashti	7	8	33	33	6
Arvi	8	8	29	29	8
Karanja	3	4	27	25	3
Kharangana	2	2	27	29	2
Samudrapur	6	6	25	23	6
Total	33	36	-	-	32

* Local medical practitioner

It may be seen that different vaidhyas use a variable number of plants and they have been cooperative enough to share with the Forest Department their names of the plants, the parts used and the disease that are used for.

Apart from the medicinal practitioners, the presence of other indigenous knowledge cannot be ruled out. It is a charge of the forest officers to tap all kinds of Indigenous Technical Knowledge (ITK) from the locals.

particularly those associated with forest and environment, and to document them for posterity.

Extent of cultural/sacred groves: There are no sacred groves in the District. Two important sites of cultural significance in the forest areas of Wardha are Girad Dargah, in Samudrapur Range and Dhaga Shiv Mandir in Kharangana Range are located in forest areas. The flow of tourists and devotees to these areas are seasonal and days-specific.

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 15 locations spread in six 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.

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

Status of Implementation of FRA 2006 in Wardha Forest Division: The status of implementation of this Act (up to July, 2015) is summarized in the table below. The cases accepted by the District level Committee is 223 of individual cases involving 109.323 Ha. and 09 claims involving 5.644 ha.

Status of Implementation of FRA 2006

Type of Claim	No. of cases received by Gram Sabha	No. of cases rejected by Gram Sabha	No. of cases rejected by SDLC	No. of cases rejected by DLC	No. of cases finally accepted by DLC	No. of cases pending for decision at DLC
Individual	591	103	252	13	223	0
Community	39	0	13	10	9	7
Total	630	103	265	23	232	7

Under Section 3(2), in 12 cases, a total of 7.644 ha land has been diverted for specified purposes.

9. ADEQUACY OF POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

The management of the forest is done accordingly to the existing policy Acts rules and regulation of the Govt. of India and the State. During the Plan period a total number of cases registered are: Fire 640, Grazing 168, Illicit cutting 8714 (involving 14029 no of trees)& other offences 578.

The manpower in place for the implementation of the Plan and the enforcement of Acts and rules are through the Sanctioned posts which are 527

in total. In Wardha Forest Division out of 527 posts, 498 are filled up and 29 post are vacant. Among the Range Forest Officer 8 post are sanctioned and 8 already filled, Forester 51 post sanctioned & 46 filled and 5 post are vacant, Forest Guard 223 post sanctioned & 208 filled and 15 post are vacant.

10. FIVE YEAR PLAN

Development under twelfth five year Plan: The year 2015-16 was the fourth year of the XII the Five-Year Plan. An investment of Rs.1380.391 lakhs was made on various developmental programmes implemented under forestry and related sectors.

It is observed that there is a more than double increase in Plan expenditure in the Division, which is a very encouraging sign. With the implementation of the Working Plan in right earnest, the goals of the 12th plan can be achievable.

11. PAST SYSTEM OF MANAGEMENT:

The forests of Wardha have been scientifically managed since the first Working Plan in 1895 onwards as follows:

Dobbes Working Plan	:	1895-1912
Dunbar Brander's working Plan	:	1913-1934
P. Sagreiya's Working Plan	:	1935-1946
R. Mishtra's Working Plan	:	1947-1964
J. G. Thosre's Working Plan	:	1965-1991
Dr. Nandkishore's Working Plan	:	1992-2002
S.D. Sontakke & Jarnail Singh's WP	:	2006-07 to 2015-16

The various Plans have earlier prescribed various types of working from Conversion WC to Improvement WC but the oft-repeated Silvicultural System has been the Teak Coppice with Reserve and Teak Coppice with Standards Silviculture System.

Recent Working Plan of Jarnail Singh and S.D.Sontakke (7th Plan) (Period 2006-07 to 2015-16)

In this Plan, the following independent Working Circles were prescribed:

1. Selection Cum Improvement
2. Improvement Working Circle
3. Afforestation and Root Stock Management
4. Protection & Catchment Area Management
5. Grass and Fodder Resource Management

Working Circle wise Prescription as per Earlier Working Plan:

1. Selection Cum Improvement Working Circle: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. Old Plantation and Forest area containing 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 fire and grazing control. The area poor in natural regeneration will be artificial regenerated by siwan, sisu, siras, kinhi, semal, khair, and other local suitable species

2. Improvement Working Circle:The good quality dense forest having young to middle aged crop are aimed at to mature as future productive selection forest. The species whose population in the 'stand' dynamics is less than 1% shall be retained till they reach the rotation age. The improvement felling supplemented by tending of naturally generated crops & root stock. The working circle aims at improvement of the crop and therefore harvesting is not visualised in the area.

3. Afforestation Working Circle:The area will be regenerated with both the Teak, Miscellaneous trees species and bamboos. No harvesting is required in this Working Circle. Tending of existing root stock viz. the sapling, copies shoots and poles, supplemented by plantation have been proposed as the main activities.

4. Protection & Catchment Area Management Working Circle:Silvicultural system is proposed on the patterns of watershed management viz, ridge to valley. Soil and moisture conservation works along with the afforestation to prevent further soil erosion, siltation of reservoirs and to enhance the vegetation cover and ground water table. No harvesting is proposed in areas directly damming in to the water bodies. No plantation is prescribed in 'D' type area. Singling and spacing out will be carried out among sapling of teak & other valuable spacing.

5. Grass & Fodder Resources Management Working Circle: The method of treatment to improve grass shall be two pronged i.e. (a) Rotational grazing in pasture area and (b) Augmenting natural grasses in the grass lands through closure to grazing.

12. STATISTIC OF GROWTH AND YIELD

The main species in Wardha Forest Division is Teak. As per FSI Report of 1997 on the Forest of Wardha 57.74% of the Forests in the District

is of Teak. It may be mentioned that the division already has a local volume table which is given below:

**Local Volume Table for Teak, Ain, Bija, Dhaora and Garari
(IVa quality areas)**

Girth class (in cms)	Mid-girth in cms.	Volume per tree in cubic meters		
		Teak	Ain, bija, dhaora, and tendu	Garari
16-30	23	0.0166	0.0185	0.0134
31-45	38	0.0340	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	0.1950
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 cms	158	1.1036	1.2140	0.8829

FUTURE MANAGEMENT

1. BASIS OF PROPOSALS

This Working Plan is prepared for the scientific management of the Forests and Wildlife of Wardha forest division. The primary management objective is to treat forests as per the requirement of site so as to optimise Growing Stock. Wildlife management is also given due importance as prime forest areas are adjoining to Bor Tiger Reserve. The existing policy framework of State and Central Government, various legislations governing Forest and Wildlife, Orders of Hon'ble Supreme Court of India and High Courts, Government Resolutions/Circulars/Notifications of the State Government etc have formed the basis of prescriptions of this Working Plan and are outlined below:

- a) National Forest Policy, 1988.
- b) National Wildlife Action Plan (2002-2016).
- c) National Forestry Action Plan
- d) Hon'ble Supreme Court's Orders in Writ Petition 202 of 1995 (GodavarmanThirumalpadVs. Union of India).
- e) JFM circulars of State and Central Government.
- f) The Biological Diversity Act, 2002.
- g) The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006.
- h) Other legislations governing forest and wildlife.

Distribution of Area to Various Working Circles: The allocation of forest area to various working circles is as below:

Sr. No.	Name of Working Circle	Area allocated (Ha.)
1	Selection-Cum-Improvement Working Circle	32852.96
2	Improvement Working Circle	19239.01
3	Afforestation Working Circle	21929.61
4	Protection Working Circle	12320.57
5	Grass and Fodder Management Working Circle	6349.90
6	Wildlife (Overlapping) Working Circle	Entire area
7	NTFP (Overlapping) Working Circle	Entire area
8	JFM (Overlapping) Working Circle	Entire area
	Total	92692.05

2. SELECTION-CUM-IMPROVEMENT WORKING CIRCLE

General constitution of the working circle: The areas capable of producing large timber are allotted to this working circle. It predominantly includes areas which support straight bole and sound trees of both seedling and coppice origin. It includes **32852.96** ha. of total area.

Special Objectives of Management: The special objects of management of the forest areas under this Working Circle are as follows:

- i. Primarily to obtain sustained supply of medium to large-sized timber.
- ii. To maintain mixed forest composition and High Forest character of the forest crop and improve density of stocking by tending existing natural regeneration.
- iii. To conserve the local bio-diversity.

Area allocation: Based on the results of the enumeration data and satellite imageries and existing stock map details, the following criteria were used for allocation of compartments to the sci areas:

- Compartments suitable for producing marketable timber.
- Compartments having dense Teak forest of IVA site quality having patches of quality III and IVB mixed in the crop.
- Areas which are dense and supporting good Growing Stock.

General character of the vegetation: The forests are mixed in nature and contain trees of all age classes. The crop predominantly consists of Teak crop and its associates. Proportion of Teak is about 60 percent. The major mixed species are Saja, Bija, Kalam, Haldu, Tiwas, Dhaoda, Garadi, Mowai, Rohan, Bhirra, Garadi, Lendia, Palas, Salai etc. In the fruit bearing species, Tendu, Moha, Char. Aonla, Bel, Harra and Beheda are the main species.. The crop is

predominantly young to middle aged with occasional mature trees. The density of the crop is 0.4 to 0.8. The dominant site quality is IVA .

Silvicultural System :

- i. Selection-Cum-Improvement System prescribes removal of mature trees above the harvestable girth to create openings in the tree canopy, thereby, facilitates tree growth in the lower girth classes. It supports establishment of natural regeneration of Teak and other valuable light demander species. This system has advantages over, the clear felling and coppice systems, in its ability to address the issues related to the biodiversity conservation and maintenance of site conditions and Mixed and High Forest nature of the forest crops.
- ii. 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.
- iii. The natural regeneration will be given suitable treatments to regenerate the area.
- iv. The areas poor in natural regeneration will be artificially regenerated by suitable species as per requirement of site. Plantations will not be taken up in SCI areas unless a minimum 5 hectares of clear open patch suitable for afforestation is available.

Most of the forest areas under this working circle have been worked under coppice with reserve silvicultural system in the past. Due to this, coppice vigor has decreased and defects in wood such as hollowness are seen.

Harvestable diameters: Harvestable girth for various important species, in SCI working circle, has been determined at maximum volume production as per the CAI & MAI curves in stem analysis exercises, carried out in the past. (For the convenience of the working staf and the ease of execution, the girth and not the diameter is taken as the mease for harvestable size trees in this Plan).

Harvestable Girth for Various Species in the Division

Group	Species	Harvestable Girth
Group 1	Teak	120 cm. for quality III 105 cm. for quality IV
Group 2	Ain, Bija, Haldu, Kalam	120 cm.
Group 3	Dhaora, Tiwas, Surya, Karam, Rohan, Bhirra, Kasai, Mokha, Palas, Dhaman, Bhilawa, Chichwa, etc.	90 cm.
Group 4	Garadi, Lendia	45 cm

Group 5	Species protected from felling (Semal, Kulu, Behada, Karai, Shisam, Haldu etc. and all fruit trees)	No felling (less than 1%)

In the past, substantial areas of S.C.I. Working Circle have been worked under Coppice with Reserve Silvicultural system. Hence, the proportion of coppice teak is significant. Timber obtained from coppice origin attains hollowness at an early age and therefore, the market value of Teak timber gets reduced.

Felling Cycle: Felling cycle has been fixed at 20 years.

Yield Calculation: Yield is calculated by Smythies' Safe-guarding formula and is regulated by area. Average area of Coupe is 105 ha. The expected average yield per hectare is 4.02 cu.m. This may vary from coupe to coupe due to differences in growth conditions, distribution of selection girth trees and their silvicultural availability.

Demarcation, Preparation of Treatment Maps and Marking Techniques:

Coupe Demarcation: The coupe demarcation, preparation of treatment maps and marking will be carried out as per the prescriptions mentioned in the chapter on Miscellaneous Regulations.

The main annual coupes shall be demarcated one year in advance. 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.

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.

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, as per requirement of site.
- ii) **Stake Planting:** In the areas around water bodies and along watercourses (A2-type), stakes of *Ficus* spp., Pangara, Salai or other suitable species will be planted at six-meter interval, and tussocks of *Khas grass* will be planted on suitable sites, as per Misc. Regulations.

Harvesting Prohibited: Harvesting of standing trees (dead or alive) is strictly prohibited in the A-type areas.

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. From the regeneration data it is seen that such B1 areas may be hard to find, but the possibility of finding such areas cannot be ruled out.

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:

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.

Progress of Natural Regeneration should be monitored by the division from time to time and data should be collected for further analysis.

Singling of Coppice Shoots: 1 to 2 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.

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.

However, from the data collected during the sampling in the Division which reveals that the regeneration in the forests of Wardha is extremely poor, areas that can be considered as B1 areas may be very little. If such areas exist, Aided Natural Regeneration as prescribed for post-harvest operations in D areas may also be carried out to augment the natural regeneration as per local conditions.

B. Artificial Regeneration in B2-Type Areas: Plantations will not be taken up in SCI areas unless a minimum of 5 hectares of clear open patch fit for plantation is available in an annual coupe. The choice of species will be decided as per the site. Teak and valuable mixed local spp. should be given preference in the plantation. Stump planting of Teak should be taken only in well drained areas with clear open patches.

C. Soil and Moisture Conservation Works: Required soil and moisture conservation works will be carried out as mentioned in the miscellaneous regulations.

Treatments Recommended for C Type area:

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.

Treatments Recommended in D Type Areas:

- a. Main felling is concentrated in the areas having density 0.4 or over and showing adequate regeneration
Artificial Regeneration is not prescribed in this area.

The Following Operations are Recommended:

Enumeration in Annual Coupes: Species and girth-class of all trees above harvestable girth class and approach class are prescribed to be recorded in 15 cm. girth class for enumeration.

Harvesting: The extent of Harvesting in different Groups is as under:

Group I species: For Teak, 2 out of 5 trees above Selection Girth (120 cm) are to be harvested if they are Silviculturally available.

Group II species: For Ain, Bija, Haldu and Kalam, the exploitable girth for these species in Site quality IV is 120 cm. To safe-guard future yield, the number of Selection Girth trees to be marked (if silviculturally available) are 1 out of 2 i.e. 50% of Selection trees are to be marked if silviculturally available.

Group III: For Chichwa, Bhirra, Rohan, Dhaoda, Salai, Mowai and other timber yielding species, the exploitable girth in Site quality IV is 90 cm. To safe-guard future yield, the number of Selection Girth trees to be marked (if silviculturally available) is 1 out of 2.

Group IV: The exploitable girth for these species in Site quality IV is 45 cm. To safe-guard future yield, the number of Selection Girth trees to be marked (if silviculturally available) is 1 out of 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 (area specific) shall be observed strictly for marking in different types of areas.

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

B-Type Areas (Under Stocked Areas):

1. All dead and diseased trees, retaining 2 dead trees/ha., as snags and dens shall be marked.
2. All live high stumps shall be marked.
3. All multiple coppice shoots; retaining 1 or 2 promising shoots, shall be marked.

4. All NTFP trees, fruit bearing trees and trees useful for wild life are to be reserved.

C-Type Areas (Congested group of young poles):

1. The congested pole crop shall be marked for thinning to maintain a spacing equal to $1/3^{\text{rd}}$ of the crop height and/or to bring down stem number as per the yield table.
2. All high stumps, dead and diseased poles shall be marked for harvesting.
3. Unwanted undergrowth interfering or likely to interfere, the seed based NR of Teak and other valuable species, shall be removed.
4. All NTFP trees, fruit bearing trees and trees useful for wild life are to be reserved.

D-Type Areas (Well-stocked Areas):

1. All Teak (group I), Ain, Bija, Haldu & Kalam (group II) and the group III & IV (listed species), trees above the harvestable girth and approach class are prescribed to be enumerated in 15 cm girth-classes, before marking.
2. Marking of trees above Selection Girth for different Groups of Species (Group I to IV) has been discussed above. Felling marking is prescribed to proceed from highest girth-class to lower girth-classes. No tree shall be marked for felling unless it is 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 wildlife, shall be reserved against felling.
4. All dead trees, retaining 2 dead trees per hectare, shall be marked for felling.
5. All live high stumps and all but 1 or 2 vigorously growing coppice pole per stool shall be marked for felling.
6. The marking of trees whose population is less than one percent is prohibited. However in the case of Group 2 trees, marking should not be done where the number of these trees individually and collectively is less than 5% of the total stand.

Subsidiary Silvicultural Operations Cleaning and Thinning:

- **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 1 or 2 per stool. All newly risen coppice shoots shall be removed to encourage establishment of seedling regeneration.

- **Natural Regeneration:** One of the main purposes of felling carried out in SCI areas is for opening up the canopy for Natural Regeneration. Operation like identification of Natural Regeneration and keeping proper spacing, soil working, soil working around the seedlings, etc. should NECESSARILY be carried out in D-areas after felling along with CBO.

Cleaning - Cleaning in the 6th 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, should be carried out in the entire coupe. Coppicing of damaged and malformed saplings and singling of coppice shoots shall be carried out. Established seedling regeneration of Teak and other miscellaneous species shall be spaced out suitably.

Regeneration: Natural Regeneration, including rootstock management, is prescribed to be given preference over Artificial Regeneration. 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.

Artificial Regeneration shall be taken only in the B-type areas, (except natural blanks) having inadequate NR in a patch of a minimum of 5 ha area. It shall be ensured that no seedling is planted within 3 meters distance from an established seedling or existing trees. The standing trees have influence zone of spreading shadow and pits should not be dug either in the shadow or in the influence zone of the standing trees. Influence zone for various sizes of trees is given below:

Sr. No	Girth class (cm)	Influence zone (meter)
1	<30	2
2	30-60	3
3	60-90	4
4	90-120	5
5	>120	6

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 suitable local species as per requirement of site. In any

case in areas where Teak is more than 50%, teak planting should be avoided if possible.

Soil and Moisture Conservation: The soil and moisture conservation works will be taken up along with marking operation and completed before on set of monsoon. The soil and moisture conservation works are to be based on the requirement of site.

Choice of Species: Since Teak is the most valuable species and comes above all the mixed timber species; it will be given 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. 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 people.

Associated regulations and measures

Other regulations: Protection from Fire and Grazing is essential for the success of Natural and Artificial regeneration. All annual coupes shall remain closed to Grazing; and shall be provided strict fire protection, at least till completion of the 6th year coupe cleaning works.

3. THE IMPROVEMENT WORKING CIRCLE

General Constitution of The Working Circle: This working circle is expected to serve as transition to SCI. Forest areas capable of producing medium to large-sized timber but not considered fit for harvesting due to preponderance of young to middle aged crop has been included in this working circle. This working circle covers 19239.01 ha. area.

Special Objects of Management:

- The special object of management for this working circle is to improve the existing crops by tending operations. Improvement measures aim at nursing back these forests to normalcy.
- To check soil erosion and conserve soil moisture, essential for creating conditions conducive for rejuvenation and growth of NR and rootstock.

- The hygienic tending and thinning operations are expected to provide small timber, poles and firewood to meet bona fide needs of the local people.

General Characteristics of Vegetation: The crop consists Teak as the predominant species. The prominent associates of *Teak* are; *Bhirra, Saja, Dhaora, Lendia, Mowai, Salai, Tendu, Rohan, Char, Karam, Khair, etc.* Proportion of teak is high (more than 50%).

The site quality ranges from IVa to IVb. The density of forests varies from 0.4 to 0.6. The crop is young to middle aged with occasional mature trees. Stems in lower girth classes are proportionately higher in number.

Silvicultural System : The good quality dense forests having young to middle aged crop are aimed to progress towards maturity as future productive selection forests. If hygienic operation of improvement felling is carried out and adequate growing space is provided to trees of valuable species such as Teak, *Chichwa, Dhaman, Haldu, Kasai, Kullu, Mokha, Semal, Shisam, Shivan, Tiwas, Behda*. The species whose population in the 'stand' dynamics is less than 1% shall be retained till they reach the rotation age. The improvement felling supplemented by tending of naturally generated crop and rootstock will aid in transition of middle aged stems to maturity.

Treatment Cycle: Treatment Cycle is fixed at 20 years.

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

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:

A-Type Areas: Protection Areas

1. Soil and moisture conservation works/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 stems 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) **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.

II) Singling of coppice shoots to retain one or two promising shoots is prescribed.

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 $1/3^{\text{rd}}$ 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, *Kullu, Semal and Salai* shall be reserved.
2. All dead and malformed trees, retaining 2 trees per hectare and all live high stumps shall be marked for felling.
3. Mature trees that have developed hollowness and show visual sign of decay will be marked for felling if, silviculturally, available.
4. All, but one or two, vigorously, growing coppice pole per stool shall be marked for felling.
5. However, in this working circle no commercial felling except for improvement felling shall be carried out.

Subsidiary Silvicultural operations Cleaning and Thinning

- **Natural Regeneration:** The main purpose of improvement felling carried out in Improvement Working Circle (D areas) is to improve the crop. Operation like identification of Natural Regeneration and keeping proper spacing, soil working, soil working around the seedlings, etc should, wherever possible, be carried out in D-areas after improvement felling.

It is prescribed that Aided Natural Regeneration by planting nursery-raised well established seedlings of miscellaneous species and associates of Teak should be carried out in the areas felled as part of the post-harvest operations. The total no of Naturally occurring seedlings and the planted numbers should be 625.

Cleaning - Cleaning in the 6th 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, should be carried out in the entire coupe. Coppicing of damaged and malformed saplings and singling of coppice shoots shall be carried out. Established seedling regeneration of Teak and other miscellaneous species shall be spaced out suitably.

Thinning: Thinning is proposed to be carried out in patches of dense pole crop by maintaining average spacing of $1/3^{\text{rd}}$ of the crop height as prescribed in C-Type areas. The post-thinning crop should have basal area and number as close to the relevant stand table or yield table for that site quality as possible.

Poles of vigorously growing non-teak trees should be preferred for retention, particularly those of Group 2 species and Group 3 species.

Regeneration:

Choice of Species: The choice of species for retention in order of importance will be Bija, Saja, Shisham, Tiwas, *Teak*, karam, Bhirra, Dhaora, Lendia, Salai, Mowai, *etc.*

Methods of Regeneration:

Natural Regeneration: Natural regeneration shall be given preference over the plantations. The existing NR and rootstock shall be tended. Plantations shall be taken as a supplementary activity to NR in the under stocked areas.

Tending operations for natural regeneration for rootstock management in the B1-type shall be taken up along with the coupe operations. While from the regeneration data such B1 areas may be hard to find, but the possibility of finding such areas cannot be ruled out.

- 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 be cut close enough to the ground.
- ii) **Coppice management of damaged and malformed saplings:** Damaged and malformed stems as prescribed in the relevant chapter should be managed.
- iii) **Tending of natural regeneration:** All seedlings and saplings of valuable species *more than one meter in height will be nursed as future crop*. Spacing operations, if required, will be carried out to leave atleast 250 saplings per hectare. Wherever possible, the Aided Natural

Regeneration by planting seedlings may be carried out. 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.
- c) **Third year operations:** Singling of coppice shoots, management of damaged and malformed saplings, climber cutting and shrub clearance shall be done.

Artificial Regeneration : Plantations in the B2-type: Areas with clear open patches and fit for plantation will be taken up for artificial regeneration.

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.

4. AFFORESTATION WORKING CIRCLE

General constitution of the working circle: The open forest areas having density less than 0.4 with sparse vegetation and inadequate natural regeneration and shrubby growth have been included in this Working Circle.

Afforestation Working Circle (AFF) forms about 13% of the entire forest area of the division. It includes 21929.61 ha. of the forest area comprising the Reserved Forests to the extent of 1142.99 ha and Protected Forests to the extent of 4102.29ha., Acquired Pvt. Forest 15.77 ha., Non Forest land taken over for C.A. 1327.89 ha. and Zudpi Jungle 15340.68 ha.

The following criteria have been applied for allocation of compartments to the AFF Working Circle:

- Compartments having large proportion of area under forest blanks.
- Compartments having poor quality open forests, which need to be afforested.

The allotment of these compartments has been done on the basis of the Forest Cover map of the latest Forest Survey of India reports and on the basis of the ground-survey/verifications. This is a very important Working Circle in

which the forest areas that is in the possession of the Forest Department will be reclaimed to enhance the forest cover in the Division and the District. It assumes greater significance in view of the addition of the Jhudpi Jungle into this Working Circle in which the capacity of the Division will be tested in its efficiency to deal with the newly added area rife with problems of demarcation, possible encroachments etc.

Special objects of Management:

The special objectives of management of this Working Circle are as follows:

- 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.

General Character of Vegetation: This working circle generally comprises of degraded open forest areas interspersed with forest blanks or brushwood. The blank areas have dominance of Khair, Palas and Bhirra.

The allotted areas in general are under stocked and open with crop density usually less than 0.4, though patches of better stocked areas are also met with in some compartments. The most of the PF areas allotted to this WC, especially, those near the villages are highly degraded and lays bare without any significant tree crop.

Silvicultural System: The area will be regenerated with suitable tree species depending on the site conditions. Tending of existing rootstock viz. the saplings, coppice shoots and poles, supplemented by plantations have been proposed as the main activities in this working circle. Yield removal is not prescribed except for removal of wind fallen, dead trees.

In view of vicinity of these areas to habitations, fuel wood and fodder availability will be expanded through plantation of fuel wood and fodder species and by involving JFM committees. The areas of this working

circle are, primarily, in bad shape. Inadequate sub-soil moisture, highly compact soil structure and heavy biotic pressure are the main limiting factors for the establishment of seedling in this area. Top soil has been washed away and as a result vast areas do not have even adequate soil-depth to support tree crop. As a consequence, a large chunk of these areas lay bare without any significant vegetation. Hence, intensive soil and moisture conservation measures and tending of existing rootstock should go hand in hand with the efforts of artificial regeneration.

Treatment cycle: It is fixed as Ten years. The entire area of this working circle will be covered in a period of Ten years.

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

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. (Note: In the case of Zudpi Jungle, the boundary demarcation will precede the coupe demarcation for the coupes falling on the first year.)

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 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.

Extent of plantation: Requirement of site would be the prime consideration for deciding the extent of plantation. However, in each coupe, not more than 50 ha be taken up for plantation. While taking plantations under special schemes such as NREGA, FDA, DPDC etc the areas under due coupes should be invariably considered.

Marking Rules and Prescriptions

Marking technique and prescriptions described in the Chapter of the Miscellaneous Regulations shall be followed, with modifications, proposed in the following paragraphs.

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 shall be observed strictly for marking the trees in different areas;

A-Type Areas: Protection Areas:

1. No tree shall be marked for felling.

B- Type Areas: Under stocked Areas:

1. No standing tree shall be marked for felling except dead trees retaining at least 2 trees/ha as snags.
2. All live high stumps shall be marked.
3. In case of Coppice regeneration, 1 or 2 most promising shoot will be retained and rest marked for removal.
4. Areas which do not contain sufficient natural regeneration or rootstock will be artificially regenerated by suitable local species if the site is suitable for afforestation works. In case, the areas selected contain old unsuccessful plantations, such areas shall be treated only after examining the factors responsible for failure and upon taking prior approval from the CCF (T).

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. Poles of seedling origin shall be preferred for retention over the poles of coppice origin.
2. Dead poles shall be marked for thinning.
3. Multiple poles shall be thinned to regain one promising pole per stump/stool.

D - Type Areas: Well-stocked Areas:

1. All dead trees shall be marked for felling except two trees per hectare which shall be retained as snags.
2. All live high stumps shall be cut back to the ground level.
3. All but one or two promising coppice pole per stool shall be marked for felling.

Regeneration:

Choice of species: Order of priority among desirable species for retention is prescribed as: Tiwas, Saja, Bija, Karam, Haldu, Shisham, Dhaora, Khair, Siwan, Rohan, Salai, Mowai, Dhaman, Lendia, Semal, Kulu, Bhirra, etc.

Valuable local species suitable for the site and favoured by the local village communities and JFMCs will be preferred in plantations. Shisham, Khair, Siwan, Sisoo, Siris, Chichwa, Karanj, Ain, Bija, Dhaora, Aonla,

Chinch, Neem, Maharukh, semal, Sitaphal, bamboo etc. should be considered among the recommended species. In poorly drained areas and swampy area Arjun, Babul, Jamun and Ain shall be preferred. Seedlings of edible fruit-yielding forest species may constitute up to 20 percent and seedlings of medicinal plants up to 5 percent each. The extent of plantation should not be exceed 50 ha.. An officer not below the rank of Assistant Conservator of Forests should approve the site selection.

Mixed species plantations will include fairly good proportion of fodder and firewood yielding species, like, Anjan, Neem, Sissoo, Ficus, babul, Gular, Pakar, Maharukh, Kinhi, Siwan, Karanj, Siras, Sitaphal, etc.

Method of Regeneration: A-type areas of high slope should not be planted. In areas of gentle slope and nalla banks, stake planting may be resorted to.

In B1 areas tending of Natural Regeneration and existing rootstock is prescribed to be given preference over plantations. The areas having promising NR and rootstock patches shall be identified and marked on the treatment map. Cultural operations for natural regeneration in the D-type areas and rootstock management in the B1-type areas are prescribed. In view of the poor regeneration status across the Division, areas with promising natural regeneration may not be available, but wherever exists, the prescriptions is that NR should be supported with Aided Natural Regeneration.

Plantations shall be taken in the B2-type areas (but not in natural blanks wherein geology, soil and water regime does not support tree growth) which have good soil depth and are well drained. Choice of species is carefully selected as per site suitability. Improved nursery practices including Root trainers shall be adopted to raise quality seedlings.

It shall be ensured that no seedling is planted within 3 meters distance from an established seedling or existing trees. The standing trees have influence zone of spreading shadow and pits should not be dug either in the shadow or in the influence zone of the standing trees.

No plantation shall be taken up in the C and D areas. In D areas with good natural regeneration NR should be supported with Aided Natural Regeneration. The details are given in Miscellaneous Regulations.

Soil and moisture conservation works in the areas put under this working circle will be done as prescribed in the relevant paras under Miscellaneous Regulations and in accordance with specific guidelines issued from time to time in this regard. Given the prevailing drought conditions and the need to conserve water and soil, this Plan has prescribed 2000 Cum of SMC per year

which will primarily be carried out in the plantation area but also covering any area of the entire Coupe as per site conditions.

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 the seedlings reach a minimum height of 10 feet.

- **Institutional frame work for executing afforestation work**

1. Agency of Implementation: For the success of afforestation works, role of local communities is extremely important. Therefore, afforestation works under this working circle are to be entrusted to JFMCs as per area allotted to JFMCs and forest department should provide technical guidance. Already, Govt. of Maharashtra has identified JFMCs as implementing agency for NREGA works.

2. NREGA Scheme can be effectively used for raising tall seedlings. This would bring in suitable convergence between the Non-plan budget resources and funds from special scheme like NREGA.

3. For protection of such plantations, JFMCs should be asked to select protection labour from among their members as per guidelines of G.R. of July 2012. This model would enable intensive protection and management of small patches.

4. 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.

5. In light of the success of the Bihar Model of roadside plantation under MNREGA implemented in Social Forestry Department, the DCF Wardha should experiment this model under block plantations for small areas. Priority should be given for good sites preferably in Zudpi Jungle in and around cities and towns. Such sites should be chosen at least one in each Range every year.

Whenever possible, teak should be avoided for AR as there is an overabundance of teak in the forest. The teak seedling should not be more than 20%.

5.PROTECTION WORKING CIRCLE

General Constitution of Working Circle:The catchment areas of the major, medium and minor irrigation projects of Wardha Division are included in this

working circle. This Working Circle includes over to 12320.57 ha. of forest areas.

Protection and soil conservation treatment in these forests is necessary for site protection, preserving the steep and precipitous slopes and reducing silt load to the major dams or water bodies in the division.

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

- The compartments having more than half of its areas on the steep slope or in the stream buffer.
- The compartments which are close to and in the catchments of the major dams and water bodies in the Wardha district.

Special Objects of Management

1. To check the soil erosion and to arrest the run off by implementing soil and water conservation measures in the forest catchments would help to increase longevity of these water bodies.
2. The special object of management of P&CAM 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.
3. To preserve and increase the vegetal cover and to help in enhancing water regime of the forest tracts.

General Characteristics of Vegetation: The forests composition varies from pure teak to the mixed crop having high proportion of Teak. The common associates of teak are Ain, Dhaora, Tiwas, Lendia, Tendu, Moha, Bhirra, Mowai, Salai, Rohan, Shisham, Aonla, Achar, Kulu, Semal and Khair. Majority of the area supports stunted tree crop. Teak, Bhirra, Palas and Khair are found in larger proportions.

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. The density of crop generally varies from 0.2 to 0.7, having well stocked patches as well as under stocked and open areas.

Silvicultural System: Silvicultural system is proposed on the pattern of watershed management viz. ridge to valley treatment approach. Soil and moisture conservation works 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.

Felling Cycle: Treatment Cycle is fixed at 20 years.

Yield Calculation :Not applicable.

Demarcation, Treatment Map and Prescription Demarcation:

The annual coupes shall be demarcated one year in advance.

The Range Forest Officer shall prepare a treatment map for Soil and Moisture Conservation works keeping in view the principles of watershed treatment.

Treatment Prescription:

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

A-Type Areas: Protection Areas

- i. **Soil and moisture conservation:** The requirement of site would be the prime consideration while planning for Soil and moisture conservation works.
- ii. **Bush sowing:** Bush sowing of *Khair*, *Neem*, *Maharukh*, *Babool* and other local seeds (except teak) are to be carried out. Any one species should not constitute more than one-third of the total species.
- iii. **Stake planting:** In the A3-type areas, stakes of *Ficus* spp., Pangara, Safai or other suitable species will be planted at six-meter interval, and tussocks of *Khas grass* will be planted on suitable sites. Provided that Stake planting shall be done in the plain areas only and not in high slopes.
- 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* and *Tiwas* may be extracted.

B-Type Areas: Under-stocked Areas

Rootstock Management – Tending of rootstock will be carried out as follows:

- 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, 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:** All seedlings and saplings of valuable species *more than 1 meter in height will be nursed as future crop*. Spacing operations, if required, will be carried out to leave nearly 400 saplings per hectare at an average of 5 metre spacing. The natural regeneration operation should give priority to non-Teak species and Teak of origin and 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 will be carried out in October.
 - (b) **Second year operations:** The soil working in October will be repeated in the following year.
 - (c) **Third year operations:** Singling of coppice shoots, management of damaged and malformed saplings, climber cutting and shrub clearance shall be repeated as third year operations.
- iv. No harvesting in B Type area.

C-Type Areas: Groups of pole crop

- i. **Thinning:** Groups of pole crop will be thinned by maintaining average spacing of one-third of the crop height in such patches. Poles of vigorously growing non-teak species should be preferred for retention if teak is more than 50 percent of the crop in stocking.
- ii. No planting shall be done in these areas.

D-Type Areas: Well-stocked Areas

- i. No harvesting of green trees is prescribed. However, dead trees after retaining two dead trees per hectare as snags are permitted for

harvesting. Similarly, coppice shoots will be tended to retain one or two promising coppice shoots per stump.

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 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. No plantation is prescribed in these areas.

Each water body / reservoir is a unique ecological site having endowed with varied and rich biodiversity as well as natural and scenic beauty. Due to proximity of water there is a great diversity of flora and fauna around these water bodies as well as along the water courses. These forest areas also support a substantial number of NWFP species, which are of great significance for the livelihood needs of the local people. Therefore, these sites are ideally suitable for developing Ecological Centres (Eco-centres) for purpose of disseminating information, generating sensitivity and developing understanding of the complex issues and concerns associated with sustainable forestry, wildlife conservation and environment conservation.

Associated Regulations and Measures

Grazing Closure, Fire Protection and Other Regulations: Protection from fire and grazing is essential for success of regeneration efforts. Grazing closure will be enforced in the entire areas.

6. GRASS AND FODDER RESOURCES MANAGEMENT WORKING CIRCLE:

General Character of the Vegetation: The areas allotted to this working circle contain degraded soils and are with heavy biotic pressure. They are therefore open (density ranges from 0.2 to 0.3) containing brushwood and bushes along with the grasses. Trees are stunted, malformed and hacked and are found scattered throughout.

Tree species found are *Teak, Palas, Lendia, Bhirra, Ain, Bor, Dhawda, Movai, Salai, Char, Moha, Sitaphal, Rohan*. Thorny and bushy species like *Bor, Khair, Bharrati, Eruni, Ghot, Chilati, Phetraare* are also common; Grass species are *Kusal, Bhurbhushi, Ghonad, Sheda, Marvel*.

Weed infestation has been observed in the tract. *Rantulasi, Lantana* 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. Hence, the availability of palatable grasses has reduced.

Treatment Cycle: Treatment Cycle is fixed at 4 years.

Silvicultural System: Based on the grass and forest resources of the site as well as the objectives of the management, the silvicultural systems to be followed as under:

1. Regulated and rotational grazing in pasture areas.
2. Regulating seeding, grass cutting and complete closure to grazing in identified Grass land.

Method of Treatment: The method of treatment to improve grasses shall be two pronged i.e. (a) rotational grazing in pasture areas and (b) augmenting natural grasses in grasslands through closure to grazing.

(a) Rotational Grazing in Pasture Lands: 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 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 stage only. Soil and moisture conservation works may be taken up extensively for improving the site, such as CCTs, Nalla-bunding and gully plugging etc.

(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 removal of such weeds manually/ mechanically is suggested.

Method of executing the felling/cutting: the grass is to be cut by “cut & Carry away basis” to be regulated by the Department through the JFMCs, whenever exists.

Subsidiary Silvicultural operations Cleaning and Thinning

• Demarcation and Treatment Prescription :

Demarcation : The coupe due for closure to grazing will be demarcated one year in advance, by cutting 3 metre wide lines and erecting pillars at suitable intervals.

Treatment prescribed: Each year about 200 ha. area suitable for fodder development will be selected from out of the coupes and developed for fodder either by removal of obnoxious weeds and unwanted grasses or through ploughing and seeding of suitable grasses. Depending on the requirement of site, suitable options for fencing can be taken up by DCF.

Regeneration: 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, *Hardwickia binata* (Anjan), *Soymida febrifuga* (Rohan), *Accacia nilotica* (Babul), *Accasia leucophloea* (Hiwar), *Zizyphus mauritiana* (Ber), *Ficus glomerata* (Umbar), *Terminalia bellerica* (Beheda) etc. and other fruit bearing and other miscellaneous species. No teak should be planted in these areas.

Associated Regulations and Measures

- (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 first 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 protected from fire with the involvement of local people or JFM Committees.
- (iii) **Inspections:** The area closed to grazing will be inspected frequently by the Officers in charge to see that the closure is adequately enforced.

7. THE WILDLIFE (OVERLAPPING) WORKING CIRCLE:

Special Objectives of Management:

- 1) To ensure wildlife (animals & plants found in wild) protection and conservation in the managed forests of this Division.
- 2) To ensure scientific management of wildlife in the managed forests by undertaking measures like habitat management, waterhole development and monitoring population of the wild animals.
- 3) To provide extra space for spill over population from adjoining protected areas.
- 4) To ensure protection of ecologically sensitive and special habitat sites for wildlife conservation, such as riparian zones, mesic sites (natural water seepage sites), perennial water holes, natural grasslands, natural wallows, salt

licks, natural resting, breeding and nesting sites (caves snags, overhangs, groves of old Ficus trees, thick Bamboo groves).

- 5) To check wildlife trade and smuggling.
- 6) To promote and encourage ecotourism without disturbing and damaging wildlife.
- 7) To generate awareness among local communities towards the need for biodiversity conservation.
- 8) To protect the wild animals from various diseases.
- 9) To explore the possibility of engineering habitat to reduce man-animal conflict.

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 in riparian zone.
- 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.

8. NON TIMBER FOREST PRODUCE (OVERLAPPING) WORKING CIRCLE:

General Constitution of the Working Circle: This working circle covers the entire forest area of the division. 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. The medicinal plants play a key role in the health support systems in remote villages.

Availability of Non-Timber Forest Produce: 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, Dhaoda gum, Salai gum, etc.

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.

Future Interventions: 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.

9. JOINT FOREST MANAGEMENT (OVERLAPPING) WORKING CIRCLE:

General Constitution of Working Circle: This Overlapping Working Circle extends to the entire area of the Wardha forest division which is co-terminus

with the area of Wardha district. Villages that are adjoining to the forest areas are the focus areas for practicing Joint Forest Management.

Special Objectives of Management:

- 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.
- To strengthen and empower local institutions for protection and conservation of forest and wildlife resources through people's participation.
- To explore and evolve strategies to generate sustainable employment to local people

Potential Areas for JFM:

The following areas will be suitable for JFM program.

- Areas prescribed under the Afforestation Working Circle.
- Areas under miscellaneous management, especially the Zudpi jungles suitable for afforestation are proposed to be covered under JFM.
- Areas under Grass & Fodder resource management Working Circle are also proposed to be included in JFM.
- Regeneration and protection of NTFP areas and collection, grading, value addition and marketability of various NTFPs in the division are proposed to be given focus for working under JFM program.
- Villages which are adjoining to potential Eco-tourism sites are proposed to be included in JFM programme.
- All potential wildlife areas are to be included in either JFM or EDC programme as per provisions contained in Govt. Resolution.

General Prescriptions:

- JFM Micro-plans will be prepared for each village through the process of participatory rural approach. Microplans are to be dovetailed with the prescriptions of the approved Working Plan.
- 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 cannot be viewed in isolation. The works depicted in the Microplans should be reflected in the planning process of the Gram Panchayat.

- Wherever required, NGOs be involved for creating awareness programmes.
- 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.
- 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.
- 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.
- 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 grassroot functionaries (FG to RFO) to change attitudes and mindset.
- Dedicated NGOs/Civil society groups can aid the village communities in strengthening JFM institution. Their services can be utilized by the FD in areas of capacity building of JFMCs in microplanning, community motivation, eco-tourism initiatives, evolving models for enhancing livelihoods etc.
- 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.
- 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.

- The JFM villages should also be covered with other source of efficient fuel management like Improved Chulhas with help from the Maharashtra Biodiversity Board.
- 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.

10. MANAGEMENT FOR CONSERVATION AND ENHANCEMENT OF BIODIVERSITY

General Constitution of Area: Forest area of whole Wardha division is important from the biodiversity conservation point of view.

Special Objectives of Management:-

1. Document, protect and replenish indigenous vegetation and local ecosystems of the Division.
2. Protect and restore freshwater ecosystems
3. Document and control invasive species
4. Minimize impacts of human interference and other disturbance like fire, grazing, etc. on biodiversity
5. Maintain and record indigenous peoples' ethno-biological knowledge
6. Improve scientific knowledge and access to information about biodiversity
7. Introduce institutional reforms.
8. Sensitize the staff on the issues of Biodiversity for better appreciation and interpretation of the area they work in.

Prescription for the maintenance & Enhancement of Biodiversity.

- (i) Medicinal Plants Conservation Area (MPCA) has been identified in the Wardha Division in Comptt No. 119 Pillapur Beat under Arvi Range. This is an area of 200 ha as an important development for the biodiversity conservation. The DCF should endeavour to involve 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. As the Division already has the list of local medicinal practitioners (LMP) and the species used by them, it shall be the duty of the Division to chalk out the ways and means of sustainable harvest, with or without the consultation with the LMPs, at its own discretion.
- (iii) Sensitization of the staff of Wardha 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 Wardha 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. Pothara Dam 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.

11. MANAGEMENT OF FOREST HEALTH AND VITALITY

General constitution of area: Forest area of whole division.

Special objectives of management:

A) 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:

- (1) Improving the regeneration status of the forest by encouraging seedling origin new regeneration.
- (2) Minimizing the occurrence and impact of forest fire on forest.
- (3) Detecting and containing pests and diseases from defoliators and skeletonisers to all forms of parasites, fungal attacks.
- (4) Ensuring grazing in forest is kept to a minimum.
- (5) Reducing human interference of all forest, from illegal felling, grazing, hunting etc. by enforcing the law & changing moral perception.

B) As the forest of Wardha have been worked for over 90 years under the Coppice with Reserve and Coppice standard system, the presence of teak in most part of forest is more than 80 & the Teak Coppice being third-fourth generation coppice has lost its vigor revitalize the forest the following needs to be done.

- (1) Wherever, regeneration comes up priority for retention and nurturing should be given to seedling- origin regeneration.
- (2) Whenever, NR is done after felling in 'D' areas and afforestation in 'B2' areas, the seedlings under NR and the species under AR should be of miscellaneous species keeping Teak to a maximum of 20 %.

(3) The choice of species for afforestation in AWC and other plantation should be of miscellaneous and fruit bearing species keeping in barest minimum teak seedlings/stumps.

Regulations and Measures: The biotic factors which have resulted in the degradation of the forests are excessive grazing, frequent fires, illicit felling, overdependence on forest for fuel wood and weed infestation. The illegal fellings are 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, that can stand to grazing and fires. These species are often of low utility. The following factors are discussed individually and special steps to combat and reduce the effect of each factor are required.

12. CONSERVATION AND MAINTENANCE OF SOIL AND WATER RESOURCE

General constitution of area: Soil and moisture is important in the area of whole division.

Special objectives of management:

- To protect, conserve and improve the forest land forming part of watershed for more efficient water retention and infiltration.
- To protect and enhance the water resource originating from forest lands.
- To check soil erosion and to reduce the effect of sediment yield on the watershed.
- To rehabilitate the deteriorating lands.
- To moderate the floods peaks at downstream areas.
- To increase infiltration of rainwater.
- To improve and increase the production of timbers, fodder and other forest resource.
- To enhance the ground water recharge, wherever applicable.
- Improvement and restoration of soil quality and thus, raising productivity rates.
- Supply and securing of clean and sufficient drinking water for the population
- To minimize the risks of floods, droughts and landslides.

Associated regulations and measures: 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.

As per the information received from the Division, the following are the major dams that are in or in the vicinity the forest areas of the Wardha Forest Division.

Sr. No.	Name of Dam	Range
1	Pothara Dam	Samudrapur
2	Bor Dam	Hingni
3	Mahakali Dam	Kharangana
4	Upper Wardha	Ashti
5	Dongargaon Tank	Karanja
6	Khairi Dam	Karanja
7	Sarangpuri Tank	Arvi
8	Lower Wardha	Arvi

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 erosion in the slope areas, which should be avoided.

13. MANAGEMENT OF THE SPIRITUAL, CULTURAL ASPECT OF FORESTS AND ECOTOURISM

Potential Eco-tourism sites in wardha forest division: Wardha 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. 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.

Eco- sites and Eco-Circuits of Wardha Division

Sr.No	Range	Eco-Tourism Place	Division	Distance in Km.
1	Wardha	Gitai Temple	Wardha	3
2	Wardha	Magan Sangrahalaya	Wardha	2
3	Wardha	H.Q. Rashtrabhasha Prachar Samiti - Hindi Vishw Vidyalaya	Wardha	4
4	Wardha	Grampayogi Vigyan Kendra, Dattapur	Wardha	6
5	Wardha	Bapukuti Sevagram	Wardha	10
6	Wardha	Vinoba Bhawe Ashram, Pawnar	Wardha	8
7	Samudrapur	Farid baba Darga, Girad	Wardha	65
8	Hingani	Ganpati Temple, Kelzar	Wardha	25
9	Hingani	Vishwa Shanti Stup, Kelzar	Wardha	25
10	Hingani	Bor Wildlife Sanctuary & Bor Dam, Bordharan	Wardha	35
11	Kharangna	Dhaga Bhawan, Dhaga	Wardha	40
12	Kharangna	Mahakali Temple & Dam, Mahakali	Wardha	30
13	Kharangna	Van Darshan Marg, Tulana	Wardha	45
14	Arvi	Sarangpuri Tank, Sarangpuri	Wardha	54
15	Karanja	Garpit, Forest Rest House	Wardha	45

Other potential sites area Madan Unnai Dharan, Ridhora dam at Hingni Range located inside the forests are also to be explored. Some areas on the fringe of the Bor Tiger Reserve can also be explored for homestay potential.

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.

- Biodiversity garden, Medicinal Plants gardens, Nakshatra van etc.
- Nature interpretation centers,
- Adventure Sports,
- Tent camping,
- Nature Trail,
- Observation towers,
- Camping,
- Homestay development,
- Boating,
- Observation tower,
- Bird watching,
- Protection hut.

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 a 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.

14. FINANCIAL FORECAST

There has been a steady increase in the funding to the Working Plan activities of the Forest Division in the past two years. This increase is a good sign and needs to be maintained. Looking into the prescriptions of the Plan, it is seen that the implementation of this Plan will incur an average amount of Rs.2709.30 lakh annually in the first three years and Rs.2584.30 lakh annually for the next seven years that is from the fourth year onwards. The total expenditure will come to Rs.26218.06 lakh. The expected revenue from the implementation of the Plan is Rs.1438.55 lakh annually.

Abstract of Yearwise Requirement of Funds for Implementation of Working Plan (Rs. In Lakh)

Sr. No	Working Circle /Activity	Year – 1	Year- 2	Year- 3	Year – 4	Year – 5	Year - 6	Year - 7	Year - 8	Year - 9	Year - 10
1	Selection cum Improvement	673.31	953.92	1121.44	1285.17	1295.41	1321.31	1321.31	1321.31	1321.31	1321.31
2	IWC	190.4	286.96	348.47	403.74	413.99	424.24	424.24	424.24	424.24	424.24
3	Afforestation	245.39	473.85	620.84	739.99	780.98	821.97	821.97	821.97	821.97	821.97
4	Grass & F.R.M.	17.83	17.83	17.83	17.83	17.83	17.83	17.83	17.83	17.83	17.83
5	Protection	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06
6	Boundary Demarcation	1034.72	1034.72	1034.72	13.72	13.72	13.72	13.72	13.72	13.72	13.72
7	Wildlife (Over-lapping) W.C. (Water hole Management)	13.75	13.75	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
	Grand Total	2182.46	2786.09	3159.36	2476.51	2537.99	2615.13	2615.13	2615.13	2615.13	2615.13

Note:-The requirement for funds will vary according to prevailing wage rate.

Benefit Cost Ratio: The benefit cost ratio for the implementation of this plan taking the figures of the Ten Years average is 1:1.823. Thus the cost of implementing this Working Plan is expected to be more than the benefit.

15. MISCELLANEOUS REGULATION:

Boundary Demarcation: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. Areas which are undemarcated should be attended on priority.

Objectives:

1. To maintain territorial integrity of forestlands in the division by delineating their boundaries by permanent pillar marks to act as legal boundary marks.
2. To ensure effective protection of the forest resources of the entire division against adverse influences.

Approach to the Forest Demarcation:

1. Well-defined forest boundary is a prerequisite for effective forest protection and its sustainable management. However, in some PF the forest boundary has not been demarcated as given by DCF in Appendix XX and this need to be carried out in the first 3 years of the implementation of the Plan. 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. Forest boundaries adjoining private land shall receive the highest priority to ensure protection of these areas.
2. 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 the area. Hence, examination of record, collection of authentic maps and demarcation of the area is essential for the entire Zudpi Jungle within three years. Entire area under Zudpi jungle should be demarcated on priority within a period of **3 years** from the start of this plan. The Zudpi jungle areas which are situated in the boundary of Municipal Corporation or Nagar Parishad are vulnerable for non-forestry activities and hence, depending on the vulnerability, suitable method of demarcation should be adopted.
3. Fixing Boundary of the Erstwhile Forest villages

16. SCIENCE AND RESEARCH

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 Wardha Forest Division one Preservation Plot was established in the year 2001-12 with the following details:

Sr. No.	Range	Name of preservation plot	Comptt. No.	Year	Area in Ha.	GPS Reading
1	Kharangana	Kharangana	216	2001-2002	10.00	N-21° 01' 09.0" E-78° 30' 09.6"

In the above preservation plot, 5 plots having size 100x100 meter has been laid down and girth of species have been taken up in each plot in the period 2001-02 to 2014-15. Information regarding species wise girth of the same is submitted herewith.

In this preservation plot 9 sub plots have also been laid down having size 10x10 meter and entry of species in the sub plots have been taken up.

Other research and experimental plot: There are no seed orchards, clonal seed orchards established in the Division till date. As mentioned earlier in the Plan the Wardha Division has an overabundance of Teak of coppice origin because of its long history of working under Coppice with Reserve and Coppice with Standards. The area of the whole Division however, may be surveyed for the possible establishment of Seed Orchards. Improved nurseries are already being established throughout the state. It may be mentioned that as of the time of writing of this Plan the polybags are being replaced with root trainers in almost all nurseries. Also, mist chambers, polyhouse, shade nets, compost sheds, vermicompost and other facilities are either established or being established. In the Division, there is a need to institutionalize the creation and maintenance of such nurseries as incidences have happened when relapses to the old technique for the sake of convenience or lack of maintenance.

In order to generate superior quality seeds/ seedlings and planting stock, the Division should also ensure the use of certified source and from known source from the forest Department.

17. TREE COVER OUTSIDE FOREST AREA

The Tree Outside Forests (TOF) / Plantation for State of Maharashtra, according to the State of Forest Report 2015, is 1,232.17 sq.kms. This area adds 2.38% to the tree cover of the State. However no specific figure for the Wardha District is available. 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.

The total geographical area of the Wardha District is 6309.00 sq. km. of which 1090.99sq. km. is forest. The total forest cover works out to be just about 13% of the total geographical area. This is way below the targeted 33% forest cover as per the National Forest Policy.

Suggestive Steps for the Increase of Area Forestry/Agroforestry:

- (a) As per the table above, the identification of the fallow lands, culturable and unculturable wasteland Range/Taluka-wise in agricultural land which is available for taking up afforestation should be done at the District level. The area under community land should be given priority for plantations.
- (b) 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
- (c) Farmers must be encouraged and motivated by way providing them technical assistance and cooperation by forest department and SFD for taking up planting trees
- (d) 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 ownland.
- (e) 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.
- (f) 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.
- (g) People's support in forest conservation is to be recognized by the state forest departments. Appropriate extension programmes are to be undertaken to motivate and make them conscious 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.

(h) 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 buy back arrangements.

(i) 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.

(j) The possibility of a Public-Private Partnership in regenerating the culturable wasteland and barren unculturable wastelands of about 260 sq. kms. should be explored. This can also be explored for raising the improved planting material for supply to the farmers.

18. CONTROL AND RECORDS

The following records will be maintained in the Wardha Forest Division Office:

- i. Control Forms.
- ii. Compartment History.
- iii. Plantation Registers.
- iv. Nursery Registers
- v. Divisional Note Book
- vi. Boundary Registers

Constraints faced during writing of plan :-

During writing up the Draft Working Plan of Wardha Forest Division following constraints has been faced.

1. The earlier Working Plan of Wardha Forest Division was not prepared as per National Working Plan code 2014 but this DWPR has been prepared as per guidelines of New National Working Plan Code.
2. As the DWPR has been prepared as per National Working Plan code 2014 for the first time, it has been difficult for subordinate & officers also to know & prepare the plan as per New Working Plan Code.
3. As per Working Plan Code 2014, various subjects has been laid down in DWPR but data base for such subjects was not available previously. Hence, such information has been obtained from various stages/sources & completed the DWPR.
4. Continuous transfer of Working Plan Officer (i.e. Conservator of Forests) & Vacant post of Assistant Conservator of Forests has also been one constraint for writing up the DWPR.

5. Work of tree enumeration and various sample plots with its analysis has been carried out as per guidelines of New Working Plan Code 2014 which was not readily available previously.

There are many parameters which require to be accessed but not readily available and have been obtained from various sources like Forest Survey of India (FSI), Maharashtra Remote Sensing Application Centre (MRSAC), IIFM (Indian Institute of Forest Management), National Bureau of Soil Survey & Land use Planning (NBLSS), Central Ground Water Board (CGWB) etc. and other Colleges & individuals. This process has taken a long time. This Working Plan has prescribed different methods for which based data will be collected for further assessment and analysis in future.

I. INTRODUCTION

A) **VISION STATEMENT:** The following vision statement is the vision statement of the Maharashtra Forest Department (www.mahaforest.nic.in)

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.

B) GOALS AND OBJECTIVES OF MANAGEMENT:

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

Primary Objectives Sectoral:

- 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.

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

Institutional

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

Operational

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

C) SWOT 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 have 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
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 forest 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 upto the mark. 13. Many RET species are untackled
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. Treatment of watersheds through Jalyukt Shivar, etc 9. Creation of assets and infrastructure from CAMPA 10. Involvement of informed public and NGOs in conservation 11. Documentation and Biodiversity 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:

Of the many prescriptions that have been set for the treatment of the forests of the Division, the following are some of the outcome that are expected to be achieved during the period of the plan.

a) Forest :

- (i) **Consolidation:** During the period of three years from the implementation of the plan, the Zudpi Jungle area handed over to the Forest Department, the boundary will be demarcated.
- (ii) **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 Wardha it is seen that out of the geographical area of 6309 sq.kms. only 859 sq.kms. (SFR of FSI 2015) is covered under forests. This works out to be meagre 13.62 % of the geographical area, in order to achieve 33 % forest cover, there is a need to cover the whole area of forests which is 926.92 sq.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.

- (iii) **Plantations:** It is expect that an area of 4000 ha. will be regenerated through the Afforestation Working Circles and another 2000 ha. 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.
- (iv) **Regeneration:** Because of implementation of the plan, the forests are expected to be more healthy and have better regeneration from opening of the canopy in 8220 ha. through SCI works and 4810 ha. due to IWC to be followed by intensive Aided Natural Regeneration works. Also due to better protection from fire and grazing, the area will be revitalised.
- (v) **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 9 sq.kms. The documentation and study of the faunal and floral diversity of the Division/District will have been done by then.
- c) **Revenue:** It is expected that the end of the plan 250 Nos. of coupes of SCI & IWC will have been worked producing 28150 cum. Teak Timber. 7040 cum. Non teak Timber, 42940 Teak Beat, 47860 Non teak Beat, 68000 Teak Pole, 12000 Non teak Pole etc. resulting in Revenue of Rs. 143.855 crores.
- d) **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.
- e) **Soil and Water Conservation:** Throughout the plan period an area of 6000 under different forms of regeneration and additional area as per site conditions are expected to be treated 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 strips along streams, A3: excessively erosion prone areas) * B-type: Understocked and Blank areas (density <0.4) (a) B1-Area with rootstock and NR (b) B2-Area without NR * C-type: Pole crop and plantations * D-type: Well stocked areas (density >0.4)
	2.6.10.2	Marking : * A type area: No marking * B type: Dead and malformed trees, live high stumps * C type: Thinning marking * D type: Enumeration of trees in Approach girth class and above is prescribed. * Trees above selection girth as per regulation of Smythies safeguarding principle. Dead & malformed trees, live high stumps are to be marked.
	2.6.2	Silvicultural System : * Selection-cum-Improvement system * Trees above Selection Girth are prescribed for felling as per principles of safeguarding future yield. * Openings created by felled trees would promote NR of light demander species * Hygienic operations (removal of dead, malformed, live high stumps) will improve the existing crop.
	2.6.12	Regeneration : * Natural Regeneration: NR of seed origin of valuable species to be preferred and managed through cultural operations in D area and B I areas. * Artificial Regeneration: Only in B2 type area if site is suitable. * Strict protection from fire and grazing * Tending of natural regeneration of valuable species in B Type area.
	2.6.10.2	SMC Works : * Gully plugging and other SMC works, as described in the chapter of Miscellaneous Regulations shall be taken up in the A3 type area. * SMC works will be alongwith marking operation and completed before on set of monsoon. * SMC Working are to be based on the requirement of site.

Chapter No. (Vol-I, Part-II)	Para No/ Sub para No.	Prescribed Activity
	2.6.11	Subsidiary Operation : * CBO works: Subsequent year of main felling * CBO works like cutting left over marked trees, removal of damaged trees, singling of multiple coppice shoots, etc * 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 * Cleaning operations: 6th Year
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: Understocked areas (density <0.4) * C-type: Congested Pole crop * D-type: Well stocked areas (density >0.4)
	3.6.10.1	Marking : * A type area: No marking * B type: All dead trees, live high stumps * C type: The congested pole crop shall be marked for thinning. * 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.
	3.6.2	Silvicultural System : * Hygienic operation of improvement felling. * Adequate growing space is provided to trees of valuable species. * The improvement felling supplemented by tending of naturally generated crop & root stock will aid in transition of middle aged stem to maturity. * The species whose population in the 'stand' dynamics is less than 1% shall be retained till they reached the rotation age.
	3.6.12	Regeneration : * Natural Regeneration: NR of seed origin of valuable species to be preferred and managed through cultural operations. * Artificial Regeneration: Only in B type area if site is suitable. * Strict protection from fire and grazing * Tending operation for Natural regeneration in the 'D' type area & Root stock management in the 'B' type shall be taken up.

Chapter No. (Vol-I, Part-II)	Para No/ Sub para No.	Prescribed Activity
	3.6.10.1	SMC Works : * SMC works, as described in the chapter of Miscellaneous Regulations are prescribed in A & B type area.
	3.6.11	Subsidiary Operations : Cleaning operations: 6th Year 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.
4-AFF	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: 30 M wide strips on both side of streams. * B-type: Understocked areas (density <0.4) * C-type: Congested Pole crop * D-type: Well stocked areas (density >0.4)
	4.6.2	Silvicultural System : * Only hygienic fellings prescribed (Dead, live high stumps) * Plantation work in B type areas. * Planting of Tall seedlings prescribed. * Not more than 50 ha.plantation per coupe. * JFMCs to be actively involved.
	4.6.12	Regeneration : * Tending of Natural regeneration & existing root stock is prescribed to be given preference over planation. * Cultural operations for natural regeneration in 'D' type areas Root stock management in 'B' type areas are prescribed.
	4.6.12	SMC Works : * SMC works will be done as prescribed in the relevant paras under Miscellaneous Regulation. No specific quantum of such works has been prescribed.
5-Protection	5.6.11	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: Understocked and Blank areas (density less than 0.3) C-type: Group of naturally green poles. D-type: Well stocked forest patches.

Chapter No. (Vol-I, Part-II)	Para No/ Sub para No.	Prescribed Activity
	5.6.11	Treatment : A type area: Harvesting of standing trees is strictly prohibited. B type: No. harvesting. All seedling & saplings of valuable species more than 1 mtr. in height will be nursed as future crop C type: Group of pole crop will be thinned by maintaining average spacing. No planting will be done. D type: No harvesting of green trees & Plantation is not prescribed.
	5.6.2	Silvicultural System : Silviculture system is proposed on the pattern of watershed management. Harvesting of green trees is prohibited. Removal of dead trees by retaining two dead trees per ha. as snags is permitted.
	5.6.11, 5.6.12	Regeneration : * Natural Regeneration: All seedlings and saplings of valuable species more than 1 meter height will be nursed as future crop. * Strict protection from fire and grazing
	5.6.11	SMC Works : * Soil & Moisture conservation works to prevent soil erosion siltation.
6-G&FRM	6.6.11	Coupe Demarcation : * The coupe due for closure to grazing will be demarcated one year in advance.
	6.6.11	Treatment : * Removal of invasive weeds. * SMC work as per site requirement. * In suitable blank areas, regeneration of grass through seed broadcasting, area closure through enclosures is prescribed. * JFMCs to be actively involved.
9-JFM (Overlapping)	9.6.13.5	Prescription : * JFM micro plans are to be dovetailed with broad prescriptions of approved working plan. * Maintenance of forest boundary, removal of encroachments, control over illicit cutting, illegal grazing, fire and wildlife offences shall receive priority apart from regularly undertaken works such as SMC & Plantations. * Transparency in programme has to be ensured through transparent payment mechanisms. * Villages which have not received funds should also be accorded importance.

Chapter No. (Vol-I, Part-II)	Para No/ Sub para No.	Prescribed Activity
7-Wildlife (Overlapping)	7.6.13.4 to 7.6.13.8	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, 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-NTFP (Overlapping)	8.6.13.3 to 8.6.13.9	Prescription : * Documentation of NTFP collection. * JFMCs to be actively involved in NTFP collection and processing. * Scientific method for Gum tapping as per rules suggested by FRI to be used. * Regular trainings for JFMCs to be conducted for capacity building in NTFP collection and processing.
15- Miscellaneous Regulation	15.1 to 15.16	Miscellaneous Regulation: * Boundary demarcation of all un demarcated areas (Entire Zudpi jungle area, Acquired Private Forest & Non Forest land taken over for C.A. & undemarcated PF) to be accomplished in first three years of the Plan. * Boundary pillar which is not easily vulnerable to damage. * Three years Survey and Demarcation Programme * Boundary demarcation is necessary due to honeycombing. * Updation of area registers * Where claims are finally rejected, removal of such encroachments.

**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.	Prescribed Activity	Year wise (year 1 to 10) distribution physical target (Ha.)									
A	B	C	D									
2-SCI	2.6.10.2	Demarcation and marking	1643	1643	1643	1643	1643	1643	1643	1643	1643	1643
	2.6.10.1, 2.6.10.2	Coupe working "D" Area	822	822	822	822	822	822	822	822	822	822
	2.6.12	Natural Regeneration – ANR+Nursing of naturally occurring seedlings and coppice management etc. in "D" area + B1 area	822	822	822	822	822	822	822	822	822	822
		PPO/PYO(Pre-planting works)	822	822	822	822	822	822	822	822	822	822
		FYO (First year operations)	822	822	822	822	822	822	822	822	822	822
		SYO (Second year operations)	822	822	822	822	822	822	822	822	822	822
		TYO (Third year operations)	822	822	822	822	822	822	822	822	822	822
	2.6.10.2, 2.7	Soil and moisture conservation works	1500 cum	1500 cum	1500 cum	1500 cum	1500 cum	1500 cum	1500 cum	1500 cum	1500 cum	1500 cum
	2.6.11	Cut Back Operation	822	822	822	822	822	822	822	822	822	822
	2.6.12	Plantation(B2 area) (Teak/ Mix) PPO/PYO (Pre - planting works)	100	100	100	100	100	100	100	100	100	100
		FYO (First year operations)	100	100	100	100	100	100	100	100	100	100
		SYO (Second year operations)	100	100	100	100	100	100	100	100	100	100
		TYO (Third year operations)	100	100	100	100	100	100	100	100	100	100
		4th YO (Fourth year operations)	100	100	100	100	100	100	100	100	100	100
		5th YO (Fifth year operations)	100	100	100	100	100	100	100	100	100	100
	2.6.11	Cleaning	822	822	822	822	822	822	822	822	822	822
3-TWC	3.6.10.1, 3.6.10.2	Demarcation and marking	962	962	962	962	962	962	962	962	962	962
	3.6.2, 3.6.10.1	Coupe working (Hygenic Felling) (D+B area)	481	481	481	481	481	481	481	481	481	481

Chapter No. (Vol-I, Part-II)	Para No. / Sub para No.	Prescribed Activity	Year wise (year 1 to 10) distribution physical target (Ha.)									
3-IWC	3.6.12.2	Natural Regeneration – ANR+Nursing of naturally occurring seedlings and coppice management etc. in Understocked patches	200	200	200	200	200	200	200	200	200	200
		PPO/PYO(Pre-planting works)	200	200	200	200	200	200	200	200	200	200
		FYO (First year operations)	200	200	200	200	200	200	200	200	200	200
		SYO (Second year operations)	200	200	200	200	200	200	200	200	200	200
		TYO (Third year operations)	200	200	200	200	200	200	200	200	200	200
	3.6.10.1	Soil and	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
		moisture conservation works	cum	cum	cum	cum	cum	cum	cum	cum	cum	cum
	3.6.12	Plantation (Teak/ Mix) PPO/PYO (Pre - planting works)	100	100	100	100	100	100	100	100	100	100
		FYO (First year operations)	100	100	100	100	100	100	100	100	100	100
		SYO (Second year operations)	100	100	100	100	100	100	100	100	100	100
		TYO (Third year operations)	100	100	100	100	100	100	100	100	100	100
		4th YO (Forth year operations)	100	100	100	100	100	100	100	100	100	100
		5th YO (Fifth year operations)	100	100	100	100	100	100	100	100	100	100
4-AFF	4.6.10.1	Demarcation and marking	2193	2193	2193	2193	2193	2193	2193	2193	2193	2193
	4.6.10.1, 4.6.10.2	Coupe working (Hygenic Felling)	1096	1096	1096	1096	1096	1096	1096	1096	1096	1096
	4.6.12	Natural Regeneration – ANR+Nursing of naturally occurring seedlings and coppice management etc. in Understocked patches	219	219	219	219	219	219	219	219	219	219
		PPO/PYO(Pre-planting works)	219	219	219	219	219	219	219	219	219	219
		FYO (First year operations)	219	219	219	219	219	219	219	219	219	219
		SYO (Second year operations)	219	219	219	219	219	219	219	219	219	219

Chapter No. (Vol-I, Part-II)	Para No. / Sub para No.	Prescribed Activity	Year wise (year 1 to 10) distribution physical target (Ha.)									
4-AFF.	4.6.12	TYO (Third year operations)	219	219	219	219	219	219	219	219	219	219
		Soil and moisture conservation works	2000 cum	2000 cum	2000 cum	2000 cum	2000 cum	2000 cum	2000 cum	2000 cum	2000 cum	2000 cum
	4.6.12	Plantation (Teak/ Mix) PPO/PYO (Pre - planting works)	400	400	400	400	400	400	400	400	400	400
		FYO (First year operations)	400	400	400	400	400	400	400	400	400	400
		SYO (Second year operations)	400	400	400	400	400	400	400	400	400	400
		TYO (Third year operations)	400	400	400	400	400	400	400	400	400	400
		4th YO (Forth year operations)	400	400	400	400	400	400	400	400	400	400
		5th YO (Fifth year operations)	400	400	400	400	400	400	400	400	400	400
5-Protection	5.6.11.1	Demarcation and marking	616	616	616	616	616	616	616	616	616	616
	5.6.11.2	Soil and moisture conservation works	1400 cum	1400 cum	1400 cum	1400 cum	1400 cum	1400 cum	1400 cum	1400 cum	1400 cum	1400 cum
6-G&FRM	6.6.11	Demarcation and marking	1587	1587	1587	1587	1587	1587	1587	1587	1587	1587
	6.6.11, 6.6.12, 6.6.13	Deep Ploughing	40	40	40	40	40	40	40	40	40	40
	6.6.11, 6.6.13	Seed Broadcasting in July	40	40	40	40	40	40	40	40	40	40
	6.6.11, 6.6.13	Enclosure	40	40	40	40	40	40	40	40	40	40
	6.6.11, 6.6.13	Removal of Shurbs & Weeds	200	200	200	200	200	200	200	200	200	200
10- Miscellaneous Regulations (Boundary demarcation)	15.2	Fixing Boundary Pillars (Artificial & Natural RF Boundary)	696 Pillars	696 Pillars	696 Pillars	696 Pillars	696 Pillars	696 Pillars	696 Pillars	696 Pillars	696 Pillars	696 Pillars
	15.2	Fixing Boundary Pillars (Artificial & Natural PF Boundary)	4462 Pillars	4462 Pillars	4462 Pillars	4462 Pillars	4462 Pillars	4462 Pillars	4462 Pillars	4462 Pillars	4462 Pillars	4462 Pillars
10- Miscellaneous Regulations (Boundary demarcation)	15.1	New Demarcation of Zudpi Jungle, Non forest land taken over for C.A. and Acquired Pvt. Forest & Undemarcated PF	6807 ha.	6807 ha.	6807 ha.	0	0	0	0	0	0	0
7-Wild Life (Overlapping) W.C.	7.6.14.4	Preparation of Water Holes (Total Water Holes 42)	5 Water Holes	5 Water Holes	4 Water Holes	4 Water Holes	4 Water Holes	4 Water Holes	4 Water Holes	4 Water Holes	4 Water Holes	4 Water Holes

II. GLOSSARY OF TERMS

Adjat species	Miscellaneous species
Bidi	Handmade cigarette wrapped in Tendu leaf.
Bir	An area reserved to grow grass.
Burad	Person who makes mats, baskets etc. of bamboos
Dholi	Containers to store grain.
Doh	A deep pond in a river or stream.
Geru	Red ochre or red earth.
Ghat	A road with a steep gradient.
Ghee	Clarified buffalo-Milk, butter.
Gully	Channel
Jagir	An estate belonging to a Zamindar.
Jagirdar	The holder of Jagir.
Janindari	An estate belonging to a Zamindar.
Jhiras	Temporary small wells dug in nalas during summer.
Juar	Cultivated millets (<i>Sorghum vulgare</i>).
Kacha (roads)	Temporary (roads).
Kankar	Lime nodules.
Katha	Catechu.
Kharif	Monsoon crop.
KhasaraNo.	Serial number given to any portion of land entered in land records
Khories	Valleys in between two hills or hillocks.
Nista	Land tenure system which existed in Vidarbha.
Maliki lands	Lands belonging to private individuals.
Mouza	A village area.
Murum	A reddish hard soil.
Naka	Barrier on road for checking forest produce in transit.
Nala	A water course.
Nistar	Forest produce required for bona-fide agricultural or domestic needs
NistarPatrak	Record of Nistar rights on Government Land.

III. LIST OF FLORA

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

A. Tree

LOCAL NAME	BOTANICAL NAME	FAMILY
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.)	Mimosaceae
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.)	DCRutaceae
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.)	BthMimosaceae
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.) ex. Hook. F.	Euphorbiaceae Bth.
Ghogar	<i>Gardenia latifolia</i> , (Soland.)	Rubiaceae
Ghoti/Ghot	<i>Ziziphus xylopyra</i> , (Sedgw)	SantRhamnaceae
Gogal/Gongal	<i>Cochlospermum religiosum</i> , (L.)	Chochlospermaceae
Gular/Umber	<i>Ficus glomerata</i> , (Roxb.)	Moraceae

Haldu *Adina cordifolia, (Roxb.) Hook.F* Rubiaceae

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

LOCAL NAME	BOTANICAL NAME	FAMILY
Shiwan/Siwan	<i>Gmelina arborea</i> , (Roxb.)	Verbenaceae
Sindi/Chhindi	<i>Phoenix sylvestris</i> , (Linn)	Arecaceae(Palmae)
Siras (Black)	<i>Albizzia lebbek</i> , (L.) Bth.	Mimosaseae
Siras (White)	<i>Albizzia 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 gummifera</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 camera</i> , (Linn.)	Verbenaceae
Gudvel	<i>Tinospora cordifolia</i>	Menispermaceae
Isharnul/saapsan	<i>Aristolochia indica</i>	Aristolochiaceae
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

LOCAL NAME	BOTANICAL NAME	FAMILY
Kharata	<i>Dodonaea viscosa</i> , (Linn.)	Sapindaceae
PandhraKuda	<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 Aonta	<i>Phyllanthus niruri</i>	Euphorbiaceae
Dudhivel/Govirdhan	<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
Kamamodi	<i>Tridax procumbens</i> (Linn)	Asteraceae
Pivladhotra	<i>Argemone mexicana</i> (L.)	Papaveraceae
Pivilitwan	<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
Kamal	<i>Nelumbo nucifera</i>	Nymphaeaceae
Kamuni	<i>Solanum nigrum</i>	Solanaceae
Kali Musti	<i>Curculigo orchioides</i>	Hypoxidaceae
Kalmegh	<i>Andrographis paniculata</i>	Acanthaceae
Lajwanti	<i>Mimosa pudica</i>	Mimosaceae

LOCAL NAME	BOTANICAL NAME	FAMILY
Ranhalad	<i>Curcuma aromatic</i>	Zyngiberaceae
Rantambaku	<i>Lobelia nicotianaefolia</i>	Lobeliaceae
Sarpgandha	<i>Rauwolfia serpentina</i>	Apocynaceae
Tarota	<i>Cassia tora</i> , (Linn)	Caesalpiniaceae
Waghnakhi	<i>Martynia annua</i> , (Linn)	Martyniaceae

D. Bamboos and Grasses

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

E. Climber

LOCAL NAME	BOTANICAL NAME	FAMILY
Aradphari/harduli	<i>Olax scandens</i> , (Roxb.)	Olacaceae
Chilati	<i>Mimosa hamata</i> (Willd)	Mimosaceae
Dhimarwel/Malkagni	<i>Celastrus paniculata</i> (Willd)	Celastraceae
Dhudhi/Bokadwel	<i>Cryptolepis buehneri</i> , R. & S.	Periplocaceae
Nagwel/Pan	<i>Piper betle</i> (L.)	Piperaceae
Eruni	<i>Zizyphus oenoplia</i> , (L.) Mill	Rhamnaceae
Gunj/Raktvel	<i>Abrus precatorius</i> , (L.)	Fabaceae
Gulvel	<i>Tinospora cordifolia</i> , (Willd)	Menispermaceae
Kanjuri	<i>Mucuna pruriens</i> , (L.) D.C.	Fabaceae
Khadyanag/ Langali	<i>Gloriosa superba</i> , (L.)	Liliaceae
Khobarvel/Anantmul	<i>Hemidesmus indicus</i> , (L.) Ait.	Periplocaceae
Kukudranji	<i>Calycopteris floribunda</i> , (Lam.)	Combretaceae
Mahulbel	<i>Bauhinia vahlii</i> , (Wand. A)	Caesalpiniaceae
Nasbel	<i>Millettia extensa</i> , (Bth.) Baker	Papilionaceae
PapriLalbel	<i>Vanilago denticulata</i> , (Willd)	Rhamnaceae
Palasvel	<i>Butea superba</i> (Roxb)	Fabaceae
	<i>Combretum ovalifolium</i> (Roxb)	Combretaceae
Ramdaton	<i>Smilax macrophylla</i> ,	Smilacaceae
Vasanvel	<i>Cocculus hirsutus</i> , (L.) Diels.	Menispermaceae

F. Parasites & Saprophytes

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

G. List of Medicinal Plants in Wardha Forest Division

Sr.No.	Local Name	Botanical Name
1	Korfad	<i>Aloe barbadensis</i> Mill
2	Palas	<i>Butea frondosa</i> (Lam) taub
3	Kallavi	<i>Gloriosa superba</i> L.
4	Bhui Nim	<i>Phyllanthus fraternus</i>
5	Sagar Goti	<i>Caesalpinia bonducella</i>
6	Pandhari Rui	<i>Calotropis gigantea</i>
7	Safed Musali	<i>Pachystoma senile</i> (Reich f)
8	Bel	<i>Aegle marmelos</i> (L) Correa
9	Neem	<i>Azadirachta indica</i> (Juss)
11	Ran Halad	<i>Curculigo orchioidea</i> (Gautn Fruet)
12	Aonla	<i>Phyllanthus emblica</i> (L)
13	Behada	<i>Terminalia bellerica</i> (Gautn) roxb
14	Kambarmodi	<i>Tridax procumbens</i> (Linn)
15	Aghada	<i>Achyranthes aspera</i>
16	Karu	<i>Sterculia urens</i> (Roxb)
17	Nivdung	<i>Echinocactus grusonii</i>
18	Katsawar (Semal)	<i>Bombax ceiba</i> (L)
19	Medsing	<i>Dolichandrone falcata</i> (seem)
20	Kadii Patta	<i>Murraya koenigii</i> (L) Sprengel
21	Pandhari Gunj	<i>Abrus precatorius</i> (L)
22	Aajan, Arjun, Kahu	<i>Terminalia arjuna</i> (Roxb)
23	Maharukh	<i>Ailanthus excels</i> (Roxb)
24	Tirunii	Not known
25	Yerandi	<i>Ricinus communis</i>
26	Umbaar	<i>Ficus glomerata</i> (Roxb)
27	Vasan	<i>Cocculus hirsutus</i> (L)
28	Nirgudii	<i>Vitex negundo</i> (L)
29	Sheetawar	<i>Asparagus racemosus</i>
30	Jatamasii	<i>Nardostachys jatamansi</i>

Sr.No	Local Name	Botanical Name
31	Haranwell	<i>Not known</i>
32	Gokharu	<i>Tribulus terrestris</i>
33	Kaddipatta	<i>Murraya koenigii</i>
34	Aamaltaas	<i>Cassia fistula (L)</i>
35	Aarandi	<i>Ricinus-communis</i>
36	Bamboo	<i>Dendro calamus stricts</i>
37	Hirda	<i>Terminalia chebula (Retz)</i>
38	Dalimba	<i>Punicagranatum</i>
39	Kachnaar (Aapta)	<i>Bauhinia racemosa</i>
40	Kudwa	<i>Holarrhena anthidysentrica (Wall)</i>
41	Indrawan	<i>Not known</i>
44	Niroki	<i>Not known</i>
45	Wagnak	<i>Martynia annua (Linn)</i>
46	Ridda/Ritha	<i>Sapindus emarginatus</i>
47	Aawan	<i>Not known</i>
48	Nayaa	<i>Not known</i>
49	Adulsa	<i>Adhatoda zeylanica</i>
50	Tarota	<i>Cassia tora L.</i>
51	Pen Ghagara	<i>Not known</i>
52	Shisham	<i>Dalbergia latifolka (Roxb)</i>
53	Khandu Chakka	<i>Not known</i>
54	Tulas	<i>Ocinum sanctum</i>
55	Sitaphal	<i>Annona squamosa (L)</i>
56	Babhul	<i>Acacia nilotica (L)</i>
57	Hiwar	<i>Acacia leucopholoea</i>
58	Lendia/Lenda	<i>Lagerstroemia Parviflora</i>
59	Lokhandi	<i>Ixora arborea (Roxb)</i>
60	Malkagni	<i>Celastrus paniculata (Willd)</i>
61	Moha	<i>Madhuca indica</i>
62	Aal	<i>Morinda citrifolia (Linn)</i>
63	Sag	<i>Tectona grandis</i>
64	Kusal	<i>Heteropogon contorjus</i>
65	Rohan	<i>Soyimida febrifuga</i>

Sr.No	Local Name	Botanical Name
66	<i>Sadafuli</i>	<i>Catharanthus roseus</i>
67	<i>Biba/Bhilawa</i>	<i>Semecarpus anacardium</i>
68	<i>Dudhi Bhopla</i>	<i>Lag0enaria sileraria</i>
69	<i>Adrak</i>	<i>Zingiber officinate</i>
70	<i>ChandraJyoti</i>	<i>Jatropha curcas</i>
71	<i>Nilgiri</i>	<i>Indigofera tinctoria</i>
72	<i>Mowai</i>	<i>Lannea coromandilica</i>
73	<i>Bharati</i>	<i>Maytenus emarginate</i>

IV. LIST OF FAUNA

The Common and Zoological Names of Animals, Birds & Reptiles Commonly Found in the Wardha Forest Division

A. Mammals

<i>Common Name</i>	<i>Zoological Name</i>	<i>IUCN Status</i>
Tiger	<i>Panthera tigris</i>	Endangered
Panther	<i>Panthera pardus</i>	Near Threatened
Striped Hyaena	<i>Hyaena hyaena</i>	Near Threatened
Wild dog	<i>Cuon alpinus</i>	Endangered
Jackal	<i>Canis aureus</i>	Least Concern
Fox	<i>Vulpes bengalensis</i>	Least Concern
Leopard cat	<i>Felis bengalensis</i>	Not assessed
Jungle cat	<i>Felis chaus</i>	Least Concern
Nilgai	<i>Boselaphus tragocamelus</i>	Least Concern
Sambhar	<i>Cervus unicolor</i>	Vulnerable
Cheetal	<i>Axis axis</i>	Least Concern
Barking deer	<i>Muntiacu muntjak</i>	Least Concern
Wild boar	<i>Sus scrofa</i>	Least Concern
Sloth bear	<i>Melursus ursinus</i>	Vulnerable
Four horned antelope	<i>Tetracerus quadricornis</i>	Vulnerable
Langur	<i>Presbytis entellus</i>	Least Concern
Three striped Palm squirrel	<i>Funambulu palmarum</i>	Least Concern
Porcupine	<i>Hystrix indica</i>	Least Concern
Rufous Tailed Hare	<i>Lepus nigricollis ruficaudatus</i>	Least Concern

B. List of Birds in Wardha District, Maharashtra
(As per Bahar Nature Foundation Document)



Sr. No	Common Name	Scientific Name	Marathi Name
Order: GALLIFORMES: Partridge & Quails			
Family: PHASIANIDAE			
1	Grey Francolin	<i>Francolinus pondiceriana</i>	राखी तित्तिर
2	Painted Francolin	<i>Francolinus pictus</i>	रंगीत तित्तिर
3	Common Quail	<i>Coturnix coturnix</i>	सामान्य लाया
4	Rain Quail	<i>Conturnix coromandelica</i>	घसा लाया
5	Jungle Bush Quail	<i>Perdica asiatica</i>	जंगल लाया
6	Rock Bush Quail	<i>Perdica argoondah</i>	पारान लाया
7	Barred Button Quail	<i>Turnix suscitator</i>	गुड्डू बटलाया
8	Small Button Quail	<i>Turnix sylvatica</i>	सामान्य बटलाया
9	Grey Junglefowl	<i>Gallus sonneratti</i>	राखी रानकोंबडी
10	Red Junglefowl	<i>Gallus gallus</i>	लाल रानकोंबडी
11	Indian Peafowl	<i>Pavo cristatus</i>	मोर लाडोर
Order: ANSERIFORMES: Ducks, Geese			
Family: DENDROCYGNIDAE			
12	Lesser Whistling Teal	<i>Dendrocygna javanica</i>	अडई
Family: ANATIDAE			
13	Bar-headed Goose	<i>Anser indicus</i>	राजहंस
14	Knob-billed Duck / Comb Duck	<i>Sarkidiornis melanotos</i>	नकटा बटक
15	Cotton Pygmy-goose	<i>Nettion coromandelianus</i>	काणूक बटक
16	Spot-billed Duck	<i>Anas poecilorhyncha</i>	डबडी कुंकू बटक
17	Ruddy Shelduck	<i>Tadorna ferruginea</i>	चक्रपाक
18	Northern Shoveler	<i>Anas chryseata</i>	धापट्या बटक
19	Northern Pintail	<i>Anas acuta</i>	तलवार बटक
20	Mallard	<i>Anas platyrhynchos</i>	यमुना बटक

Sr. No	Common Name	Scientific Name	Marathi Name
21	Common Teal	<i>Anas crecca</i>	चक्रांग बटक
22	Red-crested Pochard	<i>Netta rufina</i>	मोठी लालसरी
23	Common Pochard	<i>Aythya ferina</i>	लालसरी बटक
24	Tufted Duck	<i>Aithya fuligula</i>	बॅडी बटक
Order: PICIFORMES: Woodpeckers, Barbets			
Family: PICIDAE			
25	Yellow-crowned Woodpecker	<i>Dendrocopos maharattensis</i>	पिळळ्या मुकुटाचा सुतार
26	Brown-capped pygmy Woodpecker	<i>Dendrocopos nanus</i>	बुटका सुतार
27	Lesser Goldenback	<i>Dinopium benghalense</i>	छोटा सोनगाढी सुतार
28	White-naped Woodpecker	<i>Chrysocolaptes festivus</i>	पांढऱ्या मानेचा सुतार
29	Rufous Woodpecker	<i>Micropternus brachyurus</i>	ताभूस सुतार
30	Eurasian Wryneck	<i>Jynx torquilla</i>	मानमोडी
Family:MEGALAIMIDAE			
31	Coppersmith Barbet	<i>Megalaima haemacephala</i>	तांबट
Order:BUCEROTIFORMES: Hornbills			
Family:BUCEROTIDAE			
32	Indian Grey Hornbill	<i>Ocyrceros birostris</i>	राखी घनेब
Order:UPEPIFORMES: Hoopoes			
Family:UPUPIDAE			
33	Common Hoopoe	<i>Upupa epops</i>	हुदहुद
Order:CORACIIFORMES: Rollers,Kingfishers,Bee-eaters			
Family:CORACIIDAE			
34	Indian Roller	<i>Coracias benghalensis</i>	भारतीय निलकंठ
Family:ALCEDINIDAE			
35	Common Kingfisher	<i>Alcedo atthis</i>	सामान्य त्रिचर
Family:HALCYONIDAE			
36	White-throated Kingfisher	<i>Halcyon myrmenis</i>	पांढऱ्या छातीचा त्रिचर
37	Stork-billed Kingfisher	<i>Halcyon capensis</i>	बलाकचीच त्रिचर

Sr. No	Common Name	Scientific Name	Marathi Name
Family: CERYLIDAE			
38	Pied Kingfisher	<i>Ceryle rudis</i>	कण्डया विषर
Family: MEROPIDAE			
39	Green Bee-eater	<i>Merops orientalis</i>	पेडा राघू
40	Blue-tailed Bee-eater	<i>Merops philippinus</i>	निळ्या बेंपटीचा राघू
41	Chestnut-headed Bee-eater	<i>Merops leschenaulti</i>	ब्रदामी डोक्याचा राघू
Order: CUCULIFORMES: Cuckoos			
Family: CUCULIDAE			
42	Pied Cuckoo/Jacobean Cuckoo	<i>Clamator jacobinus</i>	जातक
43	Common Hawk Cuckoo	<i>Hierococcyx varius</i>	वाणया
44	Indian Cuckoo	<i>Cuculus micropterus</i>	भारतीय कोकीळ
45	Grey-bellied Cuckoo	<i>Cacomantis passerinus</i>	कारुण्य कोकीळ
46	Asian Koel	<i>Eudynamis scolopacea</i>	कोकीळ
47	Sirkeer Malkoha	<i>Phaenicophaeus leschenaulti</i>	लाल बोरीचा मुंग्या
Family: CENTROPODIDAE			
48	Southern Coucal	<i>Centropus (sinensis) parroti</i>	चारवाज
Family: PSITTACIDAE			
49	Alexandrine Parakeet	<i>Psittacula eupatria</i>	करण पोपट
50	Rose-ringed Parakeet	<i>Psittacula krameri</i>	कळयाळा पोपट
51	Plum-headed Parakeet	<i>Psittacula cyanocephala</i>	टोई पोपट
Order: APODIFORMES : Swifts			
Family: APODIDAE			
52	White-rumped Spinetail	<i>Zoonavena sylvatica</i>	पांढऱ्या माठीची आमोळी
53	Little Swift	<i>Apus affinis</i>	छर पाकोळी
54	Asian Palm Swift	<i>Cypsiurus balasensis</i>	तांद पाकोळी
Family: HEMIPROCENIDAE			
55	Crested Tree Swift	<i>Hemiprocne coronata</i>	तुप्याली पाकोळी

Sr.No.	Common Name	Scientific Name	Marathi Name
Order: STRIGIFORMES : Owls, Nightjars			
Family:TYTONIDAE			
56	Barn Owl	<i>Tyto alba</i>	गळगर्भा घुबड
Family:STRIGIDAE			
57	Indian Scops Owl	<i>Otus bakkamoena</i>	भारतीय भिंगळा घुबड
58	Indian Eagle-Owl	<i>Bubo bubo</i>	हुमा घुबड
59	Brown Fish-Owl	<i>Ketupa zeylonensis</i>	मासेमार घुबड
60	Mottled Wood Owl	<i>Strix ocellata</i>	चंद्ररी घन घुबड
61	Spotted Owlet	<i>Athene brama</i>	ठिपकंदार भिंगळा
Family:CAPRIMULGIDAE			
62	Indian Nightjar	<i>Caprimulgus asiaticus</i>	भारतीय रातधा
63	Savana Nightjar	<i>Caprimulgus affinis</i>	फ्रॅक्लीनचा रातधा
Order: COLUMBIFORMES : Pigeons			
Family:COLUMBIDAE			
64	Blue Rock Pigeon	<i>Columbalivia</i>	बारवा
65	Yellow-footed Green Pigeon	<i>Treronphoenicoptera</i>	पिळ्ळ्या पायाची हरीयल
66	Eurasian Collared -Dove	<i>Streptopelia decaocto</i>	कंठपाला डोला
67	Red Collared-Dove	<i>Streptopelia tranquebarica</i>	लालपंखी डोला
68	Spotted Dove	<i>Streptopelia chinensis</i>	ठिपकंदार डोला
69	Laughing Dove	<i>Streptopelia senegalensis</i>	छोटा तपकिरी डोला
Order: GRUIFORMES : Cranes, Crakes			
Family: RALLIDAE			
70	Brown Crake	<i>Amaurornis akool</i>	तपकिरी फटाकडी
71	Slaty-breasted Rail	<i>Gallirallus striatus</i>	निळ्या छातीची पाणकोबडी
72	White-breasted Waterhen	<i>Amanrornis phoenicurus</i>	सफ़-या छातीची पाणकोबडी
73	Purple Swampen	<i>Porphyrio porphyrio</i>	जामळी पाणकोबडी
74	Common Moorhen	<i>Gallinulachloropus</i>	काळी पाणकोबडी
75	Common Coot	<i>Fulica atra</i>	चांदी बटक

Sr. No	Common Name	Scientific Name	Marathi Name
Order: CICONIIFORMES			
Family: PTEROCLIDAE			
76	Chestnut-bellied Sandgrouse	<i>Pterocles exustus</i>	नटतिसिर
77	Painted Sandgrouse	<i>Pterocles indicus</i>	रंगीत नटतिसिर
Family: SCOLOPACIDAE			
78	Common Snipe	<i>Gallinago gallinago</i>	सामान्य पाणलाण
79	Common Greenshank	<i>Tringa nebularia</i>	सामान्य हिरवा टिलवा
80	Common Redshank	<i>Tringa totanus</i>	सामान्य टिलवा
81	Wood Sandpiper	<i>Tringa glareola</i>	ठिपकेदार तुतारी
82	Green Sandpiper	<i>Tringa Ochropus</i>	हिरवी तुतारी
83	Common Sandpiper	<i>Actitis hypoleucos</i>	सामान्य तुतारी
84	Little Stint	<i>Calidris minuta</i>	छोटा टिलवा
85	Sanderling	<i>Calidris alba</i>	कपड्या टिलवा
Family:ROSTRATULIDAE			
86	Greater Painted Snipe	<i>Rostratula benghalensis</i>	रंगीत पाणलाण
Family : JACANIDAE			
87	Pheasant-tailed Jacana	<i>Hydrophasianus schirgus</i>	लांब शेपटीचा कमळपक्षी
88	Bronze-winged Jacana	<i>Metopidius indicus</i>	कांस्य पंखी कमळपक्षी
Family: BURHINIDAE			
89	Great Thick-knee (Great Stone-Curlew)	<i>Esacus recurvirostris</i>	मोठा करणनक
90	Indian Thick-knee	<i>Burhinus (oedipnemus) indicus</i>	भारतीय करणनक
Family: CHARADRIIDAE			
91	Black winged Stilt	<i>Himantopus himantopus</i>	पैकाट्या
92	Little Ringed Plover	<i>Charadrius dubius</i>	कठी टिटवा
93	Kentish Plover	<i>Charadrius alexandrinus</i>	कॅटीन टिटवा

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94	Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>	माळटिटपी
95	Red-wattled Lapwing	<i>Vanellus indicus</i>	टिटपी
Family: GLAREOLIDAE			
96	Indian Courser	<i>Cursorius coromandelicus</i>	भारतीय बाणिक
97	Small Pratincole	<i>Glareola lactea</i>	छोटा आली
Family : LARIDAE - Gull, Tern			
98	Pallas's Gull	<i>Ichthyaetus ichthyaetus</i>	मल्लासचा कुरण
99	Black-headed Gull	<i>Larus ridibundus</i>	काळ्या डोब्याचा कुरण
100	River Tern	<i>Sterna aurantia</i>	नदी सुरण
101	Little Tern	<i>Sterna albifrons</i>	छोटा सुरण
Family: ACCIPITRIDAE- Raptors			
102	Osprey	<i>Pandion haliaetus</i>	मोरघार
103	Black-shouldered Kite	<i>Elanus caeruleus</i>	कापवी
104	Black Kite	<i>Milvus migrans</i>	घार
105	Brahminy Kite	<i>Haliastur indicus</i>	समुंदी घार
106	Shikra	<i>Accipiter badius</i>	पिक्रा
107	Besra	<i>Accipiter virgatus</i>	बेसरा
108	Eurasian Sparrowhawk	<i>Accipiter nisus</i>	युरेशियन चिमणमार ससाणा
109	White-rumped Vulture	<i>Gyps bengalensis</i>	पांढऱ्या पाठीचे गिधाड
110	Indian Vulture	<i>Gyps Indicus</i>	लांब चोरीचे गिधाड
111	Red-headed Vulture	<i>Sarcogyps calvus</i>	राज गिधाड
112	Egyptian Vulture	<i>Neophron percnopterus</i>	पांढरे गिधाड
113	Pied Harrier	<i>Circus melanoleucos</i>	कपड्या भोवत्या
114	Short-toed Snake Eagle	<i>Circaetus gallicus</i>	पांगुळ सर्पगरुड
115	Black Eagle	<i>Ichthyophaga malayensis</i>	काळा गरुड
116	Steppe Eagle	<i>Aquila nipalensis</i>	नेपाळी गरुड
117	Bonelli's Eagle	<i>Hieraetus fasciatus</i>	बोनेलीचा गरुड
118	Grey Headed Fish Eagle	<i>Ichthyophaga ichthyastus</i>	गळी डोब्याचा मत्स्यगरुड
119	Crested Hawk-Eagle	<i>Nisaetus cirrhatus</i>	तुरेणाला गरुड

Sr No	Common Name	Scientific Name	Marathi Name
120	Crested Serpent Eagle	<i>Spilornis cheela</i>	तुरेवाला सर्पगर्कड
121	Oriental Honey Buzzard	<i>Pernis ptilorhynchus</i>	मधुझाज
122	White-eyed Buzzard	<i>Butastur teesa</i>	पांढऱ्या डोळ्याचा झाज
123	Indian Spotted Eagle	<i>Aquila hastata</i>	भारतीय ठिपकेंदार गर्कड
124	Greater Spotted Eagle	<i>Aquila clanga</i>	मोठा ठिपकेंदार गर्कड
Family: FALCONIDAE			
125	Common Kestrel	<i>Falco tinnunculus</i>	सामान्य नारंगिनक
126	Lesser Kestrel	<i>Falco naumanni</i>	छोटा नारंगिनक
Family: PODICIPEDIDAE - Grebes			
127	Little Grebe	<i>Tachybaptus ruficollis</i>	टिड्डुल्ली
128	Great Crested Grebe	<i>Podiceps Cristatus</i>	मोठी टिड्डुल्ली
Family: Anhingidae			
129	Darter	<i>Anhinga melanogaster</i>	तिरंटाज
Family: PHALACROCORACIDAE			
130	Little Cormorant	<i>Phalacrocorax niger</i>	लहान पाणकाणळा
131	Great Cormorant	<i>Phalacrocorax carbo</i>	मोठा पाणकाणळा
Family : ARDEIDAE - Egrets, Herons			
132	Little Egret	<i>Egretta garzetta</i>	लहान झगळा
133	Intermediate Egret	<i>Mesophoyx intermedia</i>	मध्यम झगळा
134	Great Egret	<i>Casmerodius albus</i>	मोठा झगळा
135	Cattle Egret	<i>Bubulcus ibis</i>	गाऊ झगळा
136	Grey Heron	<i>Ardea cinerea</i>	राखी झगळा
137	Purple Heron	<i>Ardea purpurea</i>	जामळा झगळा
138	Striated Heron	<i>Butorides striatus</i>	हिरवी ठोकरी
139	Indian Pond Heron	<i>Ardeola grayii</i>	ठोकरी
140	Black crowned night Heron	<i>Nycticorox nyctorax</i>	रात्रीचर ठोकरी
141	Black Bittern	<i>Dupetor flavicollis</i>	काळा घचक
142	Cinnamon Bittern	<i>Exobrychus cinnamomeus</i>	झडांनी घचक
143	Yellow Bittern	<i>Exobrychus sinensis</i>	पिवळा घचक

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Family:PHOENICOPTERIDAE-Ibis			
144	Glossy Ibis	<i>Plegadis falcinellus</i>	तळतळीत बराटी
145	Black Ibis	<i>Pseudibis papillosa</i>	काळा बराटी
146	Black Headed Ibis	<i>Threskiornis melanocephalus</i>	पांढरा बराटी
147	Eurasian Spoonbill	<i>Platalea leucorodia</i>	चमचाचीच
Family : CICONIIDAE -Storks			
148	Painted Stork	<i>Myeteria leucocephala</i>	रंगीत करकोचा
149	Asian Openbill	<i>Anastomus oscitans</i>	उघडचीच करकोचा
150	Black Stork	<i>Ciconia nigra</i>	काळा करकोचा
151	Woolly Necked Stork	<i>Ciconia episcopus</i>	पांढ-या मानेचा करकोचा
Order:PASSERIFORMES			
Family:PITTIDAEZ			
152	Indian pitta	<i>Pitta brachyura</i>	नवरंग
Family:IRENIDAE			
153	Jerdon's Leafbird	<i>Chloropsis jerdoni</i>	जेरडनचा पर्णपक्षी
Family:LANIIDAE			
154	Long-tailed Shrike	<i>Lanius Schueh</i>	जांब येवरीचा खाटिक
155	Bay-backed Shrike	<i>Lanius vittatus</i>	उदी पाठीचा खाटिक
156	Southern Grey Shrike	<i>Lanius meridionalis</i>	राखी पाठीचा खाटिक
157	Brown Shrike	<i>Lanius cristatus</i>	तपकिरी खाटिक
Family: CORVIDAE			
158	Rufous Treepie	<i>Dendrocittavagabunda</i>	टकाचौर
159	House Crow	<i>Corvus splendens</i>	कापळा
160	Indian Jungle Crow	<i>Corvus (macrorhynchos) Culminatus</i>	डोमकापळा
161	Indian Golden Oriole	<i>Oriolus oriolus</i>	भारतीय हळद्या
162	Black Headed Oriole	<i>Oriolus xanthornus</i>	कृष्णपांसी हळद्या
163	Large Cuckoo Shrike	<i>Coracina macoi</i>	मोठा कोकीळ-खाटिक
164	Scarlet Minivet	<i>Pericrocotus flammeus</i>	नारिंगी गोमेद

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165	Small Minivet	<i>Pericrocotus cinnamomeus</i>	छांटा गोमेट
166	Black Drongo	<i>Dicrurus macrocercus</i>	कोतवाल
167	Ashy Drongo	<i>Dicrurus leucophaeus</i>	राखी कोतवाल
168	White-bellied Drongo	<i>Edolius caerulescens</i>	पांढऱ्या पोटाचा कोतवाल
169	Greater Racket-tailed Drongo	<i>Dicrurus purpuriscus</i>	महाशृंगराज कोतवाल
170	White-throated Fantail	<i>Rhipidura albicollis</i>	पांढऱ्या कंठाची नाचण
171	White-browed Fantail	<i>Rhipidura aureola</i>	पांढऱ्या भुवईची नाचण
172	White-spotted Fantail	<i>Rhipidura albogularis</i>	पांढऱ्या ठिपक्याची नाचण
173	Indian Paradise-flycatcher	<i>Terpsiphone paradisi</i>	स्वर्गीय नर्तक
174	Common Iora	<i>Aegithina tiphia</i>	सामान्य सुलग
175	Common Woodshrike	<i>Tephrodornis pondicerianus</i>	रान छाटिक
176	Black-headed Cuckooshrike	<i>Coracina melanoptera</i>	काळ्या डोक्याचा कौकीळ-छाटिक
Family: MUSCICAPIDAE			
177	Blue Rock Thrush	<i>Monticola solitarius</i>	नील कस्तूर
178	Orange-headed Thrush	<i>Zosterops citrina</i>	नारिंगी डोक्याचा कस्तूर
179	Tickell's Blue Flycatcher	<i>Cyornis tickelliae</i>	टिकेलचा निळा माषिमार
180	Verditer Flycatcher	<i>Eumyias thalassinus</i>	निलाग माषिमार
181	Taiga Flycatcher	<i>Ficedula albicilla</i>	तैगा माषिमार
182	Black-naped Monarch	<i>Hypothymis azurea</i>	काळ्या मानेचा आकाशी माषिमार
183	Bluethroat	<i>Luscinia svecica</i>	धकर
184	Oriental Magpie Robin	<i>Copsychus saularis</i>	दयाळ
185	Indian Robin	<i>Saxicoloides fulicatus</i>	चीरक

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186	Black Redstart	<i>Phoenicurus ochruros</i>	काळा थिसेथिरा
187	Common stone chat	<i>Saxicola torquata</i>	सामान्य गप्पीदास
188	Pied Bush Chat	<i>Saxicola caprata</i>	कपड्या गप्पीदास
189	Brown Rock Chat	<i>Cercomela fusca</i>	तपकिरी गप्पीदास
Family: STURNIDAE			
190	Chestnut-tailed Starling	<i>Sturnia malabaricus</i>	बटामी चपटीची मैना
191	Brahminy Starling	<i>Sturnia pagodarum</i>	भागपाडी मैना
192	Rosy starling	<i>Pastor roseus</i>	गुलाबी मैना
193	Asian Pied Starling	<i>Gracupica contra</i>	कपडो मैना
194	Common Myna	<i>Acridotheres tristis</i>	सालुकी
Family: PARIDAE			
195	Great Tit	<i>Parus major</i>	मोठा चमरंगा
Family: DICAEDAE			
196	Thick billed Flowerpecker	<i>Dicaeum agile</i>	जाड बोचोचा मुलटोच्या
Family: HIRUNDINIDAE			
197	Dusky Crag Martin	<i>Hirundo concolor</i>	धुसर पंकाळी
198	Barn Swallow	<i>Hirundo rustica</i>	बाघ भिंगरी
199	Wire-tailed Swallow	<i>Hirundo smithii</i>	तार-बेपटी भिंगरी
200	Red-rumped Swallow	<i>Cecropis daurica</i>	लालपाटी भिंगरी
201	Streak-throated Swallow	<i>Petrochelidon fluviicola</i>	रेशाळ कटी भिंगरी
Family: PYCNONOTIDAE			
202	Red Vented Bulbul	<i>Pycnonotus cafer</i>	लाल बुड्या बुलबुल
203	White-browed Bulbul	<i>Pycnonotus luteohus</i>	पांढ-या भुवईचा बुलबुल
Family: CISTICOLIDAE			
204	Zitting Cisticola	<i>Cisticola juncidis</i>	रेशाळ घटघट्या
205	Ashy Prinia	<i>Prinia socialis</i>	राखी घटघट्या
206	Plain Prinia	<i>Prinia inornata</i>	घटघट्या
207	Grey Breasted Prinia	<i>Prinia hodgsonii</i>	ग्राय्नी छाती गटगट्या
208	Jungle Prinia	<i>Prinia sylvatica</i>	जंगल घटघट्या

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Family:ZOSTEROPIDAE			
209	Oriental White-eye	<i>Zosterops palpebrosus</i>	चरमेणाला
Family:SYLVIIDAE			
210	Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>	झरीथचा शोरु घटघट्या
211	Clamorous Reed Warbler	<i>Acrocephalus stentoreus</i>	बडबड्या शोरु घटघट्या
212	Booted Warbler	<i>Hippolais caligata</i>	मायमाज घटघट्या
213	Greenish Warbler	<i>Phylloscopus trochiloides</i>	हिरवट पर्णघटघट्या
214	Sulpher-bellied Warbler	<i>Phylloscopus griseolus</i>	पिवळ्या पोटाचा घटघट्या
215	Common Chieffchaf	<i>Phylloscopus Callybita</i>	चिपचिप
216	Lesser Whitethroat	<i>Sylvia curruca</i>	मऊ-या गळ्याचा छोटा घटघट्या
217	Common Tailor Bird	<i>Orthobomus sutorius</i>	बिपी
218	Yellow-eyed Babbler	<i>Chrysomma sinense</i>	पिवळ्या डोळ्याचा सातमाई
219	Common Babbler	<i>Turdoides caudatus</i>	सामान्य सातमाई
220	Large Grey Babbler	<i>Turdoides malcolmi</i>	शरडी सातमाई
221	Jungle Babbler	<i>Turdoides striatus</i>	जंगली सातमाई
222	Tawny-bellied-Babbler	<i>Dumetia hyperythra</i>	पिंगट पोटाचा सातमाई
Family:ALAUDIDAE			
223	Indian Bushlark	<i>Mirafra erythroptera</i>	भारतीय चंडोल
224	Singing Bushlark	<i>Mirafra cantillanus</i>	गायक चंडोल
225	Ashy-crowned Sparrow Lark	<i>Eremopterix grisea</i>	डीबारी
226	Rufous-tailed Lark	<i>Ammomanes phoenicurus</i>	ताडूस पंढरीचा चंडोल
227	Sykes's Lark	<i>Galerida deva</i>	साईक्सचा चंडोल
228	Crested Lark	<i>Galerida cristata</i>	तुरेणाला चंडोल
229	Oriental Skylark	<i>Alauda gulgula</i>	गुलगुला चंडोल

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Family:NECTARINIDAE			
230	Purple-rumped Sunbird	<i>Leptocomazeylonica</i>	जानळ्या पाठीचा सूर्यपक्षी
231	Purple Sunbird	<i>Cinnyris asiatica</i>	जानळा सूर्यपक्षी
Family:PASSERIDAE			
232	White Wagtail	<i>Motacillaalba</i>	पांढरा घोबो
233	White browed Wagtail	<i>Motacilla maderaspatensis</i>	करड्या घोबो
234	Yellow Wagtail	<i>Motacillaflava</i>	पिढळा घोबो
235	Grey Wagtail	<i>Motacillacinerea</i>	करडा घोबो
236	Citrine Wagtail	<i>Motacillacitreola</i>	पिढळ्या डोक्याचा घोबो
237	Paddy field Pipit	<i>Anthus rufulus</i>	धान चरचरी
238	Blyth's pipit	<i>Anthus godlewskii</i>	छरीघची चरचरी
239	Tawny pipit	<i>Anthus campestris</i>	पिंगट चरचरी
240	House Sparrow	<i>Passer domesticus</i>	चिमणी
241	Chestnut-shouldered Petronia (Yellowthroated Sparrow)	<i>Gymnoris xanthocollis</i>	शानचिमणी / पीतकटी चिमणी
242	Baya Weaver	<i>Ploceus philippinus</i>	सुगरण
243	Red Ava davat (Munia)	<i>Amandava amandava</i>	लाल मनोली
244	Indian Silverbill	<i>Euodice malabarica</i>	चाटीचांच मनोली
245	Black headed / Tricoloured Munia	<i>Euodice malacca</i>	कृष्णबीश मनोली / तिनरंगी मनोली
246	Scaly-breasted Munia	<i>Lonchura punctulata</i>	ठिपकेवाली मनोली
247	White-rumped Munia	<i>Lonchura striata</i>	पांढऱ्या पाठीची मनोली
Family:FRINGILLIDAE			
248	Common Rosefinch	<i>Carpodacus erythrinus</i>	गोरली
249	Crested Bunting	<i>Lonchura lathamii</i>	तुरेणाला नारीट
250	Black-headed Bunting	<i>Emberiza melanocephala</i>	कृष्णबीश नारीट
251	Grey-necked Bunting	<i>Emberiza buchanani</i>	करड्या मानेचा नारीट

Apart from the above following birds were said to be found in Wardha as per earlier Working Plan.

Sr. No.	Common Name	Zoological Name
1.	Purple wood pigeon	<i>Columba punices</i>
2.	Common Crane	<i>Gru sgrus</i>
3.	Sarus crane	<i>Grus antigone</i>
4.	Brown wood Owl	<i>Strix leptogrammica</i>

IUCN Listed Threatened Birds from Wardha District

Sr.No.	Common Name	Latin Name	मराठीनावRDB Status
1.	Alexandrine Parakeet	<i>Psittacula eupatria</i>	करणपोपट NT
2.	Great Thick knee	<i>Esacus recurvirostris</i>	मोठाकरधानक NT
3.	River Tern	<i>Sterna aurantia</i>	नदी तूरुय NT
4.	White-rumped Vulture	<i>Gyps benghalensis</i>	पांढ-यापाटीचेगिधाड CR
5.	Indian Vulture	<i>Gyps indicus</i>	भारतीय गिधाड CR
6.	Egyptian Vulture	<i>Neophron percnopterus</i>	पांढरेगिधाड EN
7.	Red-headed Vulture	<i>Sarcogyps calvus</i>	राज गिधाड CR
8.	Steppe Eagle	<i>Aquila nipalensis</i>	नेपाळी गरुड EN
9.	Grey-headed Fish Eagle	<i>Ichthyophaga ichthyaeus</i>	राखी डोक्याचामत्स्य गरुड NT
10.	Indian Spotted Eagle	<i>Aquila hastata</i>	छोटाहिपकेदार गरुडVU
11.	Oriental Darter	<i>Anhinga melanogaster</i>	तिरदाज NT
12.	Black-headed Ibis	<i>Treskiotis melanocephalus</i>	पांढरा वराटी NT
13.	Painted Stork	<i>Myateria leucocephala</i>	संगीतकरकोचा NT
14.	Woolly necked Stork	<i>Ciconia episcopus</i>	पांढ-यामानेचा करकोचा NT

Key: RBD – Red Data Book CR – Critically Endangered
VU – Vulnerable NT – Near Threatened
EN – Endangered

C. Reptiles of Wardha District

Sr.No.	Reptilia	Scientific Name
	Trionychidae	
1	Softshell Turtle	<i>Lissymis</i>
	Geckonidae	
1	Yellow-green House Gecko	<i>Hemidactylus flaviviridis</i>
2	Brook's Gecko	<i>Hemidactylus cf. brooki</i>
3	Bark Gecko	<i>Hemidactylus leschenaultia</i>
4	Square Spotted Gecko	<i>Hemidactylus gracilis</i>
5	Termite Hill Gecko	<i>Hemidactylus triedrus</i>
6	Kollegal Ground Gecko	<i>Geckoella kollegalensis</i>
7	Nebulosus Ground Gecko	<i>Geckoella nebulosi</i>
	Agamidae	
1	Common Garden Lizard	<i>Calotes versicolor</i>
2	Forest Rock Lizard	<i>Psamophilus blanfordianus</i>
3	Fan Throated Lizard	<i>Sitana spinaecephalus</i>
	Scincidae	
1	Common Brahminy Skink	<i>Eutropis Carinata</i>
2	Little Skink	<i>Eutropis macularia</i>
3	Little Skink	<i>Eutropis innotata</i>
4	Snake Skink	<i>Lagosoma punctate</i>
5	Line d suppld Skink	<i>Lygosoma guntheri</i>
6	Gunther's Snake Skink	<i>Lygosoma guntheri</i>
7	Snake Skink	<i>Lygosoma punctate</i>
	Lacertidae	
1	Jerdons Snake-eyed Lizard	<i>Ophisops jerdoni</i>
	Varanidae	
	Bengal Monitor Lizard	<i>Varanus bengalensis</i>
	Chameleontidae	
1	Indian Chameleon Lizard	<i>Chameleon zeylanicus</i>
	Typhlopidae	
1	Brahminy Blind Snake	<i>Indotyphlops braminus</i>
2	Beaked Worm Snake	<i>Grypotyphlops acutus</i>

Sr.No.	Reptilia	Scientific Name
	Boidae	
1	Red Sand Boa	<i>Eryx johnii</i>
2	Common Sand Boa	<i>Eryx conicus</i>
	Pythoniade	
1	Indian Rock Python	<i>Python molurus</i>
	Colubridae	
1	Indian Rat Snake	<i>Ptyas mucosa</i>
2	Common Trinket Snake	<i>Coelognathus helena</i>
3	Common Wolf Snake	<i>Lycodon aulicus</i>
4	Barred Wolf Snake	<i>Lycodon striatus</i>
5	Common Kukari Snake	<i>Oligodon arnensis</i>
6	Russell's Kukari Snake	<i>Oligodon taeniolatus</i>
7	Common Cat Snake	<i>Boiga tristis</i>
8	Forstein's Cat Snake	<i>Boiga forsteni</i>
9	Bronze Back Tree Snake	<i>Dendrelaphis tristis</i>
10	Banded Racer	<i>Argyrogena fasciolata</i>
11	Gunthers racer	<i>Coluber ventromaculatus</i>
12	Green Keelback Snake	<i>Macropistodon plumbicolor</i>
13	Buffstriped Keelback	<i>Amphiesma stolatum</i>
14	Checkered Keelback Snake	<i>Xenocrophis piscator</i>
15	Olive Keelback Snake	<i>Antretium natus</i>
16	Green Vine Snake	<i>Ahaetulla natus</i>
17	Indian Smooth Snake	<i>Coronella brachyura</i>
18	Indian egg eater snake	<i>Elachistodon westermanni</i>
	Elapidae	
1	Spectacled Cobra	<i>Naja naja</i>
2	Common Krait	<i>Bungarus ceruleus</i>
3	Slender Coral Snake	<i>Calliophis melanurus</i>
	Viperidae	
1	Saw Scaled Viper	<i>Echis carinata</i>
2	Russell's Viper	<i>Daboia russelli</i>

- 1) Preliminary Survey of Reptile Fauna of Vidhabha Region, Maharashtra, (Central India)
Presented By: Parag Dandge & Ashish Tiple.
- 2) The 8th Indian Symposium of Odonatology & Biodiversity 2014 Nagpur.

V. OTHERS

List of Algae, Fungi, Bryophytes, pteridophytes found in Wardha Forest Division

(As provided by J.B. Science College Wardha)

Sr.No.	Species
1	Algae – Spirogyra, Chara, Oedogonium, Hydrodictyon, Mougotia, Oscillatoria, Nostoc, Naviculla, Scenedesmus, Cosmarium, Pinularia, Cymbella.
2	Fungi – Aspergillus, Chaetorium, Penicillium, Mucor, Rhizopus, Fusarium, Alternaria, Pyricularia, Curvularia, Helminthosporium.
3	Bryophytes – Riccia, Notothallus.
4	Pteridophytes – Pteris, Nephrolepis, Azolla, Lsoetes.

PART-I

SUMMARY OF FACTS ON WHICH PROPOSALS ARE MADE

MAP OF WARDHA FOREST DIVISION



CHAPTER-1

THE TRACT DEALT WITH

1.1: NAME AND SITUATION

Introduction: Wardha district lies in the valley of river Wardha and the district derives its name from this river. According to General Cunningham, it is "Wardha" or "Wadtha", the river of banyan trees, as the entire valley was lying beautifully with rows of banyan (Wad) trees. The district is predominantly agricultural except for a few Textile and Oil mills. There are many places of historical importance out of which few are mentioned below:

- i) **Sewagram:** It is an important village 6 km from Wardha. Its original name was Shegaon. Gandhiji made it the headquarter for social service. Many decisions of national importance were taken here and deliberations were held during the struggle for national independence when it was visited almost by all leading leaders of freedom struggle. Gandhiji's cottage is present here intact to date. Sewagram has become a place of pilgrimage and reverence to the patriots.
- ii) **Pavnar:** It is 10 km from Wardha. It is situated on the bank of Dham river. There is a Gandhi Kuti and Param Dham Ashram of Vinoba Bhave, Sarvodaya leader who had launched the Bhudan Movement.
- iii) **Vipassana Centre at Bor Dharan:** Vipassana centre was established by Trilokya Buddha Mahasangha, 30 km from Wardha where meditation and Buddha's preaching is taught.
- iv) **Girad:** There is a Tomb of Saint Sufi Shekh Farid and it has religious significance. Situated at a distance of 60 km from Wardha.
- v) **Kelzar:** There is a Varad Vinayak (Lord Ganesh) temple at Kelzer which is also known as one of the Ashtavinayak Ganesh temple from Vidarbha region. This place has religious importance.

The total forest area in-charge of Wardha forest division extends over 926.92Sq Km. The total forest area included in this working plan is 926.92 Sq.Km.

out of which 440.46 Sq.Km. is Reserved Forest, 317.28 Sq.Km. Protected Forest, 153.40 Sq. Km. Zudpi Jungle, 2.4912 Sq. Km. acquired private Forest and 13.27 Sq. Km. Non forest land taken over for C.A.

Wardha Forest Division is situated between 20° 18' to 21°21' North latitude and between 78° 30' to 79° 15' East longitude. The boundary of the Wardha Division is conterminous with the boundary of the Wardha district. The forest areas of Wardha Division occur in compact blocks and some scattered patches. The boundaries of the tract dealt with are as shown in Table 1.1.

Table 1.1: Boundaries of Wardha Forest Division

S N	Direction	Name of Forest Division / District
1	North and North-East	Nagpur Division/Nagpur District
2	East and South-East	Chandrapur Division/Chandrapur district
3	South and South-West	Yavatmal Division/Yavatmal district
4	West	Amravati Division/Amaravati district

1.2: CONFIGURATION OF THE GROUND

Due to administrative convenience, the Wardha district was reorganised into 8 talukas, namely; Wardha, Seloo, Deoli, Arvi, Karanja, Ashti, Hinganghat and Samudrapur on 1st May 1981. The northern hilly tract of the district lies at the southern fringe of Satpura range which includes Ashti, Karanja and Arvi talukas. Remaining areas are included in the valleys of Wardha and Wena rivers. The altitude of district varies from 203.91 m to 548.94 m above the Mean Sea Level. The highest point is along the boundary of compartment number 238 of the Reserved Forests, in Bor Sanctuary. The altitude of Wardha town is 248.46 m.

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

The area is drained by Wardha river and its tributaries, namely, Dham and Wena rivers which carry water almost throughout the year. The other rivers get dried up in hot months. The Satpura Hill ranges form the catchment areas of Wardha, Dham, Bor, Kar and Wena rivers. Upper Wardha on Wardha river and Lower Wena on Wena rivers are the major projects, whereas, Bor Dharan, Dham, Kar and Pothara are Medium projects in the division that provide water for domestic consumption and irrigation. There are over 15 other medium and minor irrigation projects on small rivers.

1.3: GEOLOGY, ROCK AND SOIL

Geological Formation: The geological formation throughout the district is Deccan trap. It gives rise to plateau type hills separated by broad valleys. It comprises a thick pile of volcanic flows of Deccan trap basalt with occasional thin zones of inter-trappean rocks. The basaltic flows are made of several varieties of basalt and dominantly consist of easily recognisable formation of compact, hard dark grey to black rock. Along the North-East boundary near the village of Ashti inter-trappean formation designated as *Lameta* occurs. It consists of limestone with irregular nodules of *chert*.

**Table 1.2: Rock formation in Wardha District
(Source: Geological Survey of India)**

Geological formation	Rock assemblage	Geological Period
Alluvium	Soil, Kankar and Laterite	Recent.
Deccan Trap	Volcanic flow with partings of sedimentary rocks like limestone and sandstone	Upper cretaceous Eocene
Granite gneiss	Granite, quartzite, amphibolites and granite gneiss	Archean lower proterozoic

1.3.1: Soil and Minerals: The alluvial soil along the water courses of main tributaries of Wardha, Dham and Bor rivers is eminently suited to tree growth. The basaltic rocks can be distinguished into two types, namely, those that are extremely compact, hard and homogeneous and the other type is the softer basalt exfoliating in softer flakes. The former type of rocks wither very slowly and the small quantity

of soil that is formed in such areas supports low quality tree growth. This covers, mainly, Ashti range. In the areas having softer basalt rapid decomposition takes place and a fine yellowish brown loam is obtained. It supports valuable tree growth.

As withering advances the finer grains of the soil and the decomposed organic matter are washed away from the loam and deposited in the lower sheltered regions forming patches of *regur* or black cotton soil. This is a fine grained dark soil which varies greatly in colour, consistency and fertility. It is highly hygroscopic and results in water logging at saturation point. This is chemically rich soil and is capable of yielding valuable field crops when well aerated by constant hoeing. In the forests, however, the vegetation supported by this soil has mostly to depend upon its natural aeration. Wherever, the drainage is good, as in belts along streams, it supports valuable forests, elsewhere, it remains practically waterlogged and produces as abundant crop of important fodder grasses. Such soils are not favourable for plantations. Regur is sometimes mixed with kankar 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 forest if other factors are favourable. The soil derived from Lameta rocks is only fair and does not seem influencing the vegetation.

No minerals of economic importance are associated with the rocks exposed in this area. However, minor minerals like building stones, bricks, tile clays and kankar for lime burning can be found in these areas.

1.4: CLIMATIC PARAMETERS

In general, climate of Wardha district is hot and dry. There are three seasons namely Summer, Winter and monsoon. The Winter season starts by the end of November and continues up to middle of February. The weather is pleasant during winter. The Summer season starts in 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. Monsoon season is from mid-June to September. The monsoon months are humid and sultry.

1.4.1: Rainfall

The average annual rainfall of Wardha district is about 850 mm. 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. August is the heaviest rainfall month in the year. Average number of rainy days in a year varies with place and time and decreases from Wardha to Ashti. Except, the rainy season, the entire year is dry.

1.4.2: Temperature

The diurnal variation in temperature is the maximum during March. In August these changes are minimal. The overall minimum and maximum temperature is 9.9° C and 46.0° C, respectively. The high temperature during the summer months adversely affects the vegetation in flat and bare country owing to the exposed and highly radiating basaltic rocks. In forest clad hills, however, conditions favourable to plant growth are present.

1.4.3: Drought

Damage due to drought is a rare incident. In the recent past, there have been erratic rains during the monsoon. This affects the natural regeneration and afforestation works undertaken in the division.

1.4. 4: Storms, floods and frost

The prevailing winds are North-Easterly from October to March and South-Westerly from April to September. The winds are generally moderate. Occasional storms in pre-monsoon period are also experienced which sometimes result in uprooting of isolated trees. High floods are not of common occurrence. Frost is not recorded so far and is almost unknown in the forest areas of the district.

1.4.5: Soil erosion

The effective rainfall and run-off during the south-west monsoon has important implications for crop production in the district. The effective rainfall for the south-west monsoon is computed to be around 533mm and its distribution is

110, 162, 175, and 85 mm, respectively, for the months of June, July, August, and September. On integrating the effective rainfall of the district with the water-holding capacity of the soils of the district, which is around 100-150 mm per metre depth, the run-off water is estimated to be 355 mm or 3,550 cubic metre of rain water per hectare per annum. The run off takes away the fertile top soil, leading to severe soil erosion in the district.

Soil erosion adversely affects the fertility status and land use. National Bureau of Soil Science and Land-Use Planning has grouped the soils of Wardha into different erosion classes.

Table 1.3: Soil erosion classes, Wardha District

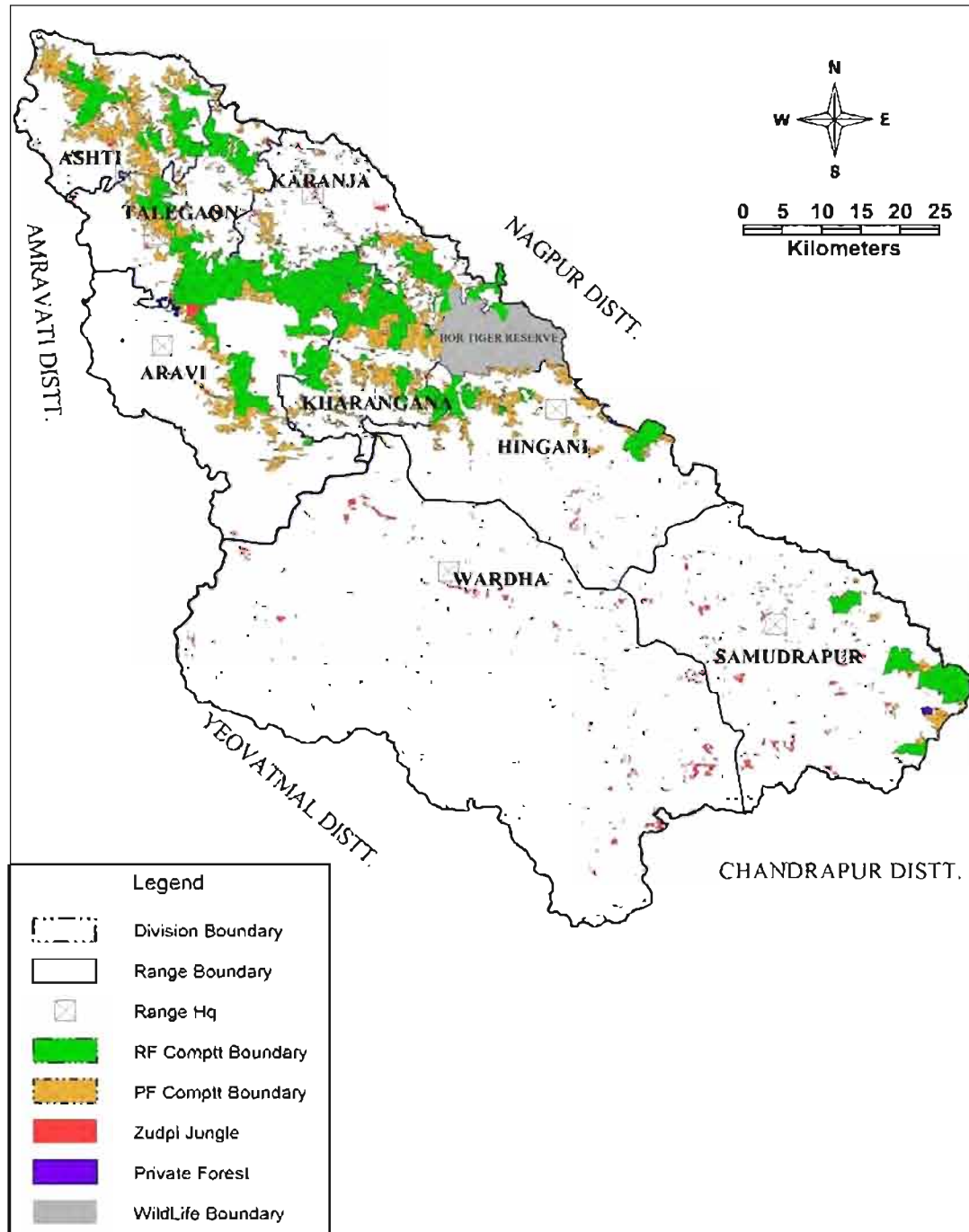
Erosion Class	Area In Hectare	Percentage of Total Geographical Area	Expected Soil Loss (tonnes/hectare/year)
Slight	46,508	7.3	5-10
Moderate	473,447	75.2	10-15
Severe	104,043	16.5	15-20
Water Bodies	4,902	1.0	

Source: Sharma J.P; K.S. Gajbhiye; C. Mandal et al. 2005(Designing Rural Technology Delivery Systems for Mitigating Agricultural Distress :A study of Wardha District M S Swaminathan Research Foundation Chennai & Office of the Principal Scientific Adviser to the Government of India New Delhi published in 2009)

1.4.6: Health

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

MAP OF WARDHA FOREST DIVISION **LEGAL STATUS WISE FOREST AREA**



CHAPTER-2

MAINTENANCE/INCREASE IN THE EXTENT OF FOREST AND TREE COVER

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

2.1.1: Area description.

The total forest area as per Form No. 1 is 1026.08 Sq. Km. Out of this, 99.16 Sq.Km is handed over to Wildlife wing. Hence, net area incharge of Wardha forest division is 926.92 Sq. Km. This Working Plan covers management prescriptions for 926.92 Sq. Km.

The area details is summarized in the Table given below

Table 2.1:Range wise area Statement of Wardha Forest Division

Range	Old RF		New RF		PF			Zudpi Jungle			Acquired Pvt. Forest			Non Forest Land taken over as a CA land against the project under F.C.A. 1980		Total Area with Division (ha.)
	Total Comptt.	Area in ha.	Total Comptt.	Area in ha.	Total Villages	Total Comptt.	Area in ha.	Total Villages	Total Survey No.	Area in ha.	Total Villages	Total Survey No.	Area in ha.	Total Villages	Area in ha.	
Wardha	0	0	0	0	1	1	82.04	376	2494	5971.84	0	0	0	0	0	6053.88
Samudrapur	17	4525.2	1	25.69	16	16	1182.52	129	1159	2962.04	1	3	84.91	0	0	8780.36
Hingani	13	2833.89	4	290.45	35	37	4626.48	136	888	1560.39	2	2	31.07	2	40.89	9383.17
Kharangana	39	7838.8	2	96.54	28	38	6622.2	19	140	254.79	0	0	0	9	136.78	14949.11
Arvi	36	8873.94	3	125.23	26	29	4301.56	48	300	988.63	1	8	53.21	9	377.58	14720.15
Asbri	21	4743.34	4	403.39	54	51	7581.36	64	330	828.70	0	0	0	15	772.64	14329.43
Talegaon	24	6456.64	3	109.12	34	37	3738	64	514	994.94	2	9	64.16	0	0	11362.86
Karanja	34	7660.56	2	63.318	55	57	3594.09	67	829	1779.35	1	1	15.77	0	0	13113.09
Total	184	42932.37	19	1113.73	249	266	31728.25	903	6654	15340.68	7	23	249.12	35	1327.89	92692.05
	Total RF Comptt. 203 = Area 44046.11 ha.															

2.1.2: Administrative units.

For administrative convenience the ranges, rounds and beats were reorganised in year 2006 and the entire division has been divided into 8 Ranges, 39 Rounds and 187 Beats.

2.1.3: Legal position.

Reserved Forest: The forests that were, originally, declared Reserved Forest under the provisions of the Indian Forest Act, VII of 1878, as per the notification no 917 (a) dated 26.2.1879. Subsequent changes, as effected under the authority of the State Govt. Gazette notifications issued from time to time. Orders of settlement officers and corrections intimated by the map office, Survey of India, Dehra Dun have been incorporated in the area statement Form 1 of the Division.

Protected Forests: As per section of Madhya Pradesh Abolition of Proprietary Rights (Estates, Mahals and Alienated lands) Act of 1950 (I of 1951), the area formerly belonging to *malgujars* was vested in the State Govt. On April 1, 1951, they were taken over by Revenue Department as per instructions contained in M P Revenue Department's 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 M P 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.

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

In 1977 Govt of Maharashtra declared 1868.41 ha area of these Protected Forest as Reserved Forest under section 20 of the Indian Forest Act, 1927 vide notification No FDL/2369-52991-F2, dated April 14, 1978.

A number of alterations and adjustments affecting the area of the Reserve and Protected Forests have subsequently taken place.

An area of 15340.68 ha. of Zudupi jungle owned by Revenue department was handed over to Forest department, the proposal for notification under Sec.4 has been sent to Commissioner, Nagpur to convert into Protected Forests is under process. Taluka wise and Range wise zudupi jungle distribution is shown in the Table below.

Table 2.2: Zudpi Jungle distribution

Zudpi Jungle				
Sr.No.	Range	Total Villages	Total Survey No.	Area in hec.
1	Wardha	376	2494	5971.84
2	Samudrapur	129	1159	2962.04
3	Hingani	136	888	1560.39
4	Kharangana	19	140	254.79
5	Arvi	48	300	988.63
6	Ashti	64	330	828.70
7	Talegaon	64	514	994.94
8	Karanja	67	829	1779.35
Total		903	6654	15340.68

2.1.4: Rights and concessions.

Reserved Forests

There are no rights in the Reserved Forest except right to way and access to water. There is no commutation of *nistar or paidawar* in the Wardha Forest Division. Various concessions have been granted from time to time to the agriculturists and other by the erstwhile Government of Madhya Pradesh and Government of Maharashtra. The following concessions have been permitted:

- The 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 is a legal right.

The inhabitants of the forest villages were allowed to cultivate the lands allotted to them on payment of nominal rent. They were also permitted to graze their cattle and to obtain timber and other forest produce for their bona fide domestic use as per the rules laid down in MP Forest manual. Since, the transfer of these villages to Revenue Department, they are treated at par with other villages.

Protected Forests

Before abolition of the proprietary rights all lands belonged to the proprietors. A village administration paper called "Wazib-ul-arz,ò was prepared for every settlement; and plots of land were separately recorded, showing the Khasara number and area which was set apart for a particular purpose. Under section 202 of the Central Province Land Revenue Act, 1917, a provision was also made for punishing the violation of any of these customs. Under the provision of the Madhya Pradesh Abolition of Proprietary Rights (Estates, Mahala, Alienated Lands) Act, 1950 (Act I of 1951), all communal and other wastelands became property of the Government while occupied lands continued to be private.. In order to distinguish between the rights existing on the government wastelands and on the other lands, a provision was made in the Madhya Pradesh Land Revenue code, 1957 prescribing the preparation of the Nistar Patrak and Wazib-ul-arz for every village. The Nistar Patrak deals exclusively with management and use of the government land while the Wazib-ul-arz deals with community and customs use over private land.

The nistar enquiry was conducted in Wardha district during 1954-1956, and 255 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 had been treated as individual zones. Villages assigned to particular zone can exercise their nistar rights within that zone.

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

- A village having tree clad area equal to half the occupied area was considered to be self-sufficient.
- A village having tree clad area more than half the occupied area was considered to be surplus village.

- A village having tree clad area less than half the occupied area considered to be a deficit village.

2.2: FOREST AREA UNDER DIFFERENT WORKING CIRCLE

The area under the different Working Circles in the Division is given in the following tables.

Table No. 2.3: Area Allocation to Different Working Circles

Sr. No.	Name of Working Circle	Area allocated (Ha.)
1	Selection-Cum-Improvement	32852.96
2	Improvement Working Circle	19239.01
3	Afforestation Working Circle	21929.61
4	Protection Working Circle	12320.57
5	Grass and Fodder Management WC	6349.90
6	Wildlife (Overlapping) Working Circle	Entire area
7	NTFP (Overlapping) Working Circle	Entire area
8	JFM (Overlapping) Working Circle	Entire area
	Total	92692.05

2.2.1: Range-wise allocation of the area of different working circles is shown in the table below:

Table No.2.4: Range-Wise Area Allocation of Different Working Circles

Sr. No	Range	Total area in ha.					
		SCI WC	IWC	AFF WC	PWC	G&FR M WC	Total
1	Arvi	5772.695	1685.587	1519.737	5219.80	522.334	14720.15
2	Ashti	1488.303	3130.966	4602.488	963.854	4143.832	14329.43
3	Hingni	2678.696	3671.401	1836.813	1196.25	0	9383.17
4	Karanja	6796.165	2526.66	2885.695	741.673	356.73	13113.09
5	Kharangana	8347.007	2105.477	715.79	3462.199	318.648	14949.11
6	Samudrapur	2346.43	2265.14	2962.04	736.79	276.115	8780.36
7	Talegaon	5423.666	3853.779	1353.173	0	732.239	11362.86
8	Wardha	0	0	6053.88	0	0	6053.88
Grand Total		32852.96	19239.01	21929.61	12320.57	6349.90	92692.05

2.3: PERCENTAGE OF FOREST WITH SECURED BOUNDARIES

State of Boundaries

The total length of the external boundary of the Reserved Forests is 735.88 km of which about 39.18 km, is formed by permanent natural features and 696.70 km is demarcated. These demarcated artificial boundaries are cleared lines 12 m wide 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 m wide boundary line. The pillars are serially numbered in anti-clock-wise direction. Separate series of numbers are adopted for boundary lines passing through different villages. Half width boundary line lies wherever the Reserved Forest adjoin the Protected Forests and other areas.

The total length of the boundary line of Protected Forests is 2060.90 km, approximately. This includes the boundaries of scattered and isolated small patches common boundaries with Reserved Forests. Out of this 17.80 km formed by permanent natural features and 1759.30 km is demarcated. The boundary common with Reserved Forests is 283.80 km. At the time of transfer of exproprietary forests to the Forest Department, no demarcation was done on the ground. The survey and demarcation of these forests was started in 1960-61. The demarcation was done by pillars. A statement showing the extent of natural and artificial boundaries is given in **Appendix XVIII**.

Thus, RF and PF are 100% demarcated while Zudpi Jungle Boundaries not truly demarcated or secured with pillars.

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

The total geographical area of the District is 6309.00 sq. km. of which 1090.99 sq. km. is forest. 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:

Table No. 2.5: Forest cover over the Last Decade during the Implementation of the Plan

SFR Year	Geographical area in sq.km.	Very dense area	Mod.dense area	Open forest	Total	% of G.A.	Scrub
2005	6309	12	415	428	855	13.55	57
2009	6309	10	419	430	859	13.62	62
2015	6309	10	419	430	859	13.62	62

There is a decrease in the Very Dense forests in the District but overall there is an increase of the forest area by 4 sq.kms..

The threats to the forests from land use and land use change and forestry (LULUCF) is real and affects large areas as pressure on land for habitation, agriculture, industries, developmental works and other activities mount up as the population increases and the accompanying wants expand.

The Plantation/ Tree Outside Forests (TOF) for State of Maharashtra according to the State of Forest Report 2015 is 1,232.17 sqkms adding 2.38% to the forest cover of the State.However no specific figure for the District is available.

2.4.1: Disforestation Prior to 1980

In Reserved Forest and Protected Forest, total area disforested is 5049.21 ha. and 2168.17 ha respectively. Details are given in **Appendix No. XV**.

2.4.2: Area Diverted for Non- forestry purposes under ForestConservation act, 1980

Area diverted under FCA 1980 through final sanction is 866.49 ha. Area diverted with Stage-I sanction involves 96.29 ha. In lieu of this, 1327.89 ha of non-forest land has been made available for compensatory afforestation.

Table No. 2.6: Area diverted for non- forestry purposes under FCA 1980

Projects of Wardha district					
No of Projects	Forest Land (ha)	Compensatory land (ha)			Remarks
		ZJ	NFL	Total	
42	866.49	2030.01	1327.89	3357.90	Final sanction

2.4.3: Areas diverted for non- Forestry Purposes under Forest Right Act, 2006

Under Section 3(2) of FRA, 7.644 ha.involving 12 cases has been diverted for Non-forestry purposes. The status of Implementation of FRA 2006 in Wardha Forest Division (up to July, 2015) is as below:

Table No. 2.7: The status of Implementation of FRA 2006 in Wardha Forest Division (up to July, 2015)

Type of Claim	No. of cases received by Gram Sabha	No. of cases rejected by Gram Sabha	No. of cases rejected by SDLC	No. of cases rejected by DLC	No. of cases finally accepted by DLC	No. of cases pending for decision at DLC
Individual	591	103	252	13	223	0
Community	39	0	13	10	9	7
Total	630	103	265	23	232	7

This diversion of forest land to the traditional forest dwellers has further fragmented the area of the Division. The details are given in the Appendix No. - LXII. In this, 223 cases of individual claims distributed cover an area of 109.32 ha and the 9 claims of community rights cover an area of 5.645 ha.

2.5: THREATS TO THE FOREST

The main threat to the maintenance of forest cover/area in the Division is encroachment. While the Division is relatively better of compared to the other areas, the propensity of people to colonise on forest land is a common obsession. The Department has also been handed over with 15340.68 ha of Zudpi Jungle and some of the area is already encroached. The area is subject to further encroachment as the consolidation of boundary is not done yet. Hence consolidation of boundary has been given highest priority for Zudpi Jungle which is proposed to be done in 3 years. The threat to the Jhudpi 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 TYPE

The Forest of Wardha Division has been classified as follows as per Champion and Sethô's classification and following are the forest types found. The majority of the forest comes under 5A/c₃ Southern dry mixed deciduous forests with very insignificant areas of the other types.

Table No. 2.8: Forest Types of Wardha Forest Division

Type	Notation	Type description
Sub-group	5 A	Southern Tropical Dry Deciduous Forests.
I. Climax types	5A/ci	Dry teak bearing forests
	5A/cia	
	5A/cib	Very dry teak forests
	5A/c ₃	Dry teak forests
		Southern dry mixed deciduous forests
II. General Edaphic types	5/E-2	Bosewellia forests
	5/E-5	Butea forests
III. Degradation stages	5/D S1	Dry deciduous scrub.
IV. General serial type	5/ISI	Dry tropical riverain forest

2.7: TREE COVER OUTSIDE FOREST AREA.

The total geographical area of the District is 6309.00 sq. km. of which 1090.99sq. km. is forest. The Plantation/ Tree outside Forests (TOF) for State of Maharashtra according to the State of Forest Report 2015 is 1,232.17 sqkms adding 2.38% to the forest cover of the State. However no specific figure for the District is available.

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 form a substantial quantity and forest cover in the areas outside

forests. 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. It is interesting to note that the Department has also carried out the assessment of the success and survival of these plantations in 2005 and the results are very encouraging.

Trees Outside Forests planted under Social Forestry Wardha Division during the period 1982 to 2005

1. Total beneficiaries --	2596
2. Total planted area - -	1298 ha.
3. Total No. of seedlings planted--	25.33 lac
4. No. of surviving trees upto 2005--	6.49 lac
5. Percentage survival--	27%

These six and half lakh mature trees that have survived may be presumed to have been retained by the beneficiaries to some extent. They have added a substantial additional forest cover in the district.

Trees Outside Forests planted under Social Forestry Wardha Division during the period 2005 to 2015

A) Block Plantation

1. Total beneficiaries-	2710
2. Total planted area -	1180.3 ha.
3. Total No. of seedlings planted-	1878705
4. Total No. of survival planted seedling - at the time of handing over the scheme	744397

B) Road-side Plantation

5. Total length planted in km. -	664.06 km.
6. Total No. of planted seedling-	257145
7. Total No. of planted seedling at the time - of handling over the scheme	244447

Hence, the total No. of plants at the time of handing over the scheme is 9,88,844 (744397 + 244447) and the percentage of the plants's survival is 46%. The

assessment of the survival as on date is required to be carried out. The above information has been extracted from the booklet prepared by the Wardha Social Forestry Division where year-wise, scheme-wise and species planted are given. The same is too bulky to be appended,

The Trees Outside Forests need to be assessed by the Social Forestry Division of the District. With the present data already available with the Division, a precise number of trees and forest cover present in the areas outside forests can be arrived at. 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.

2.8: SHIFTING CULTIVATION (JHUMMING)

Shifting cultivation is not practiced in this Forest Division.

CHAPTER-3

MAINTENANCE, CONSERVATION AND ENHANCEMENT OF BIODIVERSITY

3.1: FOREST COMPOSITION AND DISTRIBUTION

The forests of Wardha 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, 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. Generally the western and northern slopes are better stocked than the drier eastern and southern slopes. The rocks throughout the Wardha Forest Division are Deccan trap, but the soil varies. Geology, soil type and depth plays an important role in determining the composition and quality of the crop.

The biotic factors which have resulted in the degradation of the forests are excessive grazing, illicit felling, overdependence on forest for fuelwood, weed infestation and frequent fires. The illegal fellings are 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, that can stand to grazing and fires. These species are often of low utility.

3.1.1: Teak & Rock

Teak is the predominant timber species found in the region and is associated with many species of varied importance and it is usually associated with metamorphic (calcareous, crystalline phyllite, schists and granite gneiss) rocks and Deccan trap (sills, dykes, flows, inter-trappean beds). It is associated with rocks of volcanic origin as they are rich in calcium. Teak is absent from sedimentary rocks due to leaching of calcium from such rocks. Chemical properties rather than structural geology of soils are more important for the teak to grow. Teak is usually

absent from sandstone belt and therefore trap-Gondawana line perfectly separates teak and non-teak vegetation. Teak is present in such alluvium deposits while are rich in lime. The trap in this region contain 46.4% felspar. It is found growing best in pH between 6.5 to 7.5 but subsoil acidity is not a dominating factor for the presence of teak. Teak is a calcium accommodating plant. It is found doing well in soils with high $\text{SiO}_2/\text{R}_2\text{O}_3$ ratio, a high dispersion coefficient and high moisture retention.

The factors influencing the composition and condition of the crop are so variable that even in a compartment it is not uncommon to find abrupt changes in the crop representing one or more of the above sub-types.

3.1.2: Dry Teak Bearing Forests

A) Very Dry Teak Forests

These forests are found in patches, mainly in the Protected Forests of Arvi, Ashti and Karanja ranges and in the western part of Reserved Forests of Arvi range. These are open forests of very poor quality on stony, infertile and shallow soils derived from trap. In these forests teak occurs in high proportion and at places it forms pure crop. The height of the trees is between 6M to 9M. Species associates with Teak are; Salai, Dhaora, Kulu and Khair. The floristic is as given below:

- I. *Tectona grandis*, *Boswellia serrata*, *Anogeissus latifolia*, *Phyllanthus emblica*, *Sterculia urens*, *Diospyros melanoxylon*, *Soymida febrifuga*, *Terminalia alata*, *Lannea coromandelica*, *Mitragyna parviflora*.
- II. *Acacia catechu*, *Butea monosperma*, *Ziziphus mauritiana*, *Maytenus emarginata*, *Nyctanthes arbortristis*, *Gardenia spp.*
- III. *Ziziphus glaberrima*, *Woodfordia fruticosa*.
- IVa. *Cassia tora*, *Hyptis suaveolens*.
- IVb. *Heteropogon contortus*, *Eragrostis tenalla*.
- V. *Ziziphus oenoplia*, *Butea superba*.

B) Dry Teak Forest

These are found in southern parts of Ashti and Arvi ranges, western part of Karanja and Hingni ranges. The percentage of teak in these forests varies from

40% to 80%. The average quality of the crop is IVa and IVb. Rarely quality III areas are also found. The density generally varies from 0.4 to 0.8. Scattered open patches are also found. Soil is mostly black cotton and gets waterlogged during rainy season. These forests are capable of producing sound teak trees. Bamboo is generally confined to Karanja and Hingni ranges. The crop is mainly of the quality IVb. The floristic is, as follows:

- I. *Tectona grandis*, *Anogeissus latifolia*, *Choloroxylon swietenia*, *Diospyros melanoxylon*, *Mitragyana parviflora*, *Terminalia alata*, *Soymida febrifuga*, *Sterculia urens*, *Dalbergia latifolia*, *Boswellia serrata*, *Madhuca longifolia*, *Lannea coromandelica*, *Lagerstroemia parviflora*.
- II. *Butea monosperma*, *Buchnanan lanzan*, *Phyllanthus emblica*, *Acacia catechu*, *Cassia fistula*, *Aegle marmelos*.
- IIa. *Dendrocalamus strictus*.
- III. *Helicteres isora*, *Woodfordia fruticosa*, *Nyctanthes arbortristis*.
- IVa. *Cassia tora*, *Indigofera tinctoria*, *Hyptis suaveolens*.
- IVb. *Themeda quadrivalvis*, *Chrysopogon fulbus*, *Heteropogon contortus*, *Ergrastis tenella*, *Ischaemum pilosum*, *Iseilema laxum*, *Dichanthium annulatum*.
- IV. *Ziziphus oenoplia*, *Abrus precatorius*, *Bauhinia vahlii*, *Butea superba*, *Mimosa hamata*.

C) Southern Dry Mixed Deciduous Forest

This sub group differs from the Dry Teak Forests mainly floristically though some typical species like Salai are more conspicuous. Thorny plants occur and tend to increase in proportion with the heavy grazing and fires, to which most of the area is subjected. These forests are found in the western part of Arvi and Ashti ranges, Bor Sanctuary and some portion of Samudrapur range. The quality of the crop is mainly IVb. The floristic is as below:

- I/II. *Chloroxylon swietenia*, *Terminalia alata*, *Tectona grandis*, *Anogeissus latifolia*, *Boswellia serrata*, *Lagerstroemia parviflora*, *Diospyros melaoxylon*, *Lannea coromandelica*, *Soymida febrifuga*, *Ougenia oojenesis*, *Schrebera*

swietenoides, *Madhuca longifolia*, *Dalbergia latifolia*, *Buchnanian lanzan*,
Aegle marmelos, *Mitragyna parviflora*.

III. *Ziziphus spp.*, *Nyctanthes arborescens*, *Helicteres isora*, *Vitex negundo*,
Grewia spp., *Woodfordia fruticosa*, *Holarrhena pubescens*, *Lantana camara*.

V. *Cassia tora*, *Hyptis suaveolens*.

IVb. *Themeda quadrivalvis*, *Dichanthium annulatum*, *Iseilema laxum*,
Heteropogon contortus.

VI. *Butea superba*, *Bauhinia vahlii*.

D) Dry Deciduous Scrub

These forests are found on low broken soil cover and contain shrubby growth 3 to 6 m high, including, some tree species reduced to similar conditions, usually many stemmed from the base. The grass occurs throughout. They are found mostly in isolated patches of Protected Forests surrounded by cultivation and where the biotic interference is heavy. The floristic is as below:

I/II. *Chloroxylon swietenia*, *Acacia catechu*, *Butea monosperma*, *Lannea coromandelica*, *Boswellia serrata*, *Ziziphus* and *Gardenia spp.*

IV. *Holarrhena pubescens*, *Nyctanthes arborescens*.

IVa. *Cassia tora*, *Hyptis suaveolens*.

E) Boswellia Forests

These are the open forests in which *Boswellia* forms an over wood to stunted trees and consist shrubs of dry deciduous forests. They are found in small patches within the mixed forest and are mainly found in Ashti range. The floristic of these forests is as below:

I. *Boswellia serrata*, *Tectona grandis*, *Lannea coromandelica*, *Terminalia alata*, *Anogeissus latifolia*.

II. *Acacia catechu*, *Butea monosperma*.

III. *Nyctanthes arborescens*.

IVa. *Cassia tora*, *Hyptis suaveolens*.

IVb. *Themeda quadrivalvis*, *Heteropogon contortus*.

F) Butea Forest

These are found on flat ground and lower slopes with scattered, stunted and malformed trees or thickets of *Butea monosperma* standing over grass or barren ground. They are confined to old grass lands and on fringes adjoining villages, where the grazing pressure is high. They are found in all ranges. The floristic of these forests is as below:

I. *Butea monosperma* is almost found in pure patches along with *Diospyros melanoxylon*, *Acacia leucophloea*.

Other storeys are almost absent except *kusal*, *bhurbhusi* and *mushan* grasses.

G) Dry Tropical Riverain Forest

This type consists of irregular over wood of greater height than the dry deciduous forest and the trees are often of larger size and forming patches and strips with varying amount of smaller trees and shrubby undergrowth. They are confined to narrow strips along the major nalas which have moisture during the major portion of the year, in all ranges. The floristic of these forests is given as below:

I. *Terminalia arjuna*, *Terminalia alata*, *Mitragyna parviflora*, *Syzgium cumini*, *Ficus racemosa*.

I. *Pongamia pinnata*, *Diospyros tomentosa*, *Butea monosperma*.

II. *Helicteres isora*, *Ficus hispida*, *Vitex negundo*.

IVa. *Parthenium hysterophorus*.

IVb. Very little grass.

V. Very little climbers.

Due to **locality factors** certain patches of forests in the division are locally known as given below:

(i) **Ain Forests:** These occur in low lying areas with heavy soil where drainage is poor. At some places the occurrence is gregarious especially in depressions. The growth is generally stunted. They are found along the major nalas and depressions in all ranges.

(ii) **Bhirra forests:** In areas where soil is shallow, arid and sandy, bhirra is the main species, such areas are under stocked. The common associates of bhirra are dhaora (*Anogeissus latifolia*) mowai (*Lannea coromandelica*), khair (*Acaacia catechu*). They are generally found mixed with dry teak forests of Arvi, Ashti and Karanja ranges.

(iii) **Khair- Bor- forests:** They occur in arid locations where grazing is heavy and fires are frequent. The common associates of khair are thorny and shrubby species such as bharati (*Maytenus emarginata*), phetra (*Gardeniaturgida*) and bor (*Zizyphus mauritiana*). They form as a part of Dry Deciduous Scrub, having khair and ber (*Zizyphus spp*) as dominant species.

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 77 trees, 27 shrubs, 26 herbs, 20 bamboo and grass and 19 climbers. There are more than 70 species of medicinal plants in the District forests. Few species of Algae, fungi etc present in the District were also given in the Plan based on information received from the local Institutions. 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

The forests of Wardha are rich in Biodiversity and areas close to the Bor Wildlife Sanctuary are particularly noteworthy. However, in view of the presence

of large areas under teak, the repeated fires over the years, preferential treatment to commercial species; the enhancement of biodiversity in the forests as a whole needs to be addressed.

The plant diversity and faunal richness of the area needs to be maintained and enhanced with sincere effort of the Department, the help of the public, the initiative for formation of Biodiversity Committees, reducing the threats to the wildlife etc.

Among the important Schedule I species found in the area of the Division are Tiger, Panther, Leopard cat, Indian White Backed Vulture and Peafowl.

3.4: STATUS OF SPECIES PRONE TO OVER EXPLOITATION

The Status of species prone to over exploitation in the Division needs further studies with the help of the conservation experts and subject experts. However, from the information derived through discussion in the field with the forest officers and staff the following species are said to be prone to over exploitation.

Table No. 3.1: Status of Species Prone to over Exploitation in the Wardha Division

Sr.No.	Range	Species	Remarks
1	Hingni	Sandal Wood	Restricted Distribution.
2	Samudrapur	Sandal Wood	
3	Wardha Division	Gum	In forest and non-forest land
4	Wardha Division	Batair (Quail)	In forest and non -forest land
5	Wardha Division	Titar (Partridge, sandgrouse, etc)	In forest and non-forest land
6	Wardha Division	Tortoise	In forest and non-forest land
7	Talegaon	Monitor lizards	In forest and non-forest land

The above species are said to be prone to overexploitation in the District. For the other species that are also being exploited in substantial quantity by the locals are Khair, Babul and Mango trees as these have been exempted from Government regulations.

Table No. 3.2: Abstract of Species-Wise Offence Cases of Wildlife in Wardha Forest Division.

Sr. No.	Species		Range	Total Cases
	Common Name	Scientific Name		
1	Bluebull (Nilgai)	<i>Boselaphus tragocamelus</i>	Ashti	1
			Hingani	4
			Karanja	3
			Kharagana	1
			Telegaon	1
			Wardha	3
2	Red sand boa (Du tondi sap)	<i>Eryx johnii (Russell, 1801)</i>	Wardha	1
3	Leopard (Chitta)	<i>Panthera pardus</i>	Hingani	1
			Kharagana	1
			Samudrapur	1
			Telegaon	2
4	Peafowl (Mor)	<i>Pavo cristatus</i>	Hingani	1
5	Spotted Deer (Cheetal)	<i>Axis axis</i>	Hingani	2
6	Monitor Lizard (Ghorpad)	<i>Varanus bengalensis</i>	Wardha	1
7	Indian Lizard (Ghorpad, Sarda)	<i>Lacertilia</i>	Wardha	1
8	Barking Deer (Bhedki)	<i>Muntiacus vaginalis</i>	Wardha	1
			Hingani	1
9	Snake (Sap)	<i>India soft shelled</i>	Wardha	1
10	Shikra	<i>Accipiter badius</i>	Hingani	1
11	Sloth Bear (Aswal)	<i>Melursus ursinus</i>	Ashti	1
			Karanja	1
			Samudrapur	1
12	Sambhar	<i>Rusa uniclour</i>	Hingani	4

Sr. No.	Species		Range	Total Cases
	Common Name	Scientific Name		
13	Hare (Sasa)	<i>Lepus nigricollis</i>	Kharagana	1
14	Indian Black naped hare (Sasa)	<i>Lepus nigricollis</i>	Wardha	1
15	Pink headed duck-5 (Must have mistaken for Red Pochard)	-	Hingani	1
16	Ruddy Shelduck-2	<i>Tadorna ferruginea</i>	Hingani	
17	Ibis-2	<i>Threskiornithinae</i>	Hingani	
18	Red-wattled lapwing -2	<i>Vanellus indicus</i>	Hingani	
19	Laughing dove -2	<i>Spilopelia senegalensis</i>	Hingani	
20	Hyana (Tadas)	<i>Hyaenidae</i>	Hingani	1
21	Black Buck (Kalvit)	<i>Antilope cervicapra</i>	Wardha	1
22	Monkey (Vanar)	<i>Rhesus mocaques</i>	Hingani	1
	Total		7-Ranges	41

The above table of offence reflects the pressure on species of plants and animals that are being exploited in the division. It is also a matter of concern that not all cases of illicit exploitation are actually detected, considering the covert nature of the crimes. Extra efforts need to be taken to protect species prone to exploitation.

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.

(1) Fodder resource plot has been taken up in Compartment no.165 Near Chandani village of Kharangana Range.

(2) As per information received from DFO Silvicultural Scientist, Nagpur, Preservation plots situated in Wardha Forest Division is as under:

Table No. 3.3: Preservation Plot Situated in Wardha Forest Division

Division	Range	Comptt No.	Year	Area in Ha.	Name of Plot
Wardha	Kharangana	216	2001-02	10.00	Kharangana

(3) There is no identified Medicinal Plant Conservation Area in the Division of Wardha.

(4) Preservation plots where valuable species are found, where local bioclimate has brought about different crop composition and any area of biological or silvicultural significance should be identified for creation of Preservation Plots in Wardha.

3.6: FAUNA AND THEIR HABITATS

3.6.1: Distribution of the wildlife

Wardha division has a fairly good distribution of wildlife especially around areas adjoining to Bor wildlife sanctuary. Top Carnivores Tiger and Panther are present. Nilgai, sambhar and cheetal as well as wild boars are found all over the tract. Jackal, jungle cat and hyaena are also common. Large avifauna can be seen in the tract. Migratory birds near tanks are common during the season. Barking deer, sloth bear, langur and monkeys are also common mammals. Common wild birds include painted sand grouse, common sand grouse, pea fowl, grey jungle fowl, red jungle fowl, red spur fowl, painted partridge, grey partridge, jungle bush quail, black breasted quail, indian bustard quail, common or grey quail, pigeon, crane, dove, cotton teal, whistling teal and comb duck are found in the tract.

The wildlife in the tract dealt with is seriously depleted due to the indiscriminate shooting during the jamindari regime. Apart from indiscriminate shooting, poaching and hunting, the population explosion and economic developments have led to the severe degradation of natural habitat of wildlife. The food, water and shelter, the basic needs of the wild animals have become scarce in plain, accessible areas.

Biodiversity conservation is an important mandate of the forest department and with the enactment of Wildlife (Protection) Act 1972, wildlife management has become synonymous with biodiversity conservation. The history of wildlife management, summary of Wildlife (Protection) Act, 1972 and other important issues of man-animal interface have been summarized under this chapter.

3.6.2: Description of the Wildlife

The division is rich in wild life. Almost all the forest areas of the division have a fairly good distribution of wild animals, but 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:

Carnivora: (i) Tiger (*Panthera tigris*) (ii) Panther (*Panthera pardus*) (iii) Hyaena (*Hyaena hyaena*) (iv) Wild Dog (*Cuon alpinus*) (v) Jackal (*Canis aureus*) (vi) Common Fox (*Vulpes bengalensis*) (vii) Leopard Cat (*Felis bengalensis*) (ix) Jungle Cat (*Felis chaus*).

Herbivora: (i) Bison-Gaur (*Bos gaurus*) (ii) Sambhar (*Cervus unicolor*) (iii) Cheetal (*Axis axis*) (iv) Nilgai (*Boselaphus tragocamelus*) (v) Barking Deer (*Muntiacus muntjak*) (vi) Wild pig (*Sus scrofa*) (vii) Sloth bear (*Melursus ursinus*) (viii) Black Buck (*Antelope cervicapra*) (ix) Four horned antelope (*Tetracerus quadricornis*) (x) Chinkara or Indian gazelle (*Gazella gazella bennettii*).

Rodents: (i) Three striped palm squirrel (*Funambulus palmarum*) (ii) Porcupine.

Reptillia: (i) Softshell Turtle (*Lissymis*) (ii) Brook's Gecko (*Hemidactylus cf. brooki*) (iii) Bark Gecko (*Hemidactylus leschenaultia*) (iv) Square Spotted Gecko (*Hemidactylus gracilis*) (v) Termite Hill Gecko (*Hemidactylus triedus*) (vi) Kollegal Ground Gecko (*Geckoella kollegalensis*) (vii) Nebulosus Ground Gecko (*Geckoella nebulosi*) (viii) Common Garden Lizard (*Calotes versicolor*) (ix) Forest Rock Lizard (*Psamophilus blanfordianus*) (x) Fan Throated Lizard (*Sitana spinaecephalus*) (xi) Common Brhambhiny Skink (*Eutropis carinata*) (xii) Little Skink (*Eutropis macularia*) (xiii) Little Skink (*Eutropis innotata*) (xiv) Snake Skink

(*Lagosoma punctate*) (xv) Lined suppled Skink (*Lygosoma guntheri*) (xvi) Gunther's Snake Skink (*Lygosoma guntheri*) (xvii) Snake Skink (*Lygosoma punctate*) (xviii) jerdons Snake-eyed Lizard (*Ophisops jerdoni*) (xix) Bengal Monitor Lizard (*Varanus bengalensis*) (xx) Indian Chameleon Lizard (*Chameleon zelanicus*) (xxi) Bramhiny Blind Snake (*Indotyphlops braminus*) (xxii) Beacked Worm Snake (*Grypotyphlops acutus*) (xxiii) Red Sand Boa (*Eryx johnii*) (xxiv) Common Sand Boa (*Eryx conicus*) (xxv) Indian Rock Python (*Python molurus*) (xxvi) Indian Rat Snake (*Ptyas mucosa*) (xxvii) Common Trinket Snake (*Coelognathus Helena*) (xxviii) Common Wolf Snake (*Lycodon aulicus*) (xxix) Barred Wolf Snake (*Lycodon striatus*) (xxx) Common Kukari Snake (*Oligodon arnensis*) (xxxi) Russell's Kukari Snake (*Oligodon taeniolatus*) (xxxii) Common Cat Snake (*Boiga tristis*) (xxxiii) Forstein's Cat Snake (*Boiga forsteni*) (xxxiv) Bronze Back Tree Snake (*Dendrelaphis tristis*) (xxxv) Banded Racer (*Argyrogena fasciolata*) (xxxvi) Gunthers racer (*Coluber ventromaculatus*) (xxxvii) Green Keelback Snake (*Macropistodon plumbicolor*) (xxxviii) Buffstriped Keelback (*Amphiesma stolatum*) (xxxix) Checkered Keelback Snake (*Xenocrophis piscator*) (xl) Olive Keelback Snake (*Antretium natus*) (xli) Green Vine Snake (*Ahaetulla natus*) (xlii) Indian Smooth Snake (*Coronella brachyura*) (xliii) Indian egg eater snake (*Elachistodon westermanni*) (xliv) Spectacled Cobra (*Naja naja*) (xlv) Common Krait (*Bungarus ceruleus*) (xlvi) Slender Coral Snake (*Calliophis melanurus*) (xlvii) Saw Scaled Viper (*Echis carinata*) (xlviii) Russell's Viper (*Daboia russelli*)

Birds: (i) Painted sand grouse (*Pterocles indicus*) (ii) Common sand grouse (*Pterocles exustus*) (iii) Pea fowl (*Pavo cristatus*) (iv) Grey jungle fowl (*Gallus sonne ratil*) (v) Painted partridges (*Francolinus pictus*) (vi) Grey partridges (*Francolinus pondicerianus*) (vii) Jungle bush quail (*Pardicula aissstics*) (viii) Black breasted Rain quail (*Cturnix coronandelicus*) (ix) Indian Bustard quail (*Turnix suscitator*) (x) Indian or yellow legged button quail (*Turnix tanki*) (xi) Red spur fowl (*Galloperdix spadices*) (xii) Crane (*Grus antigone*) (xiii) Spotted bill duck (*Anas poecilorhyncha*) (xiv) Pigeon (*Treron phoonicoptera*) (xv) Dove

(*Streptopelia spp.*) (xvi) Cotton teal (*Nettapus coromandelianus*) (xvii) Whistling teal (*Dendrocygna javanica*). As per Bahar Foundation document on the check list of Birds of Wardha, a total 251 species were found in the District. This is a good effort from the NGO enriching some knowledge of the biodiversity in the District. The list is given in the Introduction part pages (xxiv to xxxiv).

3.7 : THREATS AND CHALLENGES TO WILDLIFE

Poaching: In spite of stringent provisions as aforesaid, poaching for skin, bones and flesh continues to be the most important reason for destruction of wildlife in the division. 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.

One of the dangerous method of poaching through poisoning of drinking water by mixing urea in large concentration has been devised 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 skin or bones of the dead animal for trafficking.

Setting of nets and traps for catching birds, hares and sometimes small animals like deer has been employed in the past but of late the poachers have been found using the improvised traps for killing the large animals like tigers very effectively.

Electrocuting the animals including tigers by laying electric wires on the tracks followed frequently by wild animals and by drawing electric current from the 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.

Wild animals are poached for the skin, bone and meat, and sometimes trapped to serve as pets; Water holes are generally the most vulnerable sites for the poaching. Nets and traps are used for trapping birds, deer and small mammals.

Disease: The livestock from the villages in the forests regularly frequent the forests and 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: Frequent fires damage the wildlife habitat, and animals become vulnerable to poaching. Similarly, habitat disturbances of different types create diverse kinds of stress having adverse impact on the wildlife.

Fires are major culprit reducing food availability for the herbivores very drastically. Thus, wild animal habitats are very adversely affected due to recurrence of fires every year.

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. These include the increased patrolling measures with proper Protection Plan to be updated every year, the

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 Wardha 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 tribalôn 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 malgujari forests was done with the permission of the malgujars. 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, 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 and hence special protection measures are necessary to protect wildlife.

3.8.2: Injuries due to Wildlife

The carnivores, tigers and panthers particularly sometimes kill domestic cattle grazing in the forests. There are also cases of human injury and even death due to attacks from wild animals. The villagers sometimes indulge in poisoning the carcass to take revenge and cases of electrocution of wild animals by the villagers to kill the animal suspected to have killed the cattle have also been reported. In such cases the persons involved in illegal killings of the wild animals do not have any intention of poaching or trade but such activities on the part of local people pose grave danger to animal populations in the forests. (Revenge Killings) The govt. of Maharashtra therefore has evolved a policy of compensating for the loss of livestock as well as for the injury to and loss of human life. This is summarised below:

Compensation for the Loss of Livestock

The scheme, which was introduced for the first time in 1971, covers the loss of Cow, Buffalo, Bullock, Sheep, Goat and other livestock (as per definition given under Section 2(1 SA)) due to attack of a Tiger, Panther or any other wild animal. The present rates of compensation as per the GR No.WLP-100S/C.No.2701F-1 of 02/07/2010 are as follows and compensation is to be paid within 3 months.

Table No.3.4: The Present Rates of Compensation

Sr.No.	Particulars	Amount to be paid
1	Cow, Buffalo, Bullock	75% of the market price or Rs.10000/- whichever is less;
2	Sheep, Goat, other livestock	75% of the market price or Rs.3000/- whichever is less;
3	Cow, Buffalo, Bullock became permanently handicapped	50% of the market price or Rs.3000/- and whichever is less;
4	Injury to Cow, Buffalo, Bullock, Goat	Treatment cost. (Govt. or ZP Hospital) 25% of the market price or Rs.1000/- whichever is less.

The compensation to livestock damage has to be given as per the terms and condition mentioned in the Govt. Resolution No. No.WLP-1008/C.No.270/F-1 of 02/07/2010. Some the conditions to be fulfilled are as under:

1. Death to be reported within 48 hours.
2. Carcass is not to be removed before case is made.
3. No death of any wild animal within 10 km radius area in the next 6 days.
4. Immediate investigation by forest officers as to the wild animal, which killed the cattle as well as Likely amount of compensation.
5. Compensation to be sanctioned by an officer not below DCF.
6. No compensation in case the livestock was grazing illegally.

Compensation for the injury to and Loss of Human Life:

Introduced through GR dated 27.1.1986, the scheme covers death as well as injury including minor injury caused to any individual in an attack by a wild animal. Any such attack by Tiger, Panther, South Bear, Bison, Wild Pigs, Wolf, Hyena, Jackal and wild dogs is covered under the scheme. Present rates of compensation have been fixed through Govt. Resolution No.WLP-2012/C.No.337/F-I, dt.30/03/2013 and 16/1/2015. These are as follows:

Table No. 3.5: Compensation for the Injury and Loss of Human Life

S.N.	Particulars	Amount to be Paid
1	Death	Rs.8.00 lakhs.
2	Permanent disability.	Rs.4.00 lakhs.
3	Major injury	Rs.1.00 Lakh.
4	Minor injury	Upto Rs.15000
Note: Cost of medication, preferably in govt. hospital, but in case of unavailability, private medication.		

The compensation to injury & loss human life has to be given as per the terms and condition mentioned in the Govt. Resolution No.WLP-1008/C.No.270/F-I, dated 02/07/2010 and Govt. Resolution No.WLP-2012/C.No.337 /F-I, dated 30/03/2013 and 16/1/2015. Some of the conditions for claiming and deciding above compensation are as under.

1. Such attack should not have occurred when the individual was indulging in violating the Wildlife (Protection) Act 1972.
2. Relative/friend should report the attack within 36 hours.
3. Police/forest officer to investigate within 3 days.
4. Death/injury due to wild animal is to be certified by the govt. medical officer.

5. Compensation due to death is to be given only to legal heir and compensation due to injury is to be given to individual concerned.
6. Compensation is to be sanctioned by the officer not below the rank of DCF/DFO.

3.8.3: 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:

1. Its provisions were also applicable outside the Reserve and the Protected Forests.
2. Arms license holders for sports were to register themselves with the Wildlife Preservation Officer.
3. 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.
4. It also sought to control transaction in trophies and other wildlife products.
5. Wildlife Advisory Board was constituted under this act to advise the government on various important matters concerning wildlife.

Developments after 1972

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.

1. The Wildlife (Stock Declaration) Rules, 1973 (became effective in Maharashtra with effect from 1.6.1973)
2. The Wildlife (Transactions and Taxidermy) Rules, 1973 (became effective III Maharashtra w.e.f. 16.1973).
3. Wildlife (Protection) (Maharashtra) Rules, 1975 (became effective from 6.3.1975).
4. The Wildlife (Protection) Rules and Licensing (Additional matters for consideration) Rules, 1983(became effective w.f. 13.4.1983).
5. Wildlife (Protection) Rules, 1995
6. Wildlife (Specified Plants-Condition for Possession by License) Rules, 1995
7. Recognition of Zoos Rules, 1992.
8. 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.

Management of Wildlife: Wildlife and its management in Wardha Forest division have been discussed in detailed in the part 2 of Volume I of this working plan, under Wildlife (Overlapping) Working Circle. The detail prescription for Special objectives of management for development & conservation of wildlife & 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 given in Wildlife (Overlapping) Working Circle in part 2 of this working plan.

CHAPTER-4

MAINTENANCE AND ENHANCEMENT OF FOREST HEALTH AND VITALITY

4.1: STATUS OF REGENERATION

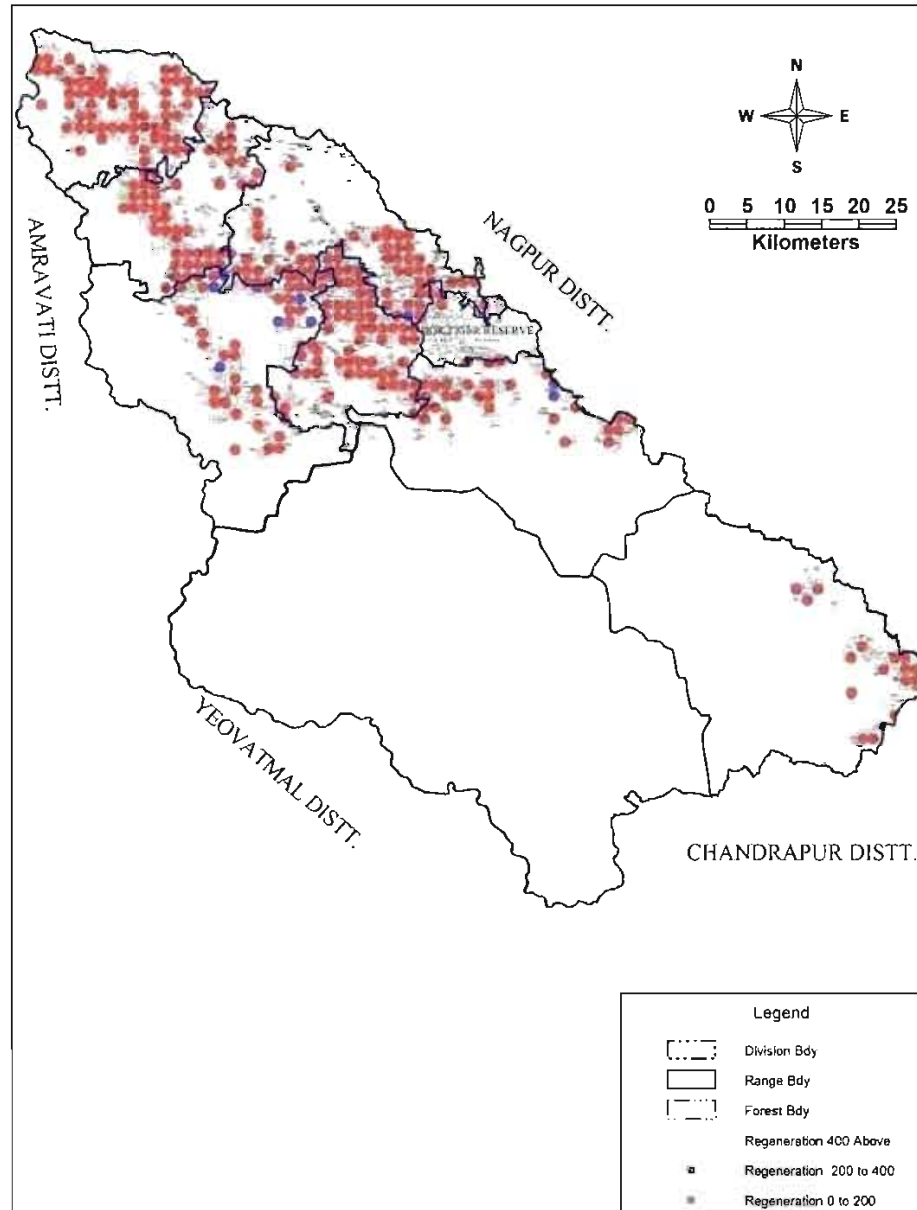
Data on regeneration status is collected along with enumeration of the crop in four 3x3 sub-plots in the enumeration plots. The seedlings are enumerated in the following three categories as given in the Table below. The data is analysed and used to devise prescriptions for regeneration of forest areas by both the natural and artificial means. The focus is on tending of existing natural regeneration (NR) and rootstock. Plantation is proposed only as a supplementary activity limited to the extent to fill the deficiency in NR, on the degraded and blank areas.

The health and vitality of the forests depends on the availability of the regeneration as it ensures the capacity of the forests to rejuvenate in the event of any calamity. This is one of the best indicator of the health of the forests. Though the total number of seedlings across the ranges appears to be uniform, the absence of saplings in the higher size R3 is a matter of concern as it appears that the seedlings are not able to establish properly. The regeneration of the forests in the Division is overall not very encouraging except for Hingni and Arvi Ranges. Incidences of fire, grazing and other human interferences are the root cause of the poor regeneration.

Table No.4.1: Seedlings and saplings per ha.in overall area

Range	R1	R2	R3	Total
Arvi	101.47	26.23	1.14	128.85
Ashti	19.70	18.95	1.79	40.44
Hingni	33.04	27.83	0.84	61.74
Karanja	27.97	23.05	3.39	54.41
Kharangana	37.23	41.08	3.54	81.85
Samudrapur	38.93	11.79	0.36	51.07
Talegaon	31.51	44.15	4.53	80.19
Average	41.85	28.63	2.40	72.88

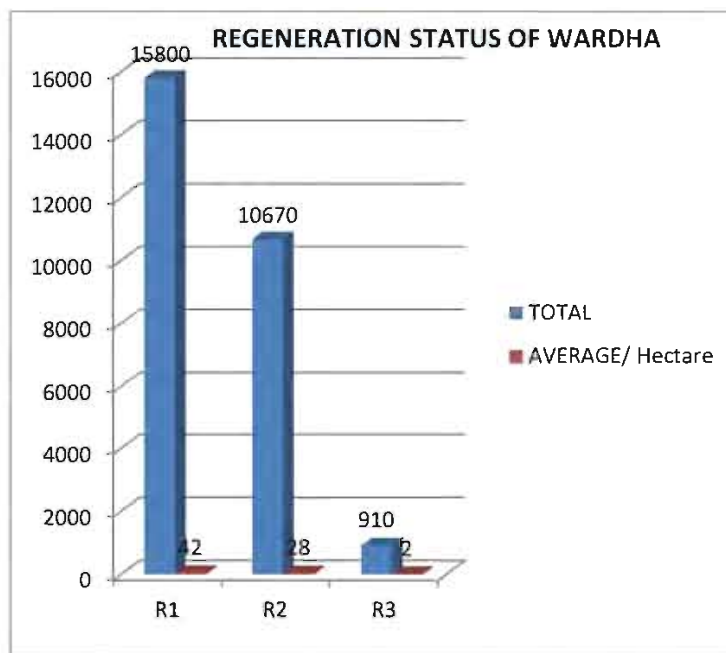
MAP OF WARDHA FOREST DIVISION REGENERATION PLOT



Analysis:

On analysis of the regeneration data of the Division, it is observed that the regeneration is extremely poor. This is an alarming situation that needs to be tackled head on.

- The regeneration survey, as with the whole survey for the Division, was carried out as per the New Working Plan Code. This is the first such survey for the SoFR unit.
- The regeneration status of Wardha forests, ie number of seedlings, is too low to be considered a healthy forest.
- The average number of seedlings in the whole forests is only 73 seedlings with 42 R1 (seedlings up to 1m), 28 R2 (seedlings between 1-3 m) and 2 R3 seedlings beyond 3m. This is an abysmally poor regeneration status.
- The probability of the plots falling in area of encroachment, cultivation and water bodies cannot be ruled out.
- 91 plots were found with no regeneration at all, i.e. $R1=R2=R3=0$. If the area is properly represented in the sampling one can conclude that in 91 out of 375 i.e. in about 25 % of the forests there is no regeneration at all.



- Out of these 375 plots, in 142 plots, the number of regeneration of R1 is Zero. This works out that 38% of the forests does not have any form of regeneration upto 1m which is an unbelievably catastrophic situation.

- Out of these 375 plots, in 148 plots, the number of regeneration of R2 is Zero. This works out that 39.5% of the forests does not have any form of regeneration between 1m to 3 m.
- Out of these 375 plots, in 325 plots, the number of regeneration of R3 is Zero. This means that 87% of the forests does not have any form of regeneration beyond 3m which is a clear indication of a dead/dying forest.
- The number of R1 seedlings is 15800 drops to 10670 when they become R2 which is a 48% drop. This figure of 10670 of R2 drops to 910 seedling of R3 which is a 1072% drop.
- On an average even on the Selection cum Improvement Working Circle the total seedlings are only close to 80.

The above figures clearly show that

1. Regeneration is abysmally poor
2. Whatever little regeneration is available is not able to grow beyond the small to medium seedling stage
3. Large number of seedlings either die out after attaining 1-2 m height or could not grow beyond 1-2m height
4. Roughly only 1 out of 17 seedlings could survive to become saplings

The data presents us with a grim picture. There are many reasons that may be attributed to this calamity.

- a. One of the prime reasons for the lack of regeneration is fire. The menace of fire has been recognized by everyone, but the impact is yet to be fully analysed and understood. The seriousness with which the Department is taking on fire requires a rethink.
- b. The soil condition in the forest of Wardha has been dealt with under the chapter Soil and Moisture Conservation. It is clearly seen that the soil depth in the forest of the Division is less than 10cm in most of the areas. In fact most of the areas are exposed with rocks. Under these conditions, tender seedlings exposed to the rigours of heat and drought and fire are most unlikely to succeed to survive.

- c. The overabundance of teak is to be blamed for the many of the ills of the forests health. There is little biodiversity, ground cover is scarce, the ground is made very vulnerable to heat and fire in the dry seasons.
- d. Grazing is another menace that has adversely affected the regeneration in the area, which needs to be addressed earnestly.

Regeneration in the area needs to be addressed earnestly. Clearly such drastic situation calls for drastic steps. A further discussion on this is given in Chapter 11, Part II of this Plan.

4.2 : AREA AFFECTED BY FOREST FIRE

The area affected by forest fires is given in the table below. During the last ten years there have been fire incidences and the figures show that the number of incidences fluctuates from year to year perhaps as per the climate condition prevailing on that year. An important step taken by the Government in 2012 involving the tendu collectors and the Tendu contractors by linking fire incidences with the forfeiture of benefits under tendu for the people and the contractors as well is said to be doing wonders in the field. Since it is a well known fact that the villagers and contractors have tendency to burn the area to facilitate fresh flush of tendu leaves from the burnt area, the step taken by the Government will help improve the forest health immensely.

Table No.4.2: Year-wise Forest Fire Cases

Year	Fire incidence	
	No.of Cases	Area in Ha.
2004-05	13	868.20
2005-06	28	1443.50
2006-07	26	566.50
2007-08	41	693.00
2008-09	98	1404.70
2009-10	49	548.07
2010-11	107	1274.01
2011-12	193	2172.31
2012-13	39	324.33
2013-14	46	264.25
Total	640	9558.87

All across the country and globally, it is admitted that forest fire are under reported. A point to be noticed with concern is also the way in which reporting is done, e.g. "Leaf & litter is burnt, no loss to government". This manner of reporting reflects ignorance of the damage fire does to the regeneration, the carbon stored in the dead wood & litter, the soil organisms, food & cover of phasants, lizards & other lower life-forms of the forests. This manner of reporting should be dealt away with forthwith.

4.3: AREA DAMAGED BY NATURAL CALAMITIES

- (i) By frost:** So far no severe frost is recorded in the area.
- (ii) By drought:** Damage due to drought is not common. However, some damage to the young plantation and young regeneration and coppice shoots is caused in the year in which the rainfall is scanty.

4.4: AREA PROTECTED FROM GRAZING

Grazing Units and villages listed to Grazing Units is given in App.No LIX.

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

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

The directives contained in the Madhya Pradesh Land Reforms Department's memorandum no. 1290-1227-XXVIII, dated 4th September 1953 prohibited grazing by sheep and goats in forests meant for production of big timber and even in the forest areas where villagers generally exercise their nistar rights.

This ban is because while grazing in the forests, these animals also uproot seedling regeneration of the important species. However, subsequent directives from the Government have allowed grazing by sheep in specified areas but continued complete prohibition on grazing by goats. Following norms of concessional grazing have been prescribed under the Protected Forests (Vidarbha Area) Rules, 1959:

- a) Cultivators-2 plough cattle per plough plus 4 others including one she-buffalo.
- b) Agricultural artisans and labourers 4 cattle including one she-buffalo;

Provided that a calf under one year shall not be counted;

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

4.5: LOPPING PRACTICES

Lopping practices are not much practiced in the Wardha District. *Hardwickia binata* 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: Bandh (*Loranthus longiflora*) is generally found on the branches of achar, hiwar, salai and sometimes on tendu, ain, dhaora and lendia.

4.6.2: By climbers and obnoxious weeds: Eruni, chilati are the common climbers which do much damage to the tree growth all over the forest and palasbel damage trees occurring on deeper moist soil. Tarota and rantulsi are common weeds. Rantulsi has invaded the grazing grounds and the grass birs, due to which, the grass growth has been badly affected. Undergrowth of kharasi and kudu in teak areas is a great impediment as it prevents teak seedlings from getting overhead light. The climbers mentioned above coppice vigorously and are hardly affected by grazing or fire. The damage is caused by strangling of trees when they entwine a sapling or a tree. Usually the apical bud is destroyed. Lantana (*Lantana camara*)

has also infested at many places. The thick cover of lantana prevents the regeneration of other trees.

4.7: INCIDENCES OF PEST AND DISEASES

Most of the forest areas under SCI Working Circle have been worked under Coppice With Reserve silvicultural system in the past. Due to this, coppice vigor has decreased and defects in wood such as hollowness are seen. To assess the extent of hollowness in teak, the available data with the division was analysed and the findings are given below.

Table No.4.3: The extent of hollowness in teak

Girth Class	No. of trees studied	No. of hollow trees	Percent hollow trees
46-60	6142	1088	17.7
61-75	3642	946	25.97
76-90	1580	549	34.74
91-105	640	247	38.59
106-120	341	131	38.41
121-135	118	60	50.84
136-150	36	21	58.33
>150	21	9	42.85

From the above table, it is evident that, there is progressive increase in hollowness with increase in girth.

4.8: FOREST DEGRADATION AND ITS DRIVERS

These forests are liable to the following, injuries:

(i) **By man:** The damage by man can be classified into the following two categories.

(a) Illicit cutting:

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. Wardha, Arvi, Karanja, Seloo and Ashti are the main places where wood are in great demand due to large scale construction activities. So they attract illicit

cutters not only from the adjoining areas but from distant places also. Due to increase in the roads, the protection of forests has become more difficult. In addition to this, the construction activity has increased in villages also and with the increase in the standard of living of people, pucca construction is now common in most villages. 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.

Analysis of data on Illicit cutting during the last 10 years reveals that, a total of 8714 cases have been registered and involves 15381 teak trees and 7648 non-teak trees. The details are given in Appendix No. LIII

(b) Encroachments: 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 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 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 problem of encroachment is more on Protected Forests, as they are surrounded by cultivation and there is no proper demarcation at most of the places.

Details of area encroached is given in Appendix LVI.

(ii) By cattle: Damage caused by grazing is heavy in the forest of Wardha Division due to large cattle population. There are a lot of co-operative milk societies engaged in dairying on a large scale. The scattered patches of Protected Forests are vulnerable to grazing. Continuous and heavy incidence of grazing not only prevents regeneration of tree species but also the young regeneration obtained during the period of closure is lost soon after the areas are opened to grazing. In areas with clayey soils the trampling by cattle results in hardening of soil and reduction in the soil aeration. In sandy soils heavy grazing results in accelerated erosion and denudation.

- (iii) **By wild animals:** The damage by wild animals in Wardha Forest Division is noticed. Nilgai is found abundantly that browse seedlings and coppice shoots. Some damage is caused by wild boars, by digging the roots of young plants. Monkeys also cause some damage to fruit trees. Due to damage by wild animals, management of artificially regenerated areas is increasingly becoming challenging.
- (iv) **By insects:** The attacks of teak defoliator (*Hyblia purea*) and teak skeletonizers (*Hapalia macharalis*) are common in teak and occur almost each year during the period from July to October. Termite attack is also common. But in bigger trees it is confined to dead bark. The damage to weak young seedlings and planted seedlings is caused by the termite at the base of the collar.
- (v) **By wind and hail storms:** Strong winds cause uprooting of trees all over the forest especially in open patches. Occasionally hail storms damage the fruit crops of moha and achar. Hailstorm in the months of April and May, sometimes, damages tendu leaves making them unfit for bidi manufacture.
- (vi) **By fire:** Summers are hot and dry from March to 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, 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.

Analysis of data of the last ten years reveals that, a total of 640 offence cases pertaining to fire have been registered in the division and the loss is shown as Rs. 114600/-. A scientific method for estimating loss due to forest fire need to be evolved so that the frontline staff would take fire prevention far more seriously.

Fire is common feature every year in the forests of Wardha Division because of the increased biotic interference. Fires are mostly set with the motive to get fresh tendu leaves. Fires are also set by the local villagers to facilitate the collection of mahua flowers and also to get the new flush of grasses. Sometimes

fires spread from the adjoining cultivation area. Detail of fire incidences in the last 10 years is shown in Appendix No. LIII

4.9: POLLUTION CONTROL AND PROTECTION OF ENVIRONMENT

Wardha is a developing District devoid of major industries. The level of protection is negligible except for a small portion in the wardha city. The following Industries are operating in Wardha District as per the information received from the held by the WPO with the DCF and other Officer of the Division.

Table No.4.4: Industries Operating in Wardha District

Range	Name of Industries	Location	Remarks
Wardha	Lloyd's Steel plant	Bhugaon	--
Wardha	Uttam Galva Steel	Bhugaon	--
Wardha	Lanco Thermal Power Plant.	Mandwa	--
Talgaon	CEDT Explosive Ltd	Talegaon	--

The above industries are said to be in the non-forest areas. However their effect on the forest areas and on the water resources of the forest cannot be ruled out. There is always a tendency of industries to dump their waste/effluents into open secluded spaces including forest areas. At a time when a huge chunk of hitherto neglected zudpi jungle area has been transferred to be managed by the forest department, the Wardha Forest Division should take all cautions against all pollution & disturbance to the forest areas.

CHAPTER-5

CONSERVATION AND MAINTENANCE OF SOIL AND WATER RESOURCES

5.1: AREA TREATED UNDER SOIL AND WATER CONSERVATION MEASURES SOIL EROSION

The effective rainfall and run-off during the southwest monsoon has important implications for the forests in the district. The effective rainfall for the southwest monsoon is computed to be around 533mm and its distribution is 110, 162, 175, and 85 mm, respectively, for the months of June, July, August, and September. On integrating the effective rainfall of the district with the water-holding capacity of the soils of the district, which is around 100-150 mm per metre depth, the run-off water is estimated to be 355 mm or 3,550 cubic metre of rain water per hectare per annum. The run off takes away the fertile top soil, leading to severe soil erosion in the district.

Soil erosion adversely affects the fertility status and land use. National Bureau of Soil Science and Land-Use Planning has grouped the soils of Wardha into different erosion classes.

Table No. 5.1: Soil Erosion Classes, Wardha District

Erosion Class	Area In Hectare	Percentage of Total Geographical Area	Expected Soil Loss (tonnes/hectare/year)
Slight	46,508	7.3	5-10
Moderate	473,447	75.2	10-15
Severe	104,043	16.5	15-20
Water Bodies	4,902	1.0	

Source: Sharma J.P; K.S. Gajbhiye; C. Mandal et al. 2005(Designing Rural Technology Delivery Systems for Mitigating Agricultural Distress :A study of Wardha District M S Swaminathan Research Foundation Chennai & Office of the Principal Scientific Adviser to the Government of India New Delhi published in 2009)

Sheet erosion is noticed all over the forest areas of the division. The top layers of soil which store organic matter and nutrients, on which plants feed, are lost in this process. It decreases soil fertility, lowers sub-soil water level and water holding capacity of the soil. The Organic Carbon content of the soil is negatively affected due to soil erosion. Laboratory studies of soil samples collected from Wardha division has shown variation in Soil Carbon from 0.44 to 4.32 % percentage.

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, in the last 10 years 3,227.85 hectares have been taken up for plantation and can safely be presumed that this area is treated for soil conservation. However, in the last two years, in view of the Jalyukt Shivar project, large areas are being treated specifically for soil and water conservation.

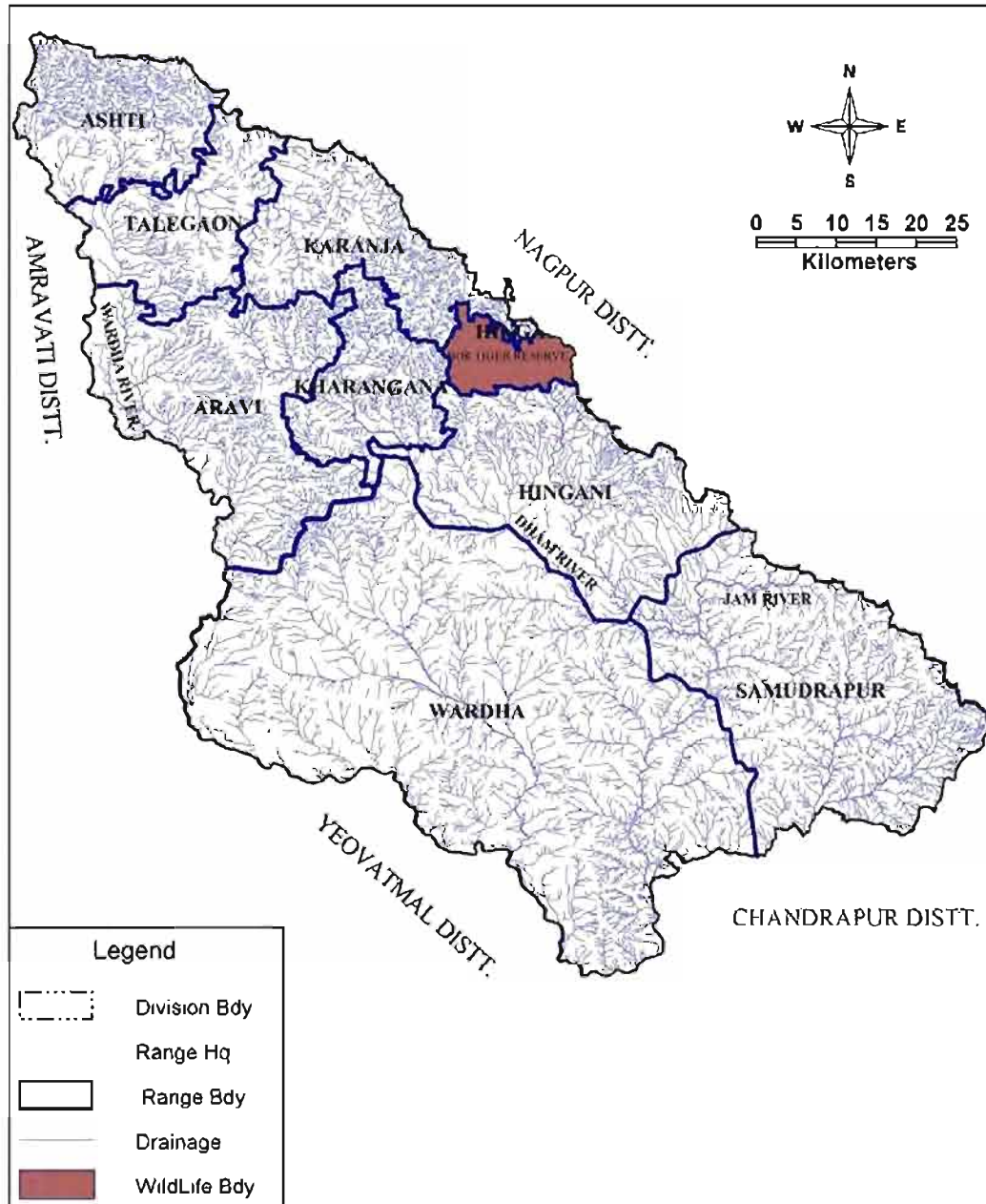
5.2: DURATION OF WATER FLOW IN THE SELECTED SEASONAL STREAMS&WATER SUPPLY

Wardha river is perennial source of water, whereas, other small rivers like Vena, Dham, Bor, Yashoda, Bakli, Lai etc. and nalas in forest areas hold water up to the end of February with stagnant pools persisting till the break of monsoon. There are 2 major, 4 medium and over 15 minor irrigation projects/tanks which are main source of irrigation. The main source of water supply is through wells. In summer there is acute shortage of water leading to supply of drinking water to some villages by tankers and bullock carts. Data on seasonal streams is not available with the Division.

5.3 : WETLANDS IN FOREST AREAS

As per the information received from the Division, the following are the major dams that are in or in the vicinity the forest areas of the Wardha Forest Division. Most of these dams are outside the forest areas but the major chunk of their watershed areas are within the forest areas.

DRAINAGE MAP OF WARDHA FOREST DIVISION



CONTOUR MAP OF WARDHA FOREST DIVISION

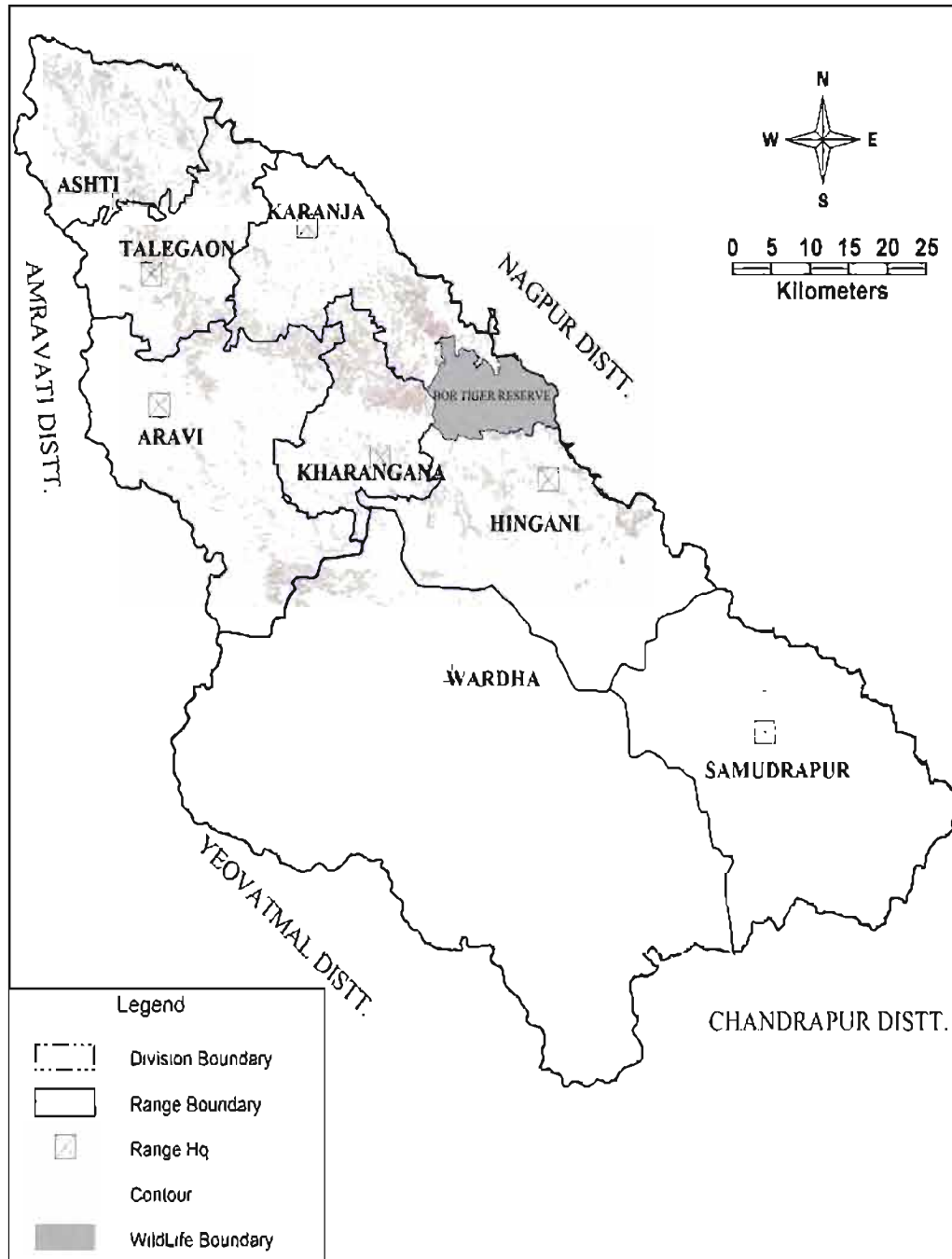


Table No. 5.2: Major Dams in or in the Vicinity of the Forest Areas

Sr. No	Name of the Dam	Range
1	Pothara Dam	Samudrapur
2	Bor Dam	Hingni
3	Mahakali Dam	Kharangana
4	Upper Wardha	Ashti
5	Dongargao Tank	Karanja
6	Khairi Dam	Karanja
7	Sarangpuri Tank	Arvi
8	Lower Wardha	Arvi

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. A copy of the checklist of the District prepared by the Bahar Foundation, a nature NGO active in the District, reveals that in the Pothara Dam and others there are innumerable birds in these dams. The report also mentions other dams/wetlands like Lalnala, Dham, Madan, Panchadhara, Panjra etc., dams in which are of significance. 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 (UP TO 5KM) OF FOREST AREA

The Division has records of the water levels of the wells within its jurisdiction and some villages. This is appended in the Volume II as Appendix No. III. The information is valuable but insufficient as there are records of only 30 sites. It is also informed that the Division has records of the wells in the villages where JFM Committed have been established and those villages where special projects like Jaluk Shivar, etc. is implemented for whose Microplan have been prepared. Records can also be obtained from the Groundwater Surveys Development Agency. This information needs to be submitted and to be formed as part of the Plan.

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.

An abstract from the Ground Water Information brought out by Central Ground Water Board (CGWB), GOI. is reproduced below nearest distance of the villages from the forest is also indicated. This data is generated at the WPO; DCF should verify and take intermittent data as per norms for building sufficient data for future planning.

**Table No. 5.3: Water Level Data with Long Term Trend (2001-2010)
Data as per GSDA Report**

Sr. No	Location	Pre monsoon DTW (mbgl)	Post monsoon DTW (mbgl)	Fluctuation (m)	Pre monsoon Trend (m/yr)		Post monsoon Trend (m/yr)		Nearest Compt No./Forest
					Rise	Fall	Rise	Fall	
1	Adegaon_pz		5.2		0.27		0.51		86 PF
2	Ajda	4.3	3.6	0.7		0.17		0.03	
3	Alipur	7.85	3.7	4.15		0.03	0.01		ZJ
4	Anji	7.65	6.5	1.15		0.01		0.08	
5	Arvi_pz		5.1		0.007		0.14		15 PF
6	Ashti	3.7	1.6	2.1	0.02	0	0.02		47 PF
7	Ashti_pz		4.6						
8	Bhidi	5.9	2.8	3.1		0.01	0.11		ZJ
9	Dahegaon		3.8			0.042	0.34		89 PF
10	Dahigaon	5.35	3	2.35		0.0151	0.06		201 PF
11	Daroda	4.4	2.9	1.5		0.0631	0.03		ZJ
12	Deoli	7.1	1.6	5.5		0.7111		0.09	
13	Dhadi	10.9	9.7	1.2	0.32		0.3		39 PF
14	Dhondgaon		3.9		0.16				
15	Girad	6.5	2.9	3.6	0.021		0.13		ZJ & 317 PF
16	Giroli	6.5	3.7	2.8	0.0801			0.02	219 PF Near
17	Hinganghat	2.4	5.9	-3.5		0.13	0.05		
18	Hingni	7.41		7.41	0.0544		0.11		

Sr. No	Location	Pre monso on DTW (mbgl)	Post monso on DTW (mbgl)	Fluctu ation (m)	Pre monsoon Trend (m/yr)		Post monsoon Trend (m/yr)		Nearest Compt No./Fo rest
					Rise	Fall	Rise	Fall	
19	Junapani	3.8	2.1	1.7	0.1245			0.02	116 PF
20	Junapani_pz		2.5						
21	Keljhar	9.63	6.9	2.73	0.08			0.09	254 PF
22	Khandali		4.9			0.08	0.27		
23	Kharangana	6.3	4	2.3	0.21		0.03		
24	Madni (new)		6.7			0.18	0.11		216 PF
25	Muradgaon (Balsare) I	5.1	2.5	2.6		0.2	0.51		
25	Muradgaon (Balsare) I	5.1	2.5	2.6		0.2	0.51		
26	Nagalwadi	9.7	3.9	5.8		0.1			
27	Nandgaon Borgaon_pz		2.4						
28	Nandori_pz		6.4			0.15	0.09		
29	Paragothan	3.5	2.4	1.1	0.07		0.33		92 PF
30	Pipri	7.1	4.3	2.8		0.12	0.08		133 Pf
31	Pulgaon	7.9	5.2	2.7		0.52		0.38	
32	Sahur	7.8	4.5	3.3	0.07		0.21		22 PF
33	Sakhra	7	6.7	0.3		0.23	0.23		ZJ near
34	Samudrapur	7.2	3	4.2		0.14	0.13		ZJ near
35	Sarul		6.1			0.15		0.17	
36	Sarul_pz		6.2						
37	Sawangi	4.7	3	1.7	0.07		0.11		ZJ near
38	Selu_pz		7						ZJ near
39	Selu	9.4		9.4		0.008			ZJ near
40	Sirasgaon2	7.75	4	3.75			0.08		ZJ near
41	Sirasgaon_pz		4.1						
42	Sirpur	10.7	7.9	2.8		0.08	0.04		
43	Sonegaon	8.3	2.9	5.4		0.08	0.17		247 PF
44	Sukli		11.7			0.37	0.46		
45	Thanegaon2		4.1				0.21		

Sr No	Location	Pre monso on DTW (mbgl)	Post monso on DTW (mbgl)	Fluctu ation (m)	Pre monsoon Trend (m/yr)		Post monsoon Trend (m/yr)		Nearest Compt No./ Forest
					Rise	Fall	Rise	Fall	
46	Tigaon	4.7	2.3	2.4	0.09		0.1		
47	Vadad	8.4		8.4	0.25		0.15		
48	Virul		3.3			0.01	0.15		
49	Wadhona	8			0.27				
50	Wardha	5.65							
51	Wasi	6.2			0.06		0.13		
52	Yelakeli	10.9	9.7	1.2			0.12		
DTW = Depth of Water mbgl = metre below ground level									

As mentioned above, this data is an important information that the Division should make use of and monitor the hydrological status of the forest areas. It is important for the Deputy Conservator of Forests to obtain the data from the authorities dealing with the subject and to also request the authorities CGWB, GSDA etc to impart training to the staff of the Division for the recording and monitoring of the water resources in our forest areas.

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 substantive 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.

5.5.2: Effect of Rainfall on Groundwater Availability

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: Reduction in cash crops

In Nagpur and Wardha districts the Orange orchard area has reduced drastically compared to 2004. This is because of depletion in the groundwater levels and drying up of the irrigation wells. Hence, there is reduction in

groundwater draft in concerned watersheds. This is directly reflected into the hydrograph of the relevant watersheds.

Table No. 5.4: Assessment of Dynamic Ground Water Resources of the Maharashtra Administrative Unit wise Categoriation 2011-12

Sr. No.	District	Admin-istrative Unit	Stage of Ground Water Development %	Pre-monsoon		Post-monsoon		Category
				Water level Trend	Is there a significant decline	Water level Trend	Is there a significant decline	
324	Wardha	Arvi	42.29	-0.87	No	-5.62	No	Safe
325	Wardha	Ashti	47.76	-1.30	No	-9.16	No	Safe
326	Wardha	Deoli	40.30	0.40	No	-11.92	No	Safe
327	Wardha	Hinganghat	39.61	4.92	No	-6.56	No	Safe
328	Wardha	Karanja	69.31	-1.74	No	-5.47	No	Safe
329	Wardha	Samudrapur	33.73	3.09	No	-6.68	No	Safe
330	Wardha	Seloo	45.80	0.78	No	-7.02	No	Safe
331	Wardha	Wardha	58.79	3.17	No	-10.12	No	Safe

5.5.4: Aquifer Parameters

According to the pumping tests conducted on wells piercing Alluvium and Deccan Trap Basalt in the district of Wardha have revealed that transmissivity for Alluvial formation range from 10.08 to 14.8 m²/day and permeability from 2.25 to 8.22 m/day. Pumping tests conducted on exploratory wells piercing Deccan Trap Basalt have revealed that transmissivity varies from 5.27 to 293.30 m²/day whereas storativity ranges from 4.3×10^{-4} to 1.3×10^{-2} .

5.5.5: Ground Water Resources

As per the Ground Water Information Wardha 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 Wardha district based on GEC-97 methodology as on 2009. Ground Water Resources

estimation was carried out for 5340.14 sq. km. area of which 820.25 sq. km is under command and 4519.90 sq. km is non-command. Taluka wise ground water resources are shown below:

Table No. 5.5: Taluka wise Ground Water Resources of Wardha 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 (%)
Wardha	Command	3225.13	971.13	79.28	1050.41			
	NonCommand	9234.48	5017.92	544.55	5562.47			
	Total	12459.62	5989.05	623.83	6612.88	1241.71	4619.86	53.07
Seloo	Command	9987.54	1145.46	155.92	10301.37			
	Non Command	3263.64	1874.38	272.01	2146.38			
	Total	13251.17	3019.83	427.92	3447.76	842.49	9515.30	26.02
Deoli	Non Command	9169.93	2729.36	353.24	3082.60	706.47	5734.10	33.62
Hinganghat	Command	1806.49	522.43	58.24	580.67			
	Non Command	10267.39	3132.17	554.40	3686.57			
	Total	12073.88	3654.60	612.64	4267.24	1223.85	7189.43	35.34
Samudrapur	Command	5856.67	952.49	113.71	1066.19			
	Non Command	7592.40	2336.10	217.62	2553.73			
	Total	13449.07	3288.59	331.33	3619.92	681.08	9413.63	26.92
Arvi	Command	6679.77	378.49	42.27	420.76			
	Non Command	8371.23	3804.08	617.92	4422.00			
	Total	15050.99	4182.57	660.20	4842.76	1178.12	12930.46	32.18
Karanja	Command	98.78	8.52	0.81	9.33			
	Non Command	7304.07	4328.84	272.90	4601.74			
	Total	7402.85	4337.36	273.72	4611.08	530.07	2953.07	62.29
Ashit	Command	15910.58	859.33	97.46	956.78			
	Non Command	3088.38	1749.06	193.32	1942.38			
	Total	18998.97	2608.39	290.77	2899.16	743.50	12543.59	15.26
Total	Command	43564.96	4837.85	547.69	5385.54			
	Non Command	58291.52	24971.91	3025.96	27997.87			
	Total	101856.5	29809.76	3573.65	33383.41	7147.29	64899.44	32.77

As per the estimation the total annual ground water recharge is 1075.67 MCM with the natural discharge of 57.10 MCM, thus the net annual ground water availability comes to be 1018.56 MCM. The gross draft for all uses is estimated at 333.83 MCM with irrigation sector being the major consumer having a draft of 298.09 MCM. The domestic and industrial water requirements are worked at 71.47 MCM. The net ground water availability for future irrigation is estimated at 648.99 MCM. Stage of ground water development varies from 15.26% (Ashti) to 62.29% (Karanja). The overall stage of ground water development for the district is 32.77%. In general, the level of ground water development in the district is quite low and all the talukas fall in "Safe" Category.

5.5.6: Ground Water Development

Almost entire district is underlain by the Deccan Trap Basalt formation. Isolated areas in the northern and central part of the district are hilly and have poor ground water development potential. The ground water development potential is low in the northern part, along the hills, in parts of Ashti, Arvi and Karanja talukas. Deccan Trap Basalt areas with low development potential are also seen in Deoli, Wardha and Samudarpur talukas. Major part of the district spread over all the talukas has medium ground water development potential. Areas with high development potential are located in parts of Deoli, Wardha, Hinganghat and Samudrapur talukas. The ground water in areas underlain by Deccan Trap Basalt may be developed through dugwells and dug-cum-bored wells (DCB). Borewells may be suitable at locations where fractured Basalt or inter-low zones form the deeper aquifer, particularly the area with high development potential. However, the sites for borewells may be located after proper scientific investigations.

The yield of the dugwells in the Deccan Traps may be expected between 10 and 70 m³/day depending on the location and season. The wells tapping vesicular basalt and inter-flow zones may have higher yields, up to 90 m³/day.

Alluvial aquifers in the district are restricted to small areas along the rivers and do not form significant aquifer. The ground water in these areas may be developed through dugwells and shallow tubewells and the yields are expected to be between 50 and 250 m³/day. The nature and yield potential of the aquifers

occurring in different areas is given below in Table-5.6, whereas the map is presented as.

Table No. 5.6: Nature and Yield Potential of Aquifers

Sr. No.	Taluka	Main Aquifer	Yield Potential	Type of Wells Suitable
1	Arvi	Basalt	Low to Medium	Dugwell, DCB
2	Ashti	Basalt	Low to Medium	Dugwell, DCB
3	Deoli	Basalt	Low to High	Dugwell, DCB, Borewell
4	Hinganghat	Basalt	Medium to High	Dugwell, DCB, Borewell
5	Karanja	Basalt	Low to Medium	Dugwell, DCB
6	Samudrapur	Basalt	Low to Medium	Dugwell, DCB
7	Seloo, (South Western part- along DhamRiver)	Alluvium	Medium to High	Dugwell, DCB, Tubewell
7a	Seloo (Eastern Part)	Basalt	Medium	Dugwell, DCB
8	Wardha	Basalt	Medium to High	Dugwell, DCB, Tubewell

5.5.7: Water Conservation and Artificial Recharge

In Basaltic area, the artificial recharge structures feasible are check dams, gully plugs, percolation tanks, nalla bunds, etc. The structures like gully plugs, contour bunds are most favourable in hilly areas, particularly in parts of Arvi, Ashti, Karanja and Seloo talukas. 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 Wardha 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.

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.

5.5.8: Recommendations

- 1. The major part of the district is underlain by Deccan Trap Basalt, where 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 only 32.77, 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 for the hilly-Basaltic area in the northern part are: contour bunds, gully plugs, nala bunds and check dams. For other Basaltic 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 Wardha 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 Wardha aquifers 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.

CHAPTER-6

MAINTENANCE AND ENHANCEMENT OF FOREST RESOURCE PRODUCTIVITY

6.1: Growing Stock of Wood:

Mostly site quality IV is found in Wardha Division. Very few patches of site quality III are found. As Karanja Range is adjoining to Kondhali Range (Nagpur Division), Hingni Range to Hingna Range (Nagpur Division), Wardha Range to South Umred Range (Nagpur Division), therefore, the stem analysis of teak, trees (2 in number) in quality III / IV areas, in the RF of South Umred Range is done and its results applied for Wardha division and reproduced in the table 6.1. CAI and MAI curve intersect at 117 years corresponding to a GBH (OB) 125 cms.

Table No. 6.1: Growth statistics of teak (Site Quality III / IV)

Age in Years	Ht. in mts.	DBH(OB) in cm.	GBH (OB) in cm.	Volume in cum.	CAI cum.	MAI cum.
10	3.70	3.40	10.70	0.0049	0.00049	0.00049
20	7.10	10.20	32.03	0.0250	0.0020	0.0012
30	10.70	14.80	46.47	0.0650	0.0040	0.0022
40	13.20	18.60	58.40	0.1350	0.0070	0.0034
50	14.90	22.40	70.34	0.2400	0.0105	0.0048
60	16.60	25.20	79.13	0.3600	0.0120	0.0060
70	18.20	29.10	91.34	0.5000	0.0140	0.0071
80	19.70	31.90	100.17	0.6450	0.0145	0.0081
90	20.30	34.20	107.39	0.7860	0.0141	0.0087
100	20.80	36.40	114.30	0.9050	0.0119	0.00905
110	21.20	38.50	120.49	0.9900	0.0085	0.0090
120	21.40	40.25	126.38	1.0700	0.0080	0.0089

The periodic CAI and MAI curves intersect at 117 years. The girth (OB) corresponding to this exploitable age is 125 cm. The exploitable girth is, hence, fixed as 120cm.

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10	3.70	3.40	10.70	0.0049	0.00049	0.00049
20	7.10	10.20	32.03	0.0250	0.0020	0.0012
30	10.70	14.80	46.47	0.0650	0.0040	0.0022
40	13.20	18.60	58.40	0.1350	0.0070	0.0034
50	14.90	22.40	70.34	0.2400	0.0105	0.0048
60	16.60	25.20	79.13	0.3600	0.0120	0.0060
70	18.20	29.10	91.34	0.5000	0.0140	0.0071
80	19.70	31.90	100.17	0.6450	0.0145	0.0081
90	20.30	34.20	107.39	0.7860	0.0141	0.0087
100	20.80	36.40	114.30	0.9050	0.0119	0.00905
110	21.20	38.50	120.49	0.9900	0.0085	0.0090
120	21.40	40.25	126.38	1.0700	0.0080	0.0089

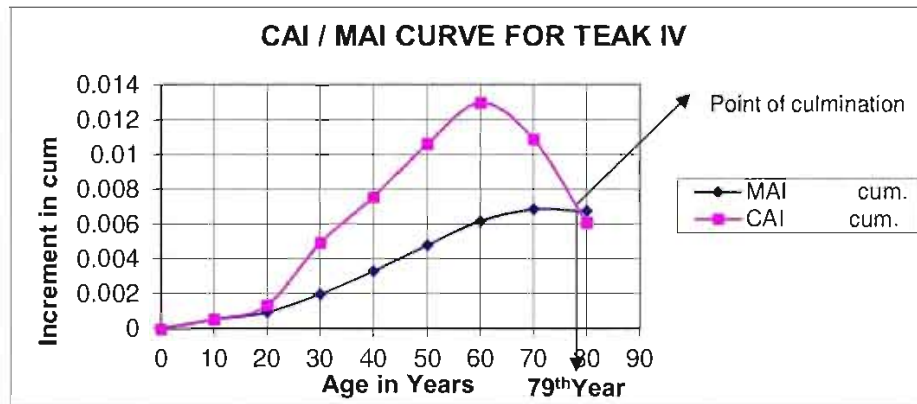
The periodic CAI and MAI curves intersect at 117 years. The girth (OB) corresponding to this exploitable age is 125 cm. The exploitable girth is, hence, fixed as 120cm.

6.2: Growing stock of bamboo: Bamboo is almost absent in Wardha Forest Division

6.3: Increment in volume of identified timber species: Stem analysis of teak on the site quality IV area was carried out by CF, Working Plan Dn. Nagpur in Compartment No. 218 RF of Arvi range; Compartment No. 179 RF of Karanja range; Compartment No 239 RF of Hingni range of Wardha Division. On the basis of this work the exploitable girth in site quality IV areas is fixed as 105 cm. as given in Table 6.2.

Table No. 6.2: Stem Analysis results for Teak. (Site Quality IV)

Sr No	Age in Years	Ht. in mts.	DBH (OB) in cm.	GBH (OB) in cm.	Stem Volume in cum.	MAI cum.	CAI cum.
1	0	0	0	0	0	0	0
2	10	1.4	4.5	14.13	0.0055	0.00055	0.00055
3	20	3.7	8.7	27.3	0.019	0.00095	0.00135
4	30	6.3	14.55	45.68	0.0595	0.00198	0.00493
5	40	9.6	19.8	62.17	0.1349	0.0033	0.00756
6	50	12.5	24.4	76.6	0.2415	0.0048	0.0106
7	60	15	28	87.92	0.3711	0.00618	0.01296
8	70	16.6	30.65	96.24	0.4798	0.00685	0.01087
9	80	17.8	32.6	102.36	0.5407	0.00675	0.00609



The periodic CAI and MAI curves intersect at 79th years. The Girth (OB) corresponding to this exploitable age is 101.10 cm. The exploitable girth is, hence, fixed as 105 cm.

Local Volume Table: The following Local volume table for Teak, Ain Bija, Dhawada, and Garadi has been applied for Nagpur Forest division. Wardha Forest division is adjoining to the division, hence it will be applied to this division. The Local volume table is given in Table 6.3.

**Table No.6.3: Local Volume Table for Teak, Ain, Bija, Dhaora and Garari
(IVa quality areas)**

Girth class (in cms)	Mid-girth in cms.	Volume per tree in cubic meters		
		Teak	Ain, bija, dhaora, and tendu	Garari
16-30	23	0.0166	0.0185	0.0134
31-45	38	0.0340	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	0.1950
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 cms	158	1.1036	1.2140	0.8829

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 6.4.

Table No. 6.4: Local Volume Table.

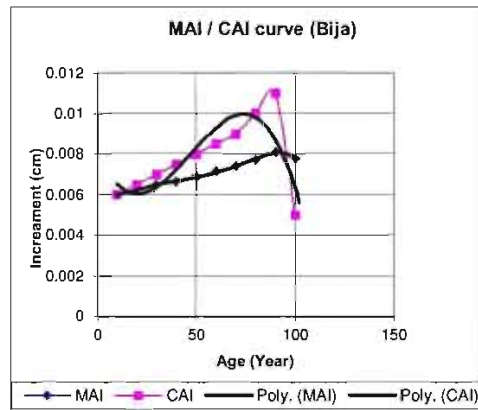
Girth Class (in cms)	Shisam	Surya	Haldu	Kumbhi	Khair	Babhul	Mowai	Shiwan	Behada
	Volume (Cumt,)								
10 -- 20	0.060	0.180	0.050	0.160	0.040	0.075	0.025	0.005	0.150
20 -- 30	0.180	0.360	0.150	0.360	0.100	0.163	0.075	0.050	0.400
30 -- 40	0.580	0.820	0.300	0.560	0.260	0.500	0.300	0.310	0.700
40 -- 50	1.340	1.620	0.500	0.980	0.620	1.310	1.375	0.940	1.150
50 -- 60	2.540	2.760	1.100	1.760	1.200	3.125		2.200	1.800
60 -- 70	4.900	4.660	2.250	2.980	2.080				2.550
70 -- 80			4.400	4.580	4.600				3.500

Growth of Miscellaneous Species:

Stem analysis is not carried out for miscellaneous species in Wardha division. However, the growth data of miscellaneous species in Nagpur division is used to determine the annual yield and harvestable girth. The growth statistics of the important miscellaneous species like Bija, Dhawada and Garai is given below: CAI / MAI curves of the following miscellaneous species are given under.

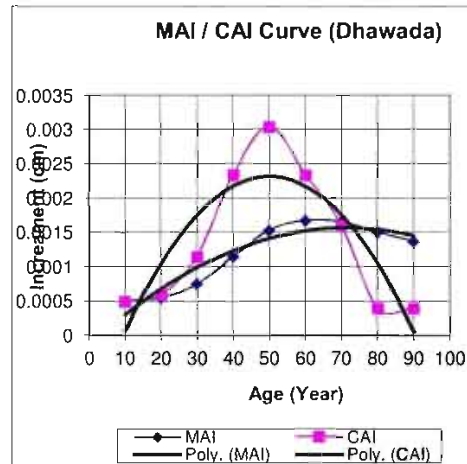
1. BIJA

Age	Gbh	Volume	MAI	CAI
10	18.3	0.06	0.006	0.006
20	31.3	0.125	0.00625	0.0065
30	42	0.195	0.0065	0.007
40	52.25	0.265	0.00663	0.0075
50	62.25	0.345	0.0069	0.008
60	72.25	0.43	0.00716	0.0085
70	80.5	0.52	0.00742	0.009
80	87.75	0.62	0.00775	0.01
90	93.25	0.73	0.00811	0.011
100	100	0.78	0.0078	0.005



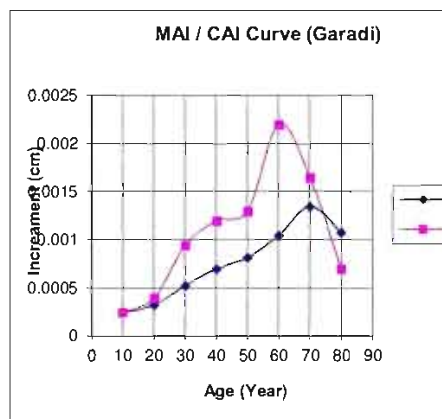
2. DHAWADA

Age	Gbh	Volume	MAI	CAI
10	20	0.005	0.0005	0.0005
20	35	0.011	0.00055	0.0006
30	48	0.0225	0.00075	0.00115
40	60	0.046	0.00115	0.00235
50	71	0.0765	0.00153	0.00305
60	79.5	0.1	0.00167	0.00235
70	82.75	0.116	0.00165	0.0016
80	88	0.12	0.0015	0.0004
90		0.124	0.00137	0.0004



3. GARADI

Age	Gbh	Volume	MAI	CAI
10	13.5	0.0025	0.00025	0.00025
20	26	0.0065	0.00033	0.0004
30	38	0.016	0.00053	0.00095
40	57.5	0.028	0.0007	0.0012
50	72	0.041	0.00082	0.0013
60	79	0.63	0.00105	0.0022
70	85	0.795	0.00135	0.00165
80	91	0.0865	0.00108	0.0007



Enumeration: SOFR unit Amravati conducted the Enumeration work in Wardha forest division as per the procedure given in National Working Plan Code, 2014. The enumeration data was analysed to arrive at Basal area, Growing Stock etc. This data was correlated with Stock Maps prepared by field units and also compared with satellite imagery before the compartments were allotted to various working circles. The results of enumeration and regeneration in various compartment is given in Volume II.

Stock Mapping: Stock mapping was done during this plan preparation well in time carried out by Dy. Conservator of Forest, Wardha Forest Division, and records compared with the enumeration data as well as satellite imageries.

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 Classified remote sensing data of 2010 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 Sample Ground Truthing during preparation of Draft Plan Report.

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 Wardha forest division.

But grass fodder plantation has been taken up in Ashti, Talegaon & Arvi Range by ploughing and seed sowing. This is a good start but the result has not been very different as there is no monitoring and assessment apart from not being able to take it as a plantation project.

6.5: Carbon Stock (Carbon Sequestration) :

Forests play an important role in combating climate change. In addition, it has the potential to provide ecosystem services, such as carbon storage. Carbon sequestered in the forests of Wardha has been derived by extrapolating from the Growing Stock calculated from the Enumeration data. The Working circle wise estimation of Carbon Stock is given below.

Table No. 6.5: Working Circle Wise Carbon Stock

Sr. No	Working Circle	Total Area in Ha.	Avg. Growing Stock per ha (m ³ /ha.)	Total Growing Stock (m ³)	Total Carbon Stock (Metric tone)
1	SCI	32852.96	44.68442	1468015.508	440404.65
2	IWC	19239.01	31.27167	601635.971	180490.791
3	Afforestation	21929.61	63.8296	1399758.234	419927.4703
4	Protection	12320.57	26.7739	329869.7091	98960.912
5	G&FRM	6349.9	5.7969	36803.37382	11041.01
6	Misc.	0	0	0	0
Total		92692.05		3836082.796	1150824.833

Soil Carbon Analysis: Quantum of soil carbon is a good indicator of nutrient status of soil. During the enumeration exercise, SOFR unit collected

soil samples (50) and they were analysed for Soil Carbon. The range of soil carbon varied from 0.4% to 4.4%.

6.6: Carbon Sequestration and Mitigation :

This plan proposed to put a minimum 4000 ha. under Afforestation WC and during the period of implementation of the Plan. It is expected that during the plan period an area of 12400 ha. would 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.

CHAPTER-7

OPTIMIZATION OF FOREST RESOURCE UTILIZATION

7.1: RECORDED REMOVAL OF TIMBER

During the past Plan the Division has harvested annually every coupe with. This is as per the Working Plan prescriptions and it appears that the average yield per hectare.

**Table No. 7.1: Working Circle wise Estimated, Obtained Yield
(Coupe No.I to IX)**

Working Circle	Total area of the coupe	Area Felled in Ha.	Estimated Yield				Actual Yield			
			TMR (Cum.)	Poles (Cum.)	FW Beat	Total (Cum)	TMR (Cum.)	Poles (Cum.)	FW Beat	Total (Cum)
SCI	16102.35	9950.45	15219.5	3670.40	13818.00	32707.91	12591.45	3963.950	18760.00	35315.409
IWC	9757.258	4861.96	3835.51	774.650	3860.00	8470.169	2361.447	991.425	4538.00	7890.872
AFF & RSM	3984.542	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.00	0.00
PRO.	5723.308	1084.98	1.470	0.24	0.89	2.590	1.06	0.64	1.22	2.915
G&F RM	10379.83	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.00	0.00
Total	45947.29	15897.4	19056.5	4445.29	17678.89	41180.66	14953.96	4956.015	23299.22	43209.196

Note:- 1) FuelBeat=1.00cum.

2) Pole = 0.025 cum.

However there is also produce from the illegal material seized The details of the illicit cutting is is given in Appendix No.LIII and the value of the material seized is given as Rs. 47,98,957/- which may have included both timber and fuelwood. The value of the outturn of the timber and fuelwood in the Division is given in the Appendix No. LXVI.

7.2: RECORDED REMOVAL OF FUEL WOOD

During the past Plan the Division has harvested annually every coupe with the average output of 4334 c.m.t firewood per year. The details Working Circle wise is given in Table 7.1.

7.3: RECORDED REMOVAL OF BAMBOO/RATTANS

As the Division is devoid of bamboo or rattans, there is no record of removal of bamboo or rattans.

7.4: RECORDED REMOVAL OF LOCALLY IMPORTANT NTFPS INCLUDING MAPS

The important Non timber forest produce that are removed and recorded from the forests are Tendu, gum and grass. The other NTFPs and medicinal and aromatic plants that are removed from the forests appear to have not been recorded.

The biggest source of NTFP produce that the Division harvests is tendu. During the past ten years the quantity of tendu removed is 138000 standard bags amounting to Rs. 63939491/-. The details are given in appendix No. LXIX.

The other species of NTFP for the Division is the gum tree which is mostly *Sterculia urens*, *Boswellia serrata*, *Anogeissus latifolia*, *Accacia spp* etc. The collection has not been regular except in the year 2010-11 and 2011-12 when about 390 quintals of gum was extracted providing a revenue of about Rs. 30 lacs. Grass was also sold in those two years, but has not been done in other years. The details are given in appendix No. LXVII.

7.4.1: Management of Tendu:

Collection of Tendu Leaves: Tendu is the prominent revenue generating NTFP 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 collection of Tendu leaves commences from the last week of April each year and continues up to first week of June. Quality of leaves is a major criteria 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 governed by the policy of the State Govt in conjunction with various Laws presently in force.
- 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.
- 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.

Tendu Regeneration: In view of importance of Tendu to support the livelihood of forest dwelling communities and its economic value for the region, sustainable management and use of Tendu is prescribed to be given added focus.

- Maintenance and improvement of Tendu in the forest crop composition is prescribed by ensuring regeneration of Tendu and its subsequent protection.
- Singling of shoots and soil working around Tendu seedlings is prescribed in the plantation and rootstock areas to promote growth of Tendu seedlings along with the annual coupes in area-specific working circles.
- 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.

7.4.2: Management of Hirda, Beheda, Aonla, Char and Other NTFPs.

Collection of Hirda, Beheda, Aonla, Char and other NTFPs: Fruits of Hirda, Beheda, Aonla and Char are marketable items. Similarly, fruits, flowers and

leaves of certain shrubs and trees are used for variety of purposes. Current level of collection is quite erratic and, therefore, poor indicator of their potential in the tract.

Collection of species, which are not covered under the monopoly procurement by government agencies, should be allowed by the Joint Forest Management Committees or Village Panchayats for better protection of Hirda, Beheda, Aonla, Char trees and to increase its stock, few of the above trees be numbered and these trees be allotted to members of JFM committee. The members of committees who have been assigned with job of protection & nurture of above trees, they should protect them from fire. Range Forest Officer is supposed to monitor this activity of JFM committee regularly and make proper documentation.

Removal of NTFPs shall be within the sustainable limits of production. Felling of trees and lopping of branches shall not be permitted for NTFPs collection. Destructive removal shall not be permitted, in any case. Digging up of plant roots, branch cutting, debarking on a plant will be considered as destructive removal.

Regeneration of Hirda, Beheda, Aonla and Char: Required tending is prescribed where saplings of *Beheda, Aonla and Char* are found in worked coupes, 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.

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

7.5.1: Agriculture customs and wants of the population

Wardha is the smallest district of the state having geographical area extending over to 6310 sq km forming about 2 percent of the total area of the state. As per 2011 census, the total population of Wardha district is 13.04 lakhs.

The population density of the district is 195 persons per sq. km; which is lower as against the state average of 256 persons per sq km and national average of 267 persons per sq km. The average literacy rate of the district is 70.67 percent, comprising 63.92 percent for women and 76.98 percent for men. Whereas, the

literacy rate in the rural and urban areas is 67.76 percent and 78.76 percent respectively.

For administrative purposes Wardha District has been divided into 8 talukas, comprising around 1371 villages, including 356 as the uninhabited villages, organized into 8 Panchayat samittees and 507 village panchayats.

The urban-rural break up of population reveals 26.40 percent as urban population while 73.60 percent forming the rural population. Moreover, 45.22 percent of the population is labourers; and around 76 percent of the labourers are engaged in primary sector such as agriculture and related works.

About 71% of the land of total geographical area is cultivable; 4.4% of the total area is under permanent pasture and grazing, while 9.2% of area is uncultivable and/or not available for agricultural use. The forest area, including, the Zudupi jungles, in charge of the forest department forms 15.40% of the total geographic area of the district.

Jowar, tur till, mung, chilli, bajra, cotton and sugarcane are the main kharif crops, whereas, wheat, gram, linseed, sunflower and groundnut are the main rabi crops grown in the district. Out of the total cultivable land 40% is under cotton, 45% is under food grains and the rest under other crops. Among the food grains maximum area (62%) is under jowar and 38% under other crops. Fruits and vegetables are grown in 2 percent of cultivable area. Among the fruits, oranges are the main crop (66%). The other fruit crops are banana (28%) and papaya (1%) and other fruits 5%.

There are over 8 Agriculture Produce Marketing Committees where the agriculturists bring their excess material for sale.

The irrigation facilities in the district are poor. About 70% was through wells and rest of the 30% was by other modes which include small, medium and major irrigation projects/tanks, lift irrigation and through pumps fixed on the bank of nala and rivers. There are 2 major and 4 medium and over 15 minor irrigation projects/tanks, namely; Upper Wardha, Lower Wena, Bor, Dham, Kar and Pothara.

There are over 212 thousand households in the district, including 158 thousand households in rural areas and 54 thousand households in urban areas.

About 1015 villages inhabit in the vicinity of the forest areas; and over 74 percent of the inhabitants of these villages depend on the forests to sustain their livelihood.

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, bamboo and grasses for constructing their houses and cattle sheds and making agricultural implements. They also require fodder, flowers and fruits as well as variety of other non timber forest produce such as moha, gum, lac, honey, tendu leaves, herbs, roots etc for food and medicinal purposes

The main forest produce that are harvested from the forests of Wardha division and those which support the livelihood of the people, are given, as under:

(1) **Timber:** Teak is the most valuable timber of the division. It is used for construction, furniture and various other articles. But due to its prohibitive prices and non-availability in sufficient quantity other species such as ain, dhaora, bhirra, lendia, kalam, dhaman and bamboos are used. The demand is heaviest in the intensively cultivated and rich plains. For the manufacture of carts, teak is preferred for the body; tiwas, ain, dhaman, tendu for shaft; dhaora for axles; tiwas, kusum or kahu for naves; teak for spokes and shiwan for yokes. For agricultural implements, such as, plough; tiwas, khair and babul are preferred in that order. Dhaora and Dhaman are used for axe handles and semal for dug outs.

(2) **Firewood:** There is a great demand for firewood throughout the division. Dhaora, khair, bhirra and ain are valued as firewood. Due to heavy demand inferior firewood of softwood species like salai and mowai is also extracted. Due to increase in small dhabas on the highways and in small township the overall demand for firewood has increased.

(3) **Bamboo:** Bamboo are in general not available in this division except in few patches of Arvi and Hingni ranges which is negligible. It is used for hut constructions and orange gardens and manufacture of household articles.

(4) **Grass:** Coarse grasses are used for thatching and palatable grasses for stall feeding. The demand for fodder grass depends upon the yield of agricultural crops, such as, jowar stalks, bhusa and paddy straw, which are used as fodder. The

demand for grass is local. For fodder marvel, shedra, paonia and mushan are preferred.

(5) **Other forest produce:** The other forest produce which the villagers take from the forests are, edible flowers and fruits, fibres from bark and roots, gum, herbs, thorns, and leaves. The main species of edible flowers and fruits are moha, charoli and tendu. Fibres are extracted from palas, palasbel. Thorns of bharati, hiwar, eruni, chilhati, ghoti, bor and babul are used. Cordage and lashings are made out from the bark of kuda, palas and sometimes piwarbel. Besides, murum and stones are also removed for building and roads.

7.5.2: Occupation and Industries

Besides agriculture, there are small occupation/industries in the villages and urban areas which are inter linked with forests; and few of them are given below:

(i) **Cattle breeding:** It is especially carried out in Arvi, Ashti and Karanja talukas. It adds substantially to livelihood of people of these talukas. Availability of quality fodder and stall feeding has been identified as the focus areas in these talukas for sustainable forestry.

(ii) **Orange gardens:** These occur all over the district. Small poles and bamboos are in great demand for supporting the fruit laden branches of orange trees. Bamboo baskets and soft wood packing cases are required for packing the oranges.

(iii) **Bamboo articles:** Burads make baskets, mats, dholis, etc. from bamboos and sell them locally. However, there are very little natural bamboo areas to meet these demands. Mostly bamboo articles prepared by Burads come from adjoining districts.

(iv) **Saw mills:** There are 73 saw mills in the Wardha district concentrated primarily at Wardha (36 nos.), Arvi (15 nos.), Ashti (10 nos.), Hingni (8 nos.) and Karanja (4 nos.) which depend on the supply of wood from the forests as well as private areas.

(v) **Furniture industry:** There are good numbers of furniture shops in rural and urban areas which use wood and timber from the forest area. Teak is the most

prominent species used for the purpose. Furniture industry and carpentry, provide job opportunities to the hundreds of skilled carpenters engaged in furniture making, joinery works house construction etc. In addition veneer and plywood board industry requires good quality teak and other miscellaneous species from the forest areas of this division for their sustenance and balanced growth.

(vi) **Manufacture of bidis:** Tendu leaves are used for preparing bidis by wrapping tobacco in these leaves. It is carried out on a small scale in the district.

(vii) **Collection of minor forest produce:** The poor class of villagers when not engaged on agricultural works collect moha flowers and fruits, charoli, gum, honey, wax, bark, roots, leaves etc. and sell them locally to supplement their income. Fuel and grass is also collected by these people for local selling.

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 Wardha. The produce that is produced from Wardha 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 Wardha. This is perhaps because the production of NTFPs in the district is insignificant.

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 (*Rahniman Bhatta*) are also taken into consideration.

Non Wood Forest Produce (NWFP)

(1) **Grass:** Grass from grass birds, closed coupes and a plantation is available on cutting basis. As per the existing Govt. orders annual lease of grass birds 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 fulfil 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. The quantity and the revenue generated in the sale of the above products is given below. It may be seen that the quantity of grass and gum is not much and the collection is very irregular. There is a need to streamline the extraction and auction of the products.

Table No. 7.2: Quantity and Revenue generated in the sale of Tendu, Gum and Grass

Sr.No	Year	Products	Qtl.	Rev. (Rs)
1	2004-05	Tendu	146400 (std.bgs)	68956150
2	to	Gum	384.475	3011224
3	2013-14	Grass	11.08	315944

CHAPTER-8

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

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

Wardha Division along with the State has come to embrace the Joint Forest Management as one of the tools of forest management as early as the mid-nineties. Ever since, the people's/ community's participation in conservation and management of forest & wildlife resources has been an integral part of management. The number of JFMCs formed are 185 and these Committees cover an area of 45833 Ha. All the areas adjoining villages have been covered under JFM, which take up 49 % of forest area of division currently. Out of this 54 JFM Committee have taken up plantation over an area of 1435 ha. during the period of the last Working Plan.

- À JFM micro plans are to be dovetailed with broad prescriptions of approved working plan.
- À Maintenance of forest boundary, removal of encroachments, control over illicit cutting, illegal grazing, fire and wildlife offences shall receive priority apart from regularly undertaken works such as SMC & Plantations.
- À Transparency in programme has to be ensured through transparent payment mechanisms.
- À Villages which have not received funds should also be accorded importance.

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 are 185 and all these villages are covered under JFM and JFM Committees are in place. 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 the District. The Wardha Division had organized an important workshop regarding Medicinal Plants & their uses. The detail of the workshop and the proceedings could not be incorporated in this Working Plan due to lack of space. However an abstract brought out below shows that the number of villages that participated were 33 in all and there were 36 local medicinal practitioners or Vaidhyas that have taken part in the workshop apart from all the staff of the Division. The number of participants Range wise details are in given below.

Table No. 8.1: Range wise Abstract of Participants in Workshop of Indigenous Technical Knowledge

Range	Total Village	Total *Vaidhya	No. of Medicinal Plants used	Total Diseases Treated	Total Forest staff participated
Talegaon	6	7	14	17	6
Hingni	1	1	5	7	1
Ashti	7	8	33	33	6

Range	Total Village	Total *Vaidhya	No. of Medicinal Plants used	Total Diseases Treated	Total Forest staff participated
Arvi	8	8	29	29	8
Karanja	3	4	27	25	3
Kharangana	2	2	27	29	2
Samudrapur	6	6	25	23	6
Total	33	36	-	-	32

* Local medical practitioner

It may be seen that different vaidhyas use a variable number of plants and they have been cooperative enough to share with the Forest Department their names of the plants, the parts used and the disease that are used for.

Apart from the medicinal practitioners, the presence of other indigenous knowledge cannot be ruled out. It is a charge of the forest officers to tap all kinds of ITK from the locals, particularly those associated with forest and environment, and to document them for posterity.

8.5: EXTENT OF CULTURAL/SACRED GROVES

There are no sacred groves in the District. Two important sites of cultural significance in the forest areas of Wardha are Girad Dargah, in Samudrapur Range and Dhaga Shiv Mandir in Kharangana Range are located in forest areas. The flow of tourists and devotees to these areas are seasonal and days-specific.

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 15 locations spread in six 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)

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): Not with standing 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;

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 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 Wardha Forest Division:

The status of implementation of this Act (up to July, 2015) is summarized in the table below. The cases accepted by the District level Committee is 223 of individual cases involving 109.323 Ha. and 09 claims involving 5.644 ha.

Table No. 8.2: Status of Implementation of FRA 2006

Type of Claim	No. of cases received by Gram Sabha	No. of cases rejected by Gram Sabha	No. of cases rejected by SDLC	No. of cases rejected by DLC	No. of cases finally accepted by DLC	No. of cases pending for decision at DLC
Individual	591	103	252	13	223	0
Community	39	0	13	10	9	7
Total	630	103	265	23	232	7

Under Section 3(2), in 12 cases, a total of 7.644 ha land has been diverted for specified purposes.

Prescriptions for management of forest areas on which the forest rights are recognised:

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. **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 help 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 are no rights in the Reserved Forest except right to way and access to water. There is no commutation of *nistar* or *paidawar* in the Wardha Forest Division. Various concessions have been granted from time to time to the agriculturists and other by the erstwhile Government of Madhya Pradesh and Government of Maharashtra. The following concessions have been permitted:

- The 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 is a legal right .

The inhabitants of the forest villages were allowed to cultivate the lands allotted to them on payment of nominal rent. They were also permitted to graze their cattle and to obtain timber and other forest produce for their bona fide domestic use as per the rules laid down in MP Forest manual. Since, the transfer of these villages to Revenue Department, they are treated at par with other villages.

Protected Forests

Before abolition of the proprietary rights all lands belonged to the proprietors. A village administration paper called "Wazib-ul-arz,ò was prepared for every settlement; and plots of land were separately recorded, showing the Khasara number and area which was set apart for a particular purpose. Under section 202 of the Central Province Land Revenue Act, 1917, a provision was also made for punishing the violation of any of these customs. Under the provision of the Madhya Pradesh Abolition of Proprietary Rights (Estates, Mahala, Alienated Lands) Act, 1950 (Act I of 1951), all communal and other wastelands became property of the Government while occupied lands continued to be private.. In order to distinguish between the rights existing on the government wastelands and on the other lands, a provision was made in the Madhya Pradesh Land Revenue code, 1957 prescribing the preparation of the Nistar Patrak and Wazib-ul-arz for every village. The Nistar Patrak deals exclusively with management and use of the government land while the Wazib-ul-arz deals with community and customs use over private land.

The nistar enquiry was conducted in Wardha district during 1954-1956, and 255 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 had been treated as individual zones. Villages assigned to particular zone can exercise their nistar rights within that zone.

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

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

8.9.2: Occupational Nistar

In the nistar patraks, occupational rights of the Kumbhars, Chambhars, Gonds, Mahars, Pradhan and Lohar communities have been recorded and recognised in several villages, having entries in the wazib-ul-arz of each village.

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: In Wardha, there is no bamboo forest and hence the number of dependent Burad families is also negligible. In Wardha, there exist only 64 burad families. They also do not demand much bamboo. Bamboos were brought from Gondia Division in 2002-2003, but they were not lifted and got decayed.

In Wardha Division, there is a great demand for supply of teak poles. The demand is met by farmers who have raised number of plantations in the district. The forest department supplies poles through Zilla Parishad. The demand of farmers is finalised by Agricultural produce committee of Zilla Parishad who then convey it to Division office. The forest department then conveys the available poles

(Depotwise) to Zilla Parishad who then distributes it to farmers through respective BDO. Allotment quota of bamboos to farmers at different depots is decided by BDO. The farmers make payment directly in the depot and lift the material.

(a) 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.

(b) 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 khasara numbers which are in excess, no such right is allowed.

Dry and Green bamboos are removed as per silvicultural rules and permitted on payment of the prescribed royalty.

Where thorns are not available, removal of brushwood such as lops and tops of the felled trees and bamboo 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, achar, tendu or other edible fruits, flowers and roots are allowed to be removed free of cost from all over the forests for domestic consumption.

As regard occupational nistar, ghont; fruits and dhaora leaves are allowed to be removed by the charmakers free of charge. They are also allowed to remove Bakkal, and Kahu bark on nominal payment from trees marked for felling.

In the nistar Patrak of each village the khasara 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

patraks in general. However, due to over harvesting, illicit felling and over grazing, these areas have become degraded and are no longer able to meet the nistar requirements of the people. They need immediate rehabilitation through afforestation and soil and moisture conservation.

8.10: DEPENDENCY OF LOCAL PEOPLE OF NTFPS

There are no significant number of people/community dependent on the forests and forest produce. There are some Burad families about 250 families in Wardha Range and 15 families in Arvi Range, whose livelihood depend on bamboos. The department supplies to these people bamboos by acquiring from near by Forest Division and selling them at Concessional rates. The Pardhi community in the District are also dependent on the forests in many ways but their lifestyle needs further study to fully understand their dependency.

8.11 OTHER ASPECT:

There is no transhumant population of grazing community available in the Wardha Forest Division. However, livelihood of local Gawali Community depends upon Forest for grazing of their cattle. They have Cows, Buffalos on large scale with some Sheeps & Goats. The Range wise Grazing blocks have been formed in Samudrapur, Hingni, Karangana, Arvi, Ashti, Talegaon & Karanja Ranges for the purpose of grazing for cattle of local peoples which appended in Appendix No. LIX.

The grazing passes are issued to such local Gawali Community peoples for grazing purpose every year. The details of grazing passes issued & Revenue obtained in last three year is as under.

Year	Nos. of Grazing Passes issued		Revenue obtained (Rs.)		Total Nos. of Animals	
	Sheeps	Other Animals	Sheeps	Other Animals	Sheeps	Other Animals
2013-14	35	3185	2175	45127	2175	40264
2014-15	23	1182	1270	34667	1270	32258
2015-16	20	1342	901	42702	901	36596

Similarly local people also collect and store fodder grasses for summer season. Natural regeneration is found adversely affected in those areas wherever rotational grazing system is not followed properly. Likewise, proportion of non fodder grasses is slowly increasing in such area. Therefore grazing in such areas needs to be managed properly to avoid adverse effect on quantity and quality of fodder species.

CHAPTER-9

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 influences, as this act recognises several individual as well as the community rights over the forest land and its produce. All the provisions of this Act will have to be taken into consideration while managing the forest.

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.

In Wardha the number of claims received were 630 out of which 232 were accepted. Of this 232 cases 223 are of individual claims covering an area of 109.32 ha. and 9 claims are of community rights which cover an area 5.645ha. The Division is in the process of digitizing the polygons of the areas handed over to the villagers. There is a need to guide and train the villagers on how best to use the forest land to meet all their needs and wean them away from their dependency on the forests.

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 28 Biodiversity Management Committees have been formed in the District of Wardha. 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: GO 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 in the last ten years are given below:

Table No. 9.1: The Extent of damage due to fire, illicit cutting & other offences

Year	Fire		Grazing		Illicit cutting					Other offences		Total	
	No.of Cases	Loss in Rs.	Noof Cases	Loss in Rs.	No.of Cases	Illicit cut tree (No.S)		Loss in Rs.	Amount of Material seized (Rs)	No.of Cases	Loss in Rs.	No.of Cases	Loss in Rs.
						Teak	Non Teak						
2004-05	13	0	7	0	1983	2305	826	532100	594830	16	0	2020	532100
2005-06	28	0	7	0	1106	2431	700	350209	406029	30	0	1172	350209
2006-07	26	0	19	0	1055	1663	801	297203	269637	29	0	1126	297203
2007-08	41	0	8	0	908	1592	714	319508	376866	55	0	1012	319508
2008-09	98	114600	22	0	896	1719	1227	360120	450014	83	0	1099	474720
2009-10	49	0	17	0	926	1651	968	391675	335389	71	0	1063	391675
2010-11	107	0	18	0	553	891	591	242363	238759	98	0	776	242363
2011-12	193	0	24	0	372	1126	391	854004	864068	42	0	631	844004
2012-13	39	0	18	0	440	1008	746	679220	615956	75	0	572	679220
2013-14	46	0	28	0	475	995	684	754241	647409	79	0	628	754241
Total	640	114600	168	0	8714	15381	7648	4780643	4798957	578	0	10099	4885243

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, Rangersô 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 02, Forester 09 & Forest Guard 15
2. Facilities of Personal Digital Assistants are given to all guards with application like Offences cases, Fire, encroachment, grazing etc. As per the table below, a total of 189 PDAs have been distributed to the Staff of the Division.

Table No. 9.2: Distribution Of PDAs

Sr. No.	Range	PDA NOs.	PDA NOs.	PDA NOs.	Total PDA NOs.
		2013-14	2014-15	2015-16	
1	Samudrapur	4	10	8	22
2	Arvi	4	6	17	27
3	Karanja	3	7	18	28
4	Ashti	5	3	12	20
5	Kharangna	5	2	16	23
6	Talegaon	4	3	20	27
7	Hingni	0	9	12	21
8	Wardha	0	11	10	21
9	Total	25	51	113	189

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

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.LXVI). The quantity and the value of the NTFPs collected in the last ten years have been duly provided in the Appendix No.LXVII.

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
- (viii) 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 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 Moist Temperate Forests, Himalayan Dry Temperate Forests, Sub Alpine Forest, Moist Alpine Scrub and Dry Alpine Scrub.

The forests of Wardha 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. 8,00,000/- and varies with the type of forest and its attributes. This value has further been revised by the India Institute of Forest Management, Bhopal and is yet to be approved. The IIFM study is more comprehensive and takes into account all aspects of the intangible benefits that the forest eco-system provides.

Below is given the value of the forests of Wardha as per the current and proposed NPV value which takes into account the tangible and some components of the intangible benefits.

Table No. 9.3: Calculation of Forest Worth Based on NPV

Sr. No.	Area of Wardha under different canopy density		Current rate of NPV (Rs Lakh/ha)	Value of Forests as per current rate (Rs Lakhs)	Proposed rate of NPV (Rs Lakh/ha)	Value of Forests as per Proposed rate (Rs Lakh)
	Category	Area (ha.)				
1	VDF	1000	8.87	8870	25.08	25080
2	MDF	41900	8.03	336457	18.62	780178
3	OF	43000	6.26	269180	11.17	480310
TOTAL		85900	614507		1285568	

The value of the forests of Wardha comes to 6145.07 crores as per the current NPV rates and Rs. 12855 crores as per the proposed 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: BUDGETARY ALLOCATIONS TO THE FORESTRY SECTOR

Table No. 9.4: Statement Showing the Revenue, Expenditure & Surplus

Year	Revenue (Rs in lakh)	Expenditure (Rs in lakh)			Total expenditure (col. 3+4+5)	Surplus (+) or Deficit (-) (Rs)
		Conservation & Works (Rs in lakh)	Establishment (Rs in lakh)	Plan (Rs in lakh)		
2004-05	268.24	82.6	371.18	77.68	531.46	-263.22
2005-06	723.19	63.49	404.40	91.32	559.21	163.98
2006-07	552.23	34.9	378.55	96.34	509.79	42.44
2007-08	837.12	88.78	492.49	100	681.27	155.85
2008-09	155.28	86.83	589.12	162.46	838.41	-683.13
2009-10	169.52	92.08	762.85	166.92	1021.85	-852.33
2010-11	470.97	184.84	860.93	213.86	1259.63	-788.66
2011-12	588.15	166.28	955.89	437.62	1559.79	-971.64
2012-13	385.14	156.19	1071.69	404.51	1632.39	-1247.25
2013-14	561.29	132.31	1320.74	552.81	2005.86	-1444.57
Total	4711.13	1088.30	7207.84	2303.52	10599.66	-5888.53

The department also has an independent Evaluation cell headed by an officer of the rank of C.C.F. at the Head office. Annual evaluation reports on various activities of the department from Plantations, SMCs, MPCAs, Building & Constructions etc. The evaluation is guided by the evaluation code.

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 250 schools in Wardha 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 year-round 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.

9.10.1: Staff

Wardha forest division is coterminous with the district boundary and is headquartered at Wardha. It is headed by an officer in the rank of the Deputy Conservator of Forests. The statement showing the names of Dy. Conservator of Forests, Wardha Division has been shown in Appendix No. VI.

Further reorganisation of the Forest Department was done in 1981-82 with a view to remove unwieldiness of administrative charges by making them compact and manageable units for efficient administration. Government of Maharashtra vide its G R No FDN-1081/76/03-F-2, dated 11.6.1981 sanctioned reorganisation of ranges, round and beats with effect from 1.9.1981. The new posts of accountants were created vide G R No FDM-1879/17-F-2 dated 11.6.81 and each range was provided with an accountant to cope with the increased quantum of work and to increase the efficiency in the range offices. One post of Junior Statistical Assistant was created in each Division vide Government Resolution No. FDM-1081/76710-F-2 dated 12.5.1981, to have timely and accurate statistical data needed for the formulation and implementation of forestry development programmes and diversifying the forest management.

Wardha Division has sanctioned strength of 527 posts in total, including 296 permanent posts and 231 temporary posts ranging from the Deputy Conservator of Forests to the Van Major. The details of the staff and the manpower, in the Division, as on date, are given in the table below:

Table No. 9.5: Present staff position in the Wardha Division

The Staff position in Wardha Forest Division							Statement Showing sanctioned filled up & Vacant post in Wardha Forest Division		
Sr. no.	Group	Designation	Pay scale in Rs	Permanent posts	Temporary post	Total	Sanctioned	Filled up	Vacant post
1	A	Dy.Conservator of Forest	15600-39100	1	0	1	1	1	0
		Asst. Conservator of Forest	9300-34800	5	1	6	6	4	2
2	B	Range Forest Officer	9300-34800	7	1	8	8	8	0
		Office Superintendent	9300-34800	0	1	1	1	1	0
3	C	Chief Accountant	9300-34800	1	0	1	1	1	0
		Accountant	5200-20200	10	4	14	14	13	1
		Jr.Statistical Asst.	5200-20200	1	0	1	1	0	1
		Surveyor	5200-20200	2	0	2	2	2	0
		Clerk	5200-20200	13	2	15	15	12	3
		Forester	5200-20200	46	5	51	51	46	5
		Forest Guard	5200-20200	193	30	223	223	208	15
		Police Constable	5200-20200	1	0	1	1	0	1
		Jeep Driver	5200-20200	2	0	2	2	2	0
		Tractor Driver	5200-20200	1	0	1	1	1	0
4	D	Naik	4440-7440	1	0	1	1	1	0
		Daptari	4440-7440	1	0	1	1	1	0
		Peon	4440-7440	3	1	4	4	4	0
		Watchman	4440-7440	5	0	5	5	4	1
		Waterman	4440-7440	1	0	1	1	1	0
		Sweeper	4440-7440	1	0	1	1	1	0
		Tractor Cleaner	4440-7440	1	0	1	1	1	0
5	D	Forest Labour	4440-7440	0	186	186	186	186	0
Total				296	231	527	527	498	29

9.10.2: Labour Supply

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 FLD 4207/ 1- Y dated 23.05.1967 and 3675/87519- F-6 dated 24.6.1977. Administration of these

villages, at present, lies with the Revenue Department. However, labourers from these villages are continued to be engaged for various forestry works in the Division.

The labour supply in general is inadequate. Large number of Van Majoors have been regularized in the recent past. They should be judiciously used for executing various forestry works including general protection of forests.

CHAPTER - 10

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 and NITI Aayog (an acronym for National Institution for Transforming India).

Contents (hide)

1. History	-	Dobb's Working Plan (1895-1912)
	-	Dunbar Brander's Working Plan (1913-1934)
	-	P.Sagreiya's Working Plan (1935-1946)
	-	R.Mishra's Working Plan (1947-1964)
2. First Plan (1951-1956)	-	--do--
3. Second Plan (1956-1961)	-	--do--
4. Third Plan (1961-1966)	-	J.G.Thosre's Working Plan (1965-1991)
5. Fourth Plan (1969-1974)	-	--do--
6. Fifth Plan (1974-1979)	-	--do--
7. Rolling Plan (1978-1980)	-	--do--
8. Sixth Plan (1980-1985)	-	--do--

9. Seventh Plan (1985-1990) - --do--
10. Annual Plans (1990-1992)- J.G.Thosre's Working Plan & Dr. Nandkishor, WP
11. Eighth Plan (1992-1997) - Dr.Nand Kishore Plan (1992-2002)
12. Ninth Plan (1997-2002) - --do--
13. Tenth Plan (2002-2007) - S.D.Sontakke and Jarnail Singh's Plan (2006-07 to 2015-16)
14. Eleventh Plan (2007-2012)- S.D.Sontakke and Jarnail Singh's Plan
15. Twelfth Plan (2012-2017)- S.D.Sontakke and Jarnail Singh's Plan on going
16. See also -
17. References

10.1: As per the Twelfth Plan Document under Environment, Forestry and Wildlife²⁰⁹ the following are the Monitorable Target of are 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. Commercialisation 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.

10.3: DEVELOPMENT UNDER TWELFTH FIVE YEAR PLAN.

- (i) The year 2015-16 was the fourth year of the XII the Five-Year Plan. An investment of Rs.1380.391 lakhs was made on various developmental programmes implemented under forestry and related sectors. The targets and

achievements under the various developmental work according to various activities are given below.

- (ii) The Progress made under various schemes implemented by the Forest Department under the 12th plan is given below.

Table No. 10.1: Financial Targets and Achievements break up according to activity group for the year.

Sr. No	NAME OF SCHEME	FINANCIAL (Rs. in lakh)				
		2012-13	2013-14	2014-15	2015-16	
	(A) TOTAL (2406 FORESTRY AND WILDLIFE) (NON TRIBAL SUB PLAN) (STATE)	Achievements	Achievements	Achievements	Target	Achievements
1	Strengthening of check Nakas	8.0	0.00	0.00	0.00	0.00
2	Strengthening of existing wireless network	0.25	0.20	4.85	0.00	0.00
3	Strengthening of Mobile Squad	0.00	0.00	0.00	6.00	6.00
4	Supply of cooking gas	0.00	5.288	9.98	89.78	89.78
5	Joint Forest Management	18.02	14.18	30.51	46.99	46.99
	TOTAL (A)	26.27	19.67	45.34	142.77	142.77

Sr. No.	NAME OF SCHEME	FINANCIAL (Rs. in lakh)				
		2012-13	2013-14	2014-15	2015-16	
	(B) CENTRALLY SPONSORED SCHEMES	Achievements	Achievements	Achievements	Target	Achievements
1	Modern forest fire control and management (IFPC)	0.00	4.26	0.00	29.08	29.08
2	National Afforestation Programme	0.00	0.00	37.65	45.93	45.93
	TOTAL (B)	0.00	4.26	37.65	75.01	75.01

Sr. No.	NAME OF SCHEME	FINANCIAL (Rs. in lakh)				
		2012-13	2013-14	2014-15	2015-16	
	(C) 2406 FORESTRY AND WILDLIFE (TRIBAL SUB PLAN) (STATE)	Achievements	Achievements	Achievements	Target	Achievements
1	Supply of cooking gas	0.00	10.62	15.17	32.89	32.89
2	Vidarbha Vikas	93.16	83.88	63.65	49.60	49.60
	TOTAL (C)	93.16	94.50	78.82	82.49	82.49

Sr. No.	NAME OF SCHEME	FINANCIAL (Rs. in lakh)				
		2012-13	2013-14	2014-15	2015-16	
	(D) 2406 FORESTRY AND WILDLIFE (NON TRIBAL) (District)	Achievements	Achievements	Achievements	Target	Achievements
1	Soil and Moisture Conservation on forests areas	0.00	0.00	182.88	278.15	278.15
2	Estt. Of central nursery	7.00	4.39	6.14	12.10	12.10
3	Forest protection from fire	16.00	13.60	13.78	23.82	23.82
4	Reforestation of degraded forest (RDF)	66.15	40.40	19.91	15.83	15.83
5	Development in Forest Tourism	1.05	22.34	0.00	26.85	26.85
6	Compensation to the farmers for losses caused by the wild life	15.00	12.75	20.00	20.00	20.00
TOTAL (D)		105.20	93.48	242.71	376.75	376.75

Sr. No.	NAME OF SCHEME	FINANCIAL (Rs. in lakh)				
		2012-13	2013-14	2014-15	2015-16	
	(E) 2406 FORESTRY AND WILDLIFE (TSP) (OTSP) (District)	Achievements	Achievements	Achievements	Target	Achievements
1	Joint Forest Management (OTSP)	0.81	1.13	0.00	0.00	0.00
2	Plantation of General use	11.95	31.20	18.08	50.98	50.98
TOTAL (E)		12.76	32.33	18.08	50.98	50.98

Sr. No.	NAME OF SCHEME	FINANCIAL (Rs. in lakh)				
		2012-13	2013-14	2014-15	2015-16	
	(F) 4406 FORESTRY AND WILDLIFE (NON TRIBAL) (STATE)	Achievements	Achievements	Achievements	Target	Achievements
1	Construction of Van Talao	0.00	0.00	0.00	30.78	30.78
2	Massive Afforestation Programme	11.27	7.07	5.15	31.31	31.31
3	Afforestation for soil Conservation	6.19	3.04	0.00	4.02	4.02
TOTAL (F)		17.46	10.11	5.15	66.11	66.11

Sr. No.	NAME OF SCHEME (G) 4406 FORESTRY AND WIDLIFE (NON TRIBAL) (District)	FINANCIAL (Rs. in lakh)				
		2012- 13	2013- 14	2014-15	2015-16	
		Achiev ements	Achiev ements	Achieve ments	Target	Achievem ents
1	Forest Building (Repairs)	9.00	2.44	6.50	19.95	19.95
2	Soil and water conservation on forests areas	0.00	0.00	0.00	166.37	166.37
3	Forest roads & bridges (4406-4415)	4.99	2.18	10.15	3.36	3.36
4	Forest Protection from fire	50.77	27.84	108.19	86.10	86.10
5	Wild Life & Nature Conservation	0.00	0.6	0.2	52.381	52.381
6	Development of Forest Tourism	0.00	0.00	0.00	29.00	29.00
7	Compensation to the formers for dossen caused by the Wild Life	11.33	13.87	32.21	229.12	229.12
TOTAL (G)		76.09	46.93	157.25	586.281	586.281
GRAND TOTAL OF PLAN SCHEMES (A to G)		350.94	301.28	585.00	1380.391	1380.391

It is observed that there is a more than double increase in Plan expenditure in the Division, which is a very encouraging sign. With the implementation of the Working Plan in right earnest, the goals of the 12th plan can be achievable.

CHAPTER-11

PAST SYSTEMS OF MANAGEMENT

11.1: GENERAL HISTORY OF THE FORESTS

Wardha district was a part of the Nagpur district till 1862, when it was made a separate district due to administrative convenience. 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 framers, village patels and malgujars*. After the enactment of the Indian Forest Act 1878 a major chunk of forest land in possession of *malgujars 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 consequence, all the private forests of Wardha district 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 Forests under section 29 of Indian Forest Act, 1927.

11.1.2: Management of the Forests and Tree Growth

Management of the Forests of the Wardha Division can be categorised into, the following, three distinct periods:

- (1) Pre-reservation period from 1853 to 1878

In 1853, when the tract was assigned to British, it was in a very undeveloped state. There was no regulation or control over felling in the forest. The accessible areas adjoining to the villages were ruthlessly plundered. The remote and inaccessible areas suffered due to shifting cultivation by aboriginal tribes. In

1862, the forest department was created and was entrusted with the duty to survey and demarcate the forests and to prepare maps.

(2) Early reservation period from 1879 to 1895

In 1879, the forests of the division were declared as Protected under the Indian Forest Act, 1878. The removal of species, like, *teak*, *bija*, *shisham*, *kusum*, *haldu* and *kowah* was regulated on the licence. Felling of fruit trees of *moha*, *harra* and *a char* was prohibited. However, there was no scheme to regulate the felling and the purchasers could obtain their requirements from anywhere they liked. This resulted in over harvesting in accessible areas.

(3) Forest management under regular working plans since 1895.

The management of Reserved Forests as well as the Protected Forests of Wardha division has a long but chequered history of management. The period of management under various Working Plans is given, as under,

Table 11.1: List of Working Plans for the Reserve Forests of Wardha Division

S.N	Working plans in chronological order	Plan period
1	Dobbs's Working Plan	1895 – 1912
2	Dunber Brander's Working Plan	1913 – 1934
3	P. Sagreya's Working Plan	1935 – 1946
4	R. Mishra's Working Plan	1947 – 1964
5	J.G. Thosre's Working Plan	1965 – 1991
6	Dr. Nand Kishore Plan	1992 - 2002
7	S.D.Sontakke and Jarnail Singh's Plan	2006-07-2015-16

11.2: PAST SYSTEM OF MANAGEMENT AND THEIR RESULTS

11.2.1: First Working Plan 1895 to 1912

The first Working Plan, covering the Reserved forest areas of Nagpur and Wardha districts was prepared by Dobbs. The entire forest area of 718 sq miles was divided into 5 Ranges. A separate Working Plan for each Range was written. The area covered was as given below:

Table No. 11.2: Range wise area in First Working Plan.

Range	Area in sq. miles	Area in sq. km.
East Pench Range	225	579
West Pench Range	118	302
Kondhali Range	99	253
Umrer Range	93	238
Arvi Range	183	469
Total	718	1838

The present, Wardha Division was included in Kondhali, Umrer and Arvi Ranges.

To regulate the felling, entire area was divided into Working Circles. The areas adjoining to the villages and containing little harvestable tree growth were set aside as pasture to meet the demand of grazing on the forest land. The areas having demand for timber, fuel and grazing were divided into felling series containing 30 compartments so as one compartment was to work every year. Improvement felling was prescribed to provide regular supplies of straight and sound poles of valuable species. In 1906-1907, such fellings were abandoned and the *Coppice-with-Standard system* was adopted. Sowing seeds of valuable species *in situ* in felled area was prescribed.

But due to intense demand for poles, purchasers removed almost all the poles of superior species. The cultural operations were also neglected. The selective removal and neglect of subsequent silvicultural operations resulted in irregularity in the growing stock. Various attempts to artificially restock the blank areas with seed sowing were also unsuccessful. As a consequence, revision of Dobbô's plan was become necessary.

11.2.2: Second Working Plan 1913 to 1934

Dobbô's Plan was revised by Dunbar Brander. The entire forest area was reclassified into 3 *working circles; namely; teak, mixed and grazing working circles*. All isolated blocks carrying unmarketable tree growth and such parts of the large blocks were allotted to the *Grazing Working Circle*. No felling were prescribed in this Working Circle but it was laid down that when a demand

arose the tree growth could be harvested with the sanction of the Conservator of Forests.

All areas containing (a) tree growth of miscellaneous species; (b) poor teak; and (c) scattered patches of better teak, were allotted to the *Mixed Working Circle* and divided into 16 felling series. Each felling series was further subdivided into 30 annual coupes. The treatment prescribed was to reserve at least 75 the most promising trees per ha as standards and to clear-fell the rest of the crop.

The remainder of the forests, comprising the richest teak stands in the trap zone, were assigned to the *Teak Working Circle* and divided into 8 felling series with 45 annual coupes in each. The method of treatment prescribed was similar to that the *Mixed Working Circle*, namely, to reserve at least 50 trees per ha as standards and to coppice the rest of the crop.

(i) Modification in the Prescriptions of Main Felling

In 1922-23 the felling rules in regard to leave a minimum number of standards per ha in the *Teak and Mixed Working Circles* were modified. Retention was considered necessary only for seed or for inducing increment in the standards. It was prescribed that only vigorous saplings of the more valuable species under a prescribed girth limit should be reserved. In 1927-28 it was found that the annual yield in certain felling series was exceeding the demand especially for fuel. It was feared that the short felling cycle viz. 30 years, might weaken the stools to produce vigorous coppice in the next rotation.

Moreover, system was changed from Coppice-with-Standards to simple coppice or transition felling. No clear rules were laid down for transition felling but they were aimed at the removal of *malformed, dead and dying trees*.

(ii) Introduction of Thinning

In the year 1924-25 an elaborate programme was drawn up prescribing thinning ten years before and after the main felling in the mixed forests (rotation 30 years) and at the ages of 10, 20 and 30 years in the teak forests (rotation 45 years).

Dunbar Brander's Plan improved both the forest and the pasture. However, difficulty in finding the minimum number of standards, sacrifice of young and

middle-aged trees in coppice system, vagueness of transition fellings and heavy thinning lead to revision of the plan.

11.2.3: Third Working Plan 1935-36 to 1946-47

Dunbar Brander's plan was replaced by the plan prepared by Sagreiya in the year 1935-36. In this plan the entire forest area was stock-mapped on the standard scale of 40"= 1 mile and reclassified forests into trees, scrub and miscellaneous categories for the purposes of grazing control in pursuance to the policy laid down in Government memorandum No.605-284-XV, dated the July 1933, as below:

**Table No. 11.3: Functional Classification of Forest in
Third Working Plan**

Range	Tree Forest		Scrub Forest		Miscellaneous		Total (ha.)
	Moist type ha.	Dry type (ha.)	PF (ha.)	Open Pasture ha	Grass (ha.)	Forest village ha	
Wardha	-	-	3231.01	1294.19	-	-	4525.20
Hingni	-	1503.41	4238.14	2322.49	-	926.33	8990.37
Karanja	-	6107.89	-	2250.85	-	1064.32	9423.06
Arvi	-	5697.75	5003.75	6122.07	84.98	216.91	17125.46
Ashti	-	-	5810.97	4540.58	-	247.67	10599.22
Bor Dharan	-	1581.51	410.49	-	-	-	1992.00
Total	-	14890.56	18694.36	16530.18	84.98	2455.23	52655.31

The entire area, except that was falling in open pasture, grass birs and forest villages was divided into two working circles; namely, *Conversion and Coppice-with-Reserve*. Each working circle was divided into a number of regular felling series. In pasture areas each block was divided into 4 coupes of varying sizes. The distribution of areas by working circles was as under:

**Table No. 11.4: The Distribution of Areas by Working Circles in
Third Working Plan**

Sr. No.	Name of Circle	No of felling series	Area of the working circle (ha.)	Percentage
1	Conversion Working Circle	2 Full 1 Part	9215.27	17.50
2	Coppice-with-Reserve WC	4 Full 2 Part	24369.65	46.28
3	Open Pasture Working Circle	12 Units	1630.18	31.39
4	Miscellaneous Working Circle			
	(a) Grass bir	-	84.98	0.16
	(b) Forest Villages	-	2455.23	4.87
	Total :		52655.31	100.00

Treatment prescribed for the above working circles, pertains to the areas of Wardha Forest Division was, as follows:

(1) Conversion Working Circle:

All areas generally containing teak of quality III and IVa were included in this working circle. A rotation of 72 years was fixed and each felling series was divided into 72 coupes. The first 24 coupes were allotted to conversion block to be taken up for main fellings. Clear-felling was prescribed after retaining young coppice or seedling growth and improvement felling in areas where reproduction was not satisfactory. In the unallotted area, coupes 25 to 48 were termed as middle aged, and coupes 49 to 72 as the youngest. In both these groups improvement fellings and light crown thinnings were prescribed in favour of the age class to which the group belonged.

(2) Coppice-With-Reserve Working Circle

This Working circle included all areas containing teak or mixed forest generally of quality IV. A rotation of 48 years was prescribed and felling series were classified as Teak or Mixed. Clear felling was prescribed subject to reservation of poorly stocked areas, healthy fruit bearing trees, advance growth, well grown poles of miscellaneous species where teak was pure, a belt of trees

along nalas and streams. Cut back operation in the year following the main felling was prescribed.

In teak felling series two thinning were to be carried out in the 16 years and 32 years after main felling were prescribed. The first thinning had to be in the form of light crown thinning, climber cutting and removal of inferior species interfering with teak except where it tended to be pure. In the second thinning, the aim was to induce rapid girth increment among the stems for the future and for this purpose a heavy crown thinning was to be carried out. The thinning was to be restricted to the crowns of top canopy, leaving congestion in the lower canopy to prevent the growth of epicormic branches on the dominant trees. In the mixed felling series one light crown thinning at half rotation age i.e. 24 years was prescribed to favour vigorous poles of the more valuable timber species and coppice shoots of timber species were to be reduced to one or two per stool.

(3) Open Pasture Working Circle

The forest areas which were considered not of great value for producing timber or fuel and which were subjected to intensive grazing were included in this working circle. The main object was to improve the pasture by periodic closures to grazing, assisted by improvement felling. The grazing units were divided into four coupes each, namely A, B, C and D. Each coupe of a grazing unit was to be successively closed to grazing for a period of 3 years. Before the closure, as above, it was to be worked with the object of improving the pasture, realizing over mature timber and thinning the congested crop. All dead, dying and over mature trees and mature trees likely to deteriorate were to be felled. Dense patches of forests were to be treated with D-grade thinning. Except teak, trees along the banks of nalas, shady trees of any species and healthy fruit bearing moha, achar and tendu were to be retained.

(4) Miscellaneous Working Circle

Grass birs and forest villages were included in this working circle. The management of the forest village areas was to be carried out according to the prescriptions of paragraphs 68 and 69 of the Central Provinces Forest Manual.

In addition to the above working circles two overlapping working circles for the working of bamboo and semal were also formed. Since the harvestable quantities of bamboos were not there in the present Wardha Division, so it is not being discussed.

(5) Semal (Overlapping) Working Circle

There was a keen demand of sound trees of semal of over 105 cm in girth for match industry. However, semal was not harvested till 1942-43 due to lack of adequate demand. Due to sudden demand it was harvested departmentally since the year 1943-44 in various coupes and material was delivered to the contractor at rail heads.

Besides the felling as above, an emergent demand for the supply of timber and other forest produce arose due to World War II. Consequently, larger areas, rather than as prescribed in the working plan, were harvested to meet the war demand from the year 1940-41 to 1945-46.

In Segreiya's plan, certain areas of present Karanja, Hingni and Arvi ranges, containing *good tree growth were classified as open pastures*. This was done mainly to satisfy the grazing demand. In many places, openly stocked areas and steep slopes were also worked which should have been excluded from fellings. Adequate attention was not given to maintain a *suitable mixture of miscellaneous species*, in areas, where teak was tending to be pure. Cut back operations in coupes were not carried out properly during the period of the plan. Besides, heavy felling were carried out from 1940-41 to 1945-46 to meet Defence requirements. It resulted in the removal of the best stems of the forest crop. All the above, necessitated revision in the prescriptions.

11.2.4: Fourth Working Plan 1947-48 to 1964-65

Segreiya's Working Plan was replaced by the one prepared by Mishra, in the year 1947-48. The stock maps prepared during 1932-33 for Segreiya's Plan were adopted after changing the age classes. The forest areas were classified, as follows, on the functional basis as per Chief Conservator of Forests, Central Provinces and Berar memorandum No.5079 dated September 28, 1946.

- (i) **Protected Forests:** This class included areas having precipitous and steep slopes (25° and over). As these areas formed the headwaters of rivers, streams and nalas, hence their preservation was of paramount importance in the interest of soil conservation and water supply.
- (ii) **Tree Forests:** This class included all areas capable of producing large sized timber especially of teak for which there was a keen demand. These forests constituted an important source of revenue and were managed on the basis of sustained yield.
- (iii) **Minor Forests:** This class included all areas which contained inferior tree growth and which were capable of producing small timber, poles and firewood. Meeting the local demand in respect of small timber, fuel wood and fodder was given precedence over other considerations.
- (iv) **Pasture Forests:** This class included areas in which primary object of management was to provide fodder and grazing to the maximum extent possible, consistent with the preservation and improvement of pasture. These areas contained little tree growth and were mostly scattered.
- (v) **Miscellaneous Forests:** This class included the grass birs and forest village areas. The former were to be closed to grazing permanently catering to the need for the supply of fodder grass to stallfeed the cattle, whereas, the latter were meant for the establishment of permanent source of labour supply for forest works.
- The area under different categories was classified as under:

**Table No. 11.5: Functional Classification of Forest in
Fourth Working Plan**

Range	Tree Forest (ha.)	Minor Forest (ha.)	Pasture Land (ha.)	Misc. Grass (ha.)	Forest Bir F V (ha.)	Total ha
Wardha	-	3231.01	1294.19	-	-	4525.20
Hingni	1503.41	6560.63	-	-	926.33	8990.37
Karanja	832.44	7261.64	264.66	-	1064.32	9423.06
Arvi	6368.11	5182.40	5273.06	84.98	216.91	17125.46
Ashti	-	5810.97	4540.58	-	247.67	10599.22
Bor Dharan	1581.51	410.49	-	-	-	1992.00
Total	10285.47	28457.14	11372.49	84.98	2455.23	52655.31

In accordance with functional classification, the following, working circles were formed:

Table No. 11.6: Working Circle wise area in Fourth Working Plan

Sr. No.	Name of working circle	Area in ha.	Felling series	Percentage
1	General High Forest W C	10285.47	3	19.53
2	Coppice-with-Reserve W C	28457.14	7 full 2 part	54.04
3	Pasture Working Circle	11372.49	11 units	21.60
4	Miscellaneous Working Circle			
	(a) Grass bir	84.98		0.16
	(b) Forest villages	2455.23		4.67
	Total	52655.31		100.00

(1) The General High Forest Working Circle

This included better type of forests of trap zone occurring in Kondhali, Arvi, Hingni and Umrer ranges. Treatment prescribed was conversion to uniform with adequate safeguard to retain a suitable mixture of teak with miscellaneous species (50:50) and no felling on precipitous and very steep slopes and in under stocked areas. Conversion period was fixed as 60 years and the whole area was divided into equal number of approximately equi-productive coupes.

In the main felling coupes, climber cutting was to be carried out 3 years in advance of main felling and the areas was to be closed for grazing after reproduction. Climber cutting was again to be done at the time of marking i.e. one year in advance of the main felling. Besides, adequate safeguards as mentioned above, in mixed forest, well grown poles upto 45 cm girth at breast height of all miscellaneous species except *garari* were to be retained as future crop. In stands containing a reasonable proportion of poles below 60 cm in girth in good quality areas, and below 45 cm in girth at breast height in poor quality areas, were to be reserved as part of the future crop. Clear felling was to be carried out in fully

stocked areas, subject to above reservations, and improvement felling in other areas.

Cut back operation a year after the main felling, climber cutting and cleaning at the age of 5 years and thinning at the age of 10, 20 and 40 years were prescribed. The aim of first two thinning was to attain the *uniform spacing while the third thinning was to induce maximum girth increment*. The thinnings were not obligatory but were to be carried out after careful inspection of the areas.

(2) The Coppice-with-Reserve Working Circle

This included major portion of the forests capable of producing only small to medium sized timber, poles and firewood. This was a flexible system in which the treatment of crop varied from no felling to clear felling depending upon the condition of the crop. The main aim was to obtain sustained annual yield of small to medium sized timber, poles and fuel wood and to provide fodder and grazing to the extent possible. The rotation of 48 years, as adopted in Sagreiya's plan was adopted. In the main felling coupe, poorly stocked forests, steep slopes and nala banks were to be excluded. All advance growth, except garari, upto 23cm girth at breast height was to be retained. In well stocked areas where teak is tending to become pure a minimum of 30 well grown poles per acre of miscellaneous species up to 60 cm in girth at breast height were to be reserved. In other areas where the resultant coppice from the main crop and the existing advance growth is likely to be adequate, sound and straight poles, upto 60 cm in girth at breast height of *teak, saja, shisham, tinsa, dhaora, haldu, shivan, dhaman and bhirra* were to be retained. In areas with a medium or low stocking, a minimum of 40 to 50 reasonably well grown trees per acre of valuable species were to be retained.

Cut back operation a year after the main felling, climber cutting and cleanings 8 years after the main felling and thinning at half the rotation age i.e. 24 years after year of felling were prescribed.

(3) The Pasture Working Circle

This included forest not capable of producing timber or fuel to any appreciable extent and where the grazing demand was acute. Felling of any tree growth, except in the interest of improvement of pasture was not to be carried out. Introduction of tree species yielding leaf-fodder and edible grasses was recommended. The area was divided into two sections A & B, each of which was to be closed to grazing during monsoon months, in alternate years.

(4) The Miscellaneous Working Circle

This included all the grass birs and the forest villages. Grass birs were permanently closed to grazing to produce good fodder which was to dispose off through auction. To improve the quality and quantity of fodder grasses in the grass birs, operations like periodic burning late in the hot weather, once in five years; eradication of weed and climbers; opening up of dense growth of tree species interfering in the growth of grass; artificial regeneration of fodder trees like, *anjan*, *mowai* and *papal*, etc. and light soil working and introduction of seeds of indigenous grasses like *paonia*, *sheda*, *mushan* and *lahan marvel* during the year of burning operations were prescribed. The areas included in the forest villages were meant for cultivations and meeting the nistar requirements of the forest villagers.

(5) The Overlapping Khair Circle

This extended over to all the forests of the division as Khair occurred scattered or in pure patches in teak and mixed forests in all the ranges of the division. Six felling series were formed and were to be worked on a 20 years felling cycle. Khair trees of and over 150 (37.7 cm.) in girth at base were to be harvested through the agency of contractor for the manufacture of katha. Many coupes remained unsold.

The prescriptions of this plan were found more or less suitable except in dry exposed localities, as no soil conservation works were prescribed. But the natural regeneration did not come up satisfactorily in Coppice-with-Reserve working circle. Since the plan period came to a close this working plan was revised.

11.2.5: Fifth Working Plan By Thorse(1965 to 1976 extended upto 91)

Mishra's plan was replaced by Thorse's Plan. The whole forest area was restocked, mapped on 40=1 mile scale maps. As per the Madhya Pradesh Government's Resolution No. 3952-2624-XI dated 10.12.1952, the forests were functionally classified as under:

**Table No. 11.7: Functional classification of forest in
Fifth Working Plan**

Range	Tree Forest ha.	Minor Forest ha.	Pasture Land ha.	Misc. Grass ha.	Forest Bir F V ha.	Total ha.
Wardha	-	3231.01	1294.19	-	-	4525.20
Hingni	1503.41	6560.63	-	-	926.33	8990.37
Karanja	-	7766.29	264.66	-	1064.32	9095.27
Arvi	-	11550.51	273.06	84.98	216.91	17125.46
Ashti	-	5810.97	4540.58	-	247.67	10599.22
Bor Dharan	1581.51	410.49	-	-	-	1992.00
Total	3084.92	35329.90	11372.49	84.98	2455.23	52327.52

On the basis of functional classification the working circles have been formed as under:

Table No. 11.8: Working Circle Wise Area in Fifth Working Plan

Sr. No	Name of working circle	Area in ha	Felling series	Percentage
1	General High Forest W C	3084.92	1	5.89
2	Coppice-with-Reserve W C	38329.90	12 full 2 part	67.52
3	Pasture Working Circle	11372.49	11 units	21.74
4	Miscellaneous Working Circle (a) Grass bir (b) Forest villages	84.98 2455.23		0.16 4.69
	Total	52327.52		100.00

(1) The General High Forest Working Circle

This included good quality teak forests in the trap zone occurring in Kondhali, Hingni and Umrer ranges, of which only one felling series lies in the Wardha Forest Division. The forest crop was mostly of IVa / IVb quality with patches of quality III on nala banks and sheltered slopes. Teak formed about 50 to 90 percent of the crop. Average density of the crop was about 0.7. The over wood in mixed forests consisted of *ain*, *dhaora*, *tendu*, *achar*, *lendia*, *semal*, *tinsa*, *bel* and *bhirra*. The aim was to convert the forests to a normal series of age classes by *Conversion to Uniform System with plantation with 60 years rotation*, and to achieve a forest crop with 70% teak and 30% of valuable miscellaneous species. The coupe demarcation was to be done three years in advance of main felling. A treatment map was to be prepared showing the areas excluded from working, areas fit for light felling, areas to be planted with teak and the remaining areas fit for clear felling. The unworkable areas included precipitous and steep slopes of 25° and over, under stocked areas below 0.4 density, eroded areas and areas liable to erosion. The areas marked for light working included nala banks in 20m wide strip on either side of well defined nalas and main water courses, inadequately stocked areas with density 0.4 to 0.6 climbers were to be cut, all advance growth of teak upto 23 cm in girth at breast height was to be retained, all healthy fruit bearing trees of achar, tendu, moha and imli were to be retained where they were collected by local people and all khair, kulu and seminal trees were to be retained.

Subsidiary silvicultural operations included gully plugging with debris or stones found nearby and cut back operations in the year following the year of main felling. Cleaning operations were to be carried out after 5 years of the main felling. This included spacing between advance growth retained and mechanical thinning in exceptionally good plantation of teak.

Two thinning at the 11th and 21st year after the main felling were prescribed. In the young crop retained at the time of main felling, the thinning was to be carried out as per the following formula:

$$D = \frac{d+3}{2}$$

Where, D = Distance between the stems in feet.

d = Diameter of the stem in inches.

In the remaining areas light crown thinning in favour of teak and other superior species, were prescribed.

(2) The Coppice-with-Reserve Working Circle

This included all the harvestable forests of inferior quality which were capable of producing mostly small timber, poles and firewood. The crop varied in composition, density and growth from place to place, comprising, two main types of forest areas, as follows.

- (i) Predominantly, teak forests characterised by the presence of more than 50% of teak in the over wood
- (ii) Predominantly, mixed forests, the over wood of which consisted miscellaneous species of *bhirra*, *dhaora*, *ain*, *lendia*, *tendu*, *rohan*, *salai*, *mowai* etc.

The quality of both types of forests varied from IVa to IVb to III. Better quality was found along nala banks, shelter valleys and gentle slopes. The aim was to get the maximum yield of small timber, poles and firewood and to provide for grass and grazing without impairing the productive capacity of the forests. The treatment adopted was Coppice-With-Reserve with a rotation of 48 years.

Demarcation was prescribed 3 years in advance to the main felling and all the climbers were to be cut. A treatment map similar to the General High Forest Working Circle was to be prepared. In the unworkable areas, only dead, diseased and dying trees were to be removed. In the areas containing patches of young poles, thinning to space out the crop approximately 1/3 rd of the crop height to be carried out along with removal of dead, dying seriously diseased and malformed poles were prescribed. In areas having density over 0.4 to 0.6, improvement felling consisting of removal of dead, dying, malformed and over mature trees were prescribed. The areas suitable for clear felling and planting of teak, not less than 2 ha. in extent at one place were to be clear felled and planted with teak. A minimum

of 10% of the workable area was to be selected for planting. In the remaining areas, all well grown poles of teak and other valuable species upto 30cm In girth at breast height in quality IVa areas and upto 45cm in girth at breast height in quality III areas, all healthy trees bearing edible flowers and fruits, all *harra*, *khair*, *semal* and *kulu* trees and trees of valuable species required for production of seed, were to be retained. Rest of the crop was to be felled.

In the next year of main felling subsidiary silvicultural operations were to be carried out. They involved anti-erosion works, and cut back operations. Cleanings were to be carried out after 5 years of main felling. This included cutting and removal of inferior species interfering with the growth of teak and other superior species, cutting of damaged young growth of teak, reduction of coppice shoots on each stump to 2 or 3 vigorous and well spaced shoots, spacing of advance growth retained at the time of felling to 2 to 2.5 m, mechanical thinning in exceptionally good teak plantations and pruning of persistent side branches. Two thinning after 12 years and 24 years of main felling were prescribed. They included removal of dead, dying, unsound and badly damaged trees, singling of coppice shoots and spacing out the pole crop to $1/3^{\text{rd}}$ of crop height. Any growth badly affected by fire was to be cut back as soon as possible, after the occurrence of fire.

(3) The Pasture Working Circle

This included the forests, which were incapable of producing either timber or firewood but were required to meet the local grazing demand. A few compartments bearing sufficient tree growth so as to be worked for timber and firewood were also included in this Working Circle, as they could not be conveniently included in other working circles due to their scattered nature. In these areas species like *teak*, *lendia*, *dhaora*, *bhirra*, *ain*, *mahua*, *tendu* and *thorny species like bharati, khair, ghot, bor and chilhati* were present. Common grasses found were *bhurbhushi*, *kusal* and *ghonad* and at places *marvel* and *sheda*. *Tarota*, *bantulsi* and *diwali* were the common weeds. The main aim was to provide adequate grazing to the cattle of local population without deterioration in the productive capacity of the site. To achieve this the entire area was divided into suitable pasture series and each pasture series was divided into 4 coupes which

were to remain closed to grazing for three years in rotation. Each of the coupes was further divided into 2 sections, one of which was to remain closed to grazing during monsoon in alternate years.

The coupe due for closure to grazing was to be demarcated one year in advance and a treatment map, showing (i) areas having well drained soil upto 15 cm deep and suitable for introduction of better fodder grasses, (ii) areas suitable for introduction of fodder yielding tree species such as anjan, mowai, pipal, gular etc., (iii) areas having dense crop of trees and (iv) protection and unworkable areas, was to be prepared. The extent of area was to be not less than 2 acres. During the first year of closure, the areas in category (i) were to be sown with the seed of paonia, marvel, etc. by broadcasting after the receipt of about 10 to 13 cm rainfall. In area (ii) pits of size 30 cm³ were to be dug at 10m x 10m and were to be planted with fodder yielding species. In area (iii), heavy openings were to be carried out to allow the growth of grass. In area (iv) anti-erosion works and improvement felling were to be carried out. Weeds were to be uprooted all over the areas in the month of October.

Second year operations included broadcasting of grass seeds after soil working in areas of category (i), casualty replacement in areas of category (ii) and weeding all over the areas. These operations were to be repeated in third year also.

(4) The Miscellaneous Working Circle

This included grass birs and forest villages. Scattered patches of forest areas incapable of producing trees were managed under grass birs. These areas were to be completely closed to grazing and the grasses were to be sold to the Gram Panchayats or other public bodies or to be sold in open auction or on rated passes in accordance with the instructions contained in (a) para 107 of M P Forest Manual, Volume II; (b) Bombay Government's G R No.6991, dated 22.1.1952 and FLT/1488/13208-E dated 17.11.1958. However, as per M P Govt. Resolution No.861-77XI dated 14.2.1953, grasses from the grass birs situated within a radius of 5 miles of a township having population of 10,000 and over, were to be reserved for such township and were to be sold on rated passes. Improvement works such as eradication of weeds and climbers, cutting of thorny shrubs of chilhti, bharati, etc.;

opening of dense patches of tree growth, burning of grass birs every 5 years followed by light soil working and broadcasting of seeds of fodder grasses and planting of fodder yielding trees at suitable places at a spacing of 10m x 10m, were prescribed.

Forest villages were to be managed in accordance with the instructions contained in *para 68 and 69 of M P Forest Manual*. The forest areas in these villages were reserved to meet the nistar requirements of the villagers. *Thinning and Selection-cum-Improvement felling to utilize the timber trees likely to deteriorate and to improve the forests could be carried by the D F O with the approval of Conservator of Forests.*

(5) Overlapping Khair Working Circle

Due to decline in the demand for khair this working circle was not formed initially. However, due to the increase in demand again and as per Government's memo No.WPN/1469/2/889-X dated 1.12.1969 this working circle was added to the working plan and the first coupe was to be worked in 1970-71. A felling cycle of 20 years was proposed. The harvestable girth was fixed as 38 cm, when khair trees develop sufficient heartwood suitable for manufacture of *katha*.

(6) Ex-proprietary or Protected Forests

For the purpose of description of the general history of management of the ex-proprietary or protected forests, the following, periods can be distinguished:

- 1) Pre-abolition period i.e. from 1853 to 1950,
- 2) Early abolition period i.e. from 1951 to 1968,
- 3) Period of regular working under a working scheme from 1968 to date.

(1) Pre-abolition period (1853 to 1950)

Before the abolition of proprietary rights, the proprietors used to control the forest lands. Though, the nistar rights existed in these proprietary forests but the enjoyment of these rights depended mostly on the whims of the individual proprietors. People of the villages, in which there were insufficient grazing lands or

forest areas; used to obtain their requirements from the neighbouring villages with the permission of the landlord or as a right, if it was recognised in the *Wazib-ul-arz*.

In the very early stages, the nistar rights were not confined to particular villages but were available in the neighbourhood also. As the country developed, restrictions were placed on grazing and other facilities. The superior species of timber were reserved in favour of proprietors themselves. The restrictions increased with the pace of development. Distinction came to be made between agriculturists and non-agriculturists, the former were being given priority over the later. During the World War II, there was heavy demand for timber, firewood, charcoal and bamboos. This led to heavy and unregulated commercial felling by the proprietors.

From 1948 to 1950, large scale indiscriminate felling of the proprietary forests was done by the proprietors before taking over by the Government. As a result, these forests became devoid of mature and valuable trees.

(2) Early abolition period (from 1951 to 1968):

In 1951, proprietary rights were abolished and these areas vested in the State Government. The crop consisted mainly of young coppice. In 1954 '*Nistar officers*' were appointed to enquire into the nature of rights existing over these forests. From 1954 to 1956 they carried out enquires and prepared '*Nistar Patraks*' for each village. In '*Nistar Patrak*', *khasra numbers* were allotted for village site, burial ground, camping ground, bazaar and other village purposes. Khasra numbers allotted for grazing of the cattle and for obtaining timber, firewood etc. for nistar, were also mentioned. Wherever the forest area in a particular village was found to be in excess, the adjoining village with deficit forest was attached to it. The units formed by such arrangements were called '*grazing and nistar zones*'. Initially these forests were taken over by the Revenue Department but, subsequently, the areas in compact blocks and in excess of the village needs were transferred to the Forest Department for management. Later on these areas were declared as Protected Forests under section 29 of Indian Forest Act 1927 vide M P Government's No.3058-2979-XI, dated 4.6.1955. The detail of which are given below:

**Table No. 11.9: Area Vested in the Government for Grazing
and Nistar Zones**

Name of the district	Total area vested in the Govt. (ha.)	Area retained by the Revenue Department (ha.)	Area transferred to the Forest Department(ha.)
Wardha	48734.98	14517.07	34217.91

After taking over of these forests by the Forest Department, they were placed under the protective staff for protection from thefts and fires. No systematic afforestation work was attempted except over a small area in *Khadki village*.

11.2.6 Period of Regular Working Scheme (By K.H. Chati from 1968 to 1991)

The first working scheme for ex-proprietary forests of Wardha Division was written by Chati. As per MP Govt.'s No 3952-2624-XI dated 10.12.1952 these forests were classified into various categories as below:

Table No. 11.10: Functional Classification

Sr. No.	Class of Forests	Area in	
		Acres	Hectares
1	Minor Forests	63039.22	25511.09
2	Pasture lands	10756.71	4353.68
3	Remaining Forests	10758.31	4353.14
	Total	84554.24	34217.91

Based on the situation of the forests, type and quality of the crop, condition of reproduction of the crop and the nistar requirements of the local people, following circles were formed.

- 1) Coppice-with Reserve Working Circle
- 2) Improvement Working Circle
- 3) Pasture Working Circle
- 4) Miscellaneous Working Circle

**Table No. 11.11: The Range Wise Distribution of Area in
Different Working Circle**

Sr No	Range	CWR W. C. (ha)	Improvem ent W. C. (ha)	Pasture W.C. (ha)	Misc Grass Bir (ha)	Other W. C. (ha)	Total (ha)
1	Wardha	-	812.61	469.30	-	128-29	1410.20
2	Hingni	3837.85	476.38	1763.45	373.02	521.33	6972.03
3	Karanja	1348.42	792.78	417.83	570.93	328.61	3458.57
4	Arvi	6628.20	2482.89	-	608.43	-	9719.52
5	Ashti	5623.92	2051.41	1702.51	998.76	824.36	11200.96
6	Bor Dharan	162.45	1294.17	-	-	0.01	1456.63
	Total	17600.84	7910.24	4353.09	2551.14	1802.60	34217.91

1) Coppice-with Reserve Working Circle

This included greater portion of ex-proprietary forests capable of producing small to medium sized timber, poles and firewood, a few patches capable of producing large sized timber and inextricably mixed with previous category. The forest crop varied from mixed forest to pure teak forests. The miscellaneous species consisted of *bhirra*, *dhaora*, *ain*, *tendu*, *lendia*, *aonla*, *moha*, *mowai* and *salai*. The quality varied from IVa to IVb, common being IVb. The main object of management was to get maximum sustained yield of small timber, poles and firewood and to provide for fodder and grazing needs of the local people and to improve proportion of valuable species. The rotation was fixed at 40 years.

The demarcation was to be done one year in advance of main felling and a treatment map was to be prepared. In the treatment map following areas were to be shown (i) *Unworkable and protection areas being under stocked and blank* (ii) *fully stocked young crop fit for retaining as future crop* (iii) *inadequately stocked teak and mixed forests with or without salai trees* (iv) *well stocked areas* and (v) *areas fit for teak plantations or afforestation*. In areas falling in category (i) above, dead and dying trees were to be removed. Pollard trees and stools of illicit cutting were to be cut back and dressed properly. In the category (ii) areas, thinning in

favour of well grown and healthy poles of superior species was to be carried out so as to attain an average spacement of $1/3^{\text{rd}}$ the height of dominant trees. In the category (iii) improvement felling consisting of removal of dead, dying, diseased and malformed trees, and C/D grade thinning in dense patches were to be carried out. In the remaining well stocked areas felling were to be carried out after reserving (i) trees required for protection, seed or for other silvicultural purposes (ii) fruit trees of economic importance such as *amba*, *chinch*, *moha*, *jamun*, *kuda* and *khair* (iii) all advance growth up to 23 cm in girth at breast height, and (iv) well grown poles of teak and other valuable species up to 30 cm in girth at breast height in IVa quality areas and up to 45 cm in girth at breast height in IVb quality areas.

Cut back operations were to be carried out in the year following the main felling. Cleanings were to be carried out in the 6th year after the main felling. They included climber cutting, cutting of inferior species interfering or likely to interfere with the girth of teak and other valuable species, cutting back of damaged young growth, reduction of multiple coppice shoots on each stump to 2 or 3 well spaced healthy shoots and spacing out of advance growth to 2m to 3m depending upon the height growth. One thinning at the mid-rotation age was prescribed. It consisted of improvement felling, singling of coppice shoots and removal of inferior species in favour of poles of more valuable species.

2) Improvement Working Circle

This included hilly areas liable to erosion, forests of poor quality and low density and the surplus areas left out of the nistar zones. The crops consisted mainly of miscellaneous species with few patches bearing teak. The quality of the crop was mostly IVb. The density varied from 0.5 to 0.7 scattered patches of teak of IVa quality with density over 0.7 occurred chiefly along main nalas and along lower gentle hill slopes. Seedlings regeneration of miscellaneous species was practically absent due to heavy grazing, fire and nearness to villages. The major portion of the crop was young with scattered middle aged nature trees which were mostly unsound and malformed. Reproduction of coppice origin especially of teak over major part was conspicuous. The main object of management was to improve

the growing stock, check soil erosion and meet the nistar demands of local people. The felling cycle was fixed at 10 years. The treatment prescribed was improvement felling.

The coupe due for felling was to be demarcated one year in advance. The felling besides climber cutting involved (i) removal of dead, dying, diseased, malformed and silviculturally available mature trees (ii) removal of inferior species interfering with the growth of superior species (iii) thinning in congested patches, (vi) singling of coppice shoots and (v) cutting back of live stools to the ground. No felling was to be carried up to 1 chain on either side of prominent nalas and water courses. Similarly, trees bearing edible fruits and flowers such as *moha*, *achar* and *tendu* and trees of economic importance like *khair* and *semal* were to be reserved.

Fellings were prescribed through *Gram Panchayats*, *Gram sabha* or *nistar panchayats*; cutting back operations were to be carried out in the year following the year of working. They included (i) felling of leftover marked trees (ii) felling of damaged or broken trees (iii) cutting back of malformed advance growth of teak and other valuable species (iv) clearance of felling debris from stool and (iv) climber cutting.

3) Pasture Working Circle

This included forest areas which were generally open and incapable of producing timber or fuel and where the grazing demand was heavy. Some well stocked, scattered compartments which could not be accommodated in other working circles were also included. The major portion of the areas was of IVb quality. The main object of management was to provide grazing to the maximum possible extent consistent with preservation and improvement of pasture. The whole area was divided into grazing series. Each grazing series was divided into four coupes viz. A, B, C and D and each coupe was to be closed to grazing in rotation for three years. In the closed areas cutting of grass was allowed from 1st of Decemberevery year.

The coupe due for closure was to be marked one year in advance. Besides climber cutting, improvement felling in the protection and unworkable areas, heavy

thinning in the dense crop to stimulate the growth of grasses, retention of trees providing shade, fodder and edible flowers and fruits were prescribed. Patches containing good soil were to be ploughed before the onset of the monsoon and were to be sown with the seed of better fodder grasses like *sheda*, *paonia*, *marval*, etc. Tussocks of above species were to be preferred for planting. Uprooting of obnoxious weeds in the first year was suggested.

4) Miscellaneous Working Circle

It included scattered patches which could not be conveniently allotted for regular working and existing grass birs. The scattered patches were generally surrounded by agricultural fields of adjoining villages. Major portion of the area was under stocked with blank patches. The crop was stunted and malformed due to constant hacking for nistar. Moderately stocked areas contained miscellaneous crop with teak trees of quality IVb and varying in density from 0.4 to 0.6. The common grasses noticed in them were *sheda*, *ghonad*, *kusal* and *gokru*.

No regular working was prescribed in scattered patches. However, thinning and improvement felling for meeting the nistar requirements or otherwise were to be carried out under the orders of Conservator of Forests.

Grass birs were to be managed to supply the fodder grasses. To improve the quality and quantity of fodder in these pastures, periodical burning once in five years in hot weather followed by soil working and sowing of seed of *paonia*, *sheda*, *mushan* and *marvel* during monsoon was suggested.

11.2.6.1: Regulation of Grazing in the Forest

(A) Reserve Forest:

Prior to 1875: In the years before reservation, the *Banjaras*, who kept large herds of cattle for transport of grain and trade in bullocks and the *Dhangars*, who reared large flocks of sheep and goats for trading in wool, skins and meat, grazed large numbers of cattle in these forests. As there were no restrictions, grazing was concentrated in the most accessible forests. Grazing of goats and sheep was stopped in early reservation days. No restrictions on cattle were imposed before 1875.

From 1875 to 1912: Soon after reservation of the forests, the need to control the unregulated grazing was felt. Some areas belonging to present Nagpur Forest Division were closed to grazing. However, it was found that continuous closure was not favourable to reproduction. The working plan of 1895, therefore, prescribed that the coupes should be closed only for ten or fifteen years after felling and should remain open to grazing for rest of the rotation. Subsequent description of the forests show that these closure resulted in a distinct improvement of the tree forests and pasture between 1895 and 1912, when a revised grazing settlement was introduced.

From 1912 to 1934; Leftwitch's scheme: Under Dunbar Brander's plan grazing was regulated as per Leftwitch's scheme. Under this scheme, the forests of the division were divided in 34 grazing units and grazing in each was regulated to preserve tree growth and pasture and at the same time to provide sufficient grazing. The periodical closures for 5 years, at interval of 5 years, were prescribed in various working circles. No closures were prescribed in Grazing Working Circle. The maximum incidence of grazing of 1.5 acres per head was prescribed. Grass birs were set aside as grass reserve and permanently closed.

To restrict the number of cattle from each village three classes of cattle were distinguished.

- (i) **Privileged:** Absolutely indispensable for bona-fide agricultural purposes; a limit of 4 per working plough was fixed.
- (ii) **Ordinary:** Reasonably necessary for quasi-agricultural purposes, such as the supply of milk, manure and breeding for domestic use; 4 per plough over above (i) were considered adequate; and
- (iii) **Commercial:** Others kept mostly for trade in cattle and milk products.

Different rates were fixed for above three classes, being lowest for privileged class and highest for commercial class. Preference was given to privileged class and other classes were allowed to graze if permitted as per the grazing incidence. Certain areas were exclusively reserved for commercial cattle.

Subsequent modifications to Leftwitch's scheme: Leftwitch's scheme was subsequently modified (i) to regulate licences (ii) to lay down the number of cattle that each agriculturist could graze (iii) to limit the number of cattle for each village that can be allowed grazing in the Government Forests and (iv) to increase the grazing area in Government forest due to decrease and deterioration of private grazing grounds and the unreasonable grazing rates charged by the proprietors. To meet the later demand restrictions were relaxed in 1928.

From 1935-36 to 1946-47: The grazing settlement of Sagreiya's plan was effected by Sukhthankar in the year 1934. Smaller grazing units were formed in this settlement. In open pasture grazing incidence of 0.5 acre per cow unit was fixed.

For the purposes of grazing control, the forest area was reclassified as per Government memorandum No.605-264-XV dated July 19, 1933. The grazing incidence aimed in each type of forests was, as under:

(a) Tree Forest: (i) *Moist type*: Four acres per cow unit. (ii) *Dry type*: Two acres per cow unit in teak forest and three acres per cow unit in mixed forest.

(b) Scrub forest: (i) *Pasture type*: One acre per cow unit. (ii) *Open pasture type*: Unlimited grazing.

The grazing closures prescribed in various working circles were as under:

(i) **Improvement Working Circle:** Eight year's closure after main felling i.e. one third area always remained closed to grazing after the eight year of the plan.

(ii) **Conversion Working Circle:** Six year's closure after main felling. After this period 18 years grazing was to alternate with six year's closure.

(iii) **Coppice-with Reserve Working Circle:** (a) *Teak felling series*: Four year's closure after main felling. After this period 12 years grazing was to alternate with four years closure. As these periodic closures were to take effect immediately, one fourth area always remained closed to grazing.

(iv) **Open Pasture Working Circle:** One coupe in each unit was closed at a time for four years and then opened to grazing for 12 years i.e. one fourth areas always remained closed to grazing.

(v) **Miscellaneous Working Circle:** Grass birs always remained closed to grazing and the forest village areas were reserved for the forest village cattle to graze.

From 1947-48 to 1964-65: In Sagreiya's plan large areas were classified as such forests keeping in mind the grazing requirement. This resulted in larger grazing incidence and consequent deterioration of the growing stock. In Mishra's plan the forests were reclassified as per Chief Conservator of Forests, Central Provinces and Berar's memorandum No.5079 dated September 28, 1946. Due to this the forest area classified as 'scrub forest' came under the category of '*minor forest*'. The grazing incidence, thus, came down in these forests. The grazing in various working circles, falling in the Wardha Division, was regulated as under:

- (i) **General High Forest Working Circle:** In this working circle the maximum permissible grazing incidence was not to exceed 3 acres per cow unit. All coupes remained closed to grazing for 2 years in advance of main felling followed by a closure of 6 years.
- (ii) **Coppice-with Reserve Working Circle:** The maximum grazing incidence was 2 acres per cow unit in these forests. All coupes remained closed to grazing for a period of 6 years from the year of main felling.
- (iii) **Pasture Working Circle:** The maximum grazing incidence was 1 acre area per cow unit in this working circle. Monsoon closures were applied by dividing each grazing unit in Section A and B and closing them to grazing alternatively.
- (iv) **Miscellaneous Working Circle:** Grass birs were permanently closed to grazing. Forest village areas were open to grazing to the cattle of the forest villagers only.

The grazing settlement of Mishra's plan was effected by Verma, Assistant Commissioner in 1947. In all 25 grazing units were formed.

From 1965-66 to 1990-91: The prescriptions for grazing under Thosre's plan for various working circles remained same as those in Mishra's plan.

In 1968 Govt. of Maharashtra announced a **new grazing policy** by which the grazing incidence for different types of forests were fixed, as under:

- (a) Protection forests: No grazing.
- (b) Tree forests: 1.2 ha per cattle unit.
- (c) Minor forests: 0.8 ha per cattle unit.

(d) Pasture forests: 0.4 ha per cattle unit.

In accordance with the provisions of the Grazing Policy, the Grazing Rules were framed in the year 1973 to regulate the grazing in forest areas in Maharashtra State.

(B) Protected Forests:

Prior to 1951: Before the abolition of the proprietary rights all lands in a village belonged either to the tenants or to the proprietors who permitted unlimited grazing by charging grazing rate as per practice existing during the period.

From 1951 to 1968: To determine the existing nistar rights and to allot vested areas for different purposes nistar officers were appointed in 1954. From 1954 to 1956, they carried out enquiries and prepared 'Nistar Patra' for each village. In Nistar Patra, khasra numbers allotted for grazing of cattle, were mentioned. In villages where grazing land was just sufficient for the needs of the cattle of that village no right of persons residing in other villages to graze their cattle were recognised unless already recorded in *Wazib-ul-arz*. Villages in which the areas of grazing land were less than half an acre per cattle head in *cotton-juar tract* and one acre in the remaining tracts were clubbed with neighbouring village in which such area exceeded the above standard. Villages so clubbed constituted a *grazing zone*.

Under Bombay Govt. Notification No.FLD/4657/103064-E, dated 19.12.1958 for allowing free grazing, distinction between cultivator and agricultural artisans and labourers, was made. Free grazing at the following scale was allowed in the ex-proprietary forests:

- (a) **Cultivators:** 2 plough cattle per plough plus 4 others including one she-buffalo.
- (b) **Agricultural artisans and labourers:** 4 cattle including one she- buffalo.

Further, no person was allowed to graze his cattle without a valid licence. to be granted by a person duly authorised. No specific areas were allotted for sheep and goat grazing. Sheep and goats were to be excluded from the forests required (i) for production of big sized timber, firewood and (ii) for meeting the nistar requirements of the villages.

From 1968-69 to 1990-91: In the Chatiôs working scheme the grazing in different working circles was regulated, as under:

(i) Coppice-with-Reserve Working Circle: The main felling coupes remained closed to grazing for 5 years beginning with the year of marking. Mid-rotational thinning coupes were closed to grazing for 3 years from the year of thinning. The coupes of advance cultural operations were closed to grazing for one year only.

(ii) Improvement Working Circle: The main felling coupes were closed to grazing for a period of 5 years from the year of working.

(iii) Pasture Working Circle: Each coupe remained closed to grazing for 3 years and open to grazing for 9 years.

(iv) Miscellaneous Working Circle: Grass birs were permanently closed to grazing. To keep the grazing incidence under control the Division Forest Officer was to control the entry of cattle in these forests as per the provision of Nistar Patraks.

11.2.6.2: Management of Areas by FDCM

FDCM Ltd has taken up massive afforestation works since 1988 in Wardha division. Other than afforestation, no other activity such as harvesting; was carried out. FDCM Project Division, Wardha did afforestation on 6499.90ha during 1988-1993. The area is now handed over back to parent division.

11.2.7: The Sixth Plan: Dr Nand Kishore (from 1992-93 to 2001-2002)

This plan was written by Dr. Nand Kishore. It was the first independent Working Plan of Wardha Forest Division, covering all the reserved, protected and unclassified forests of Wardha District. It replaced Thosreôs Plan for Reserved Forests and Chatiôs Working Scheme for the Protected Forests. The forests were classified on the functional basis and the following Working Circles were formed.

**Table No. 11.12: Functional Classification of Forest in
Sixth Working Plan**

Sr No	Working Circle	Reserve Forests (in ha)	Protected Forests (in ha)	Unclassed Forests (in ha)	Total (in ha)	Per centage
1	CWR	29457.40	13042.64	---	42500.04	49.82
2	Improvement	14452.17	6657.38	---	21109.5	24.74
3	Fuel, Fodder and Pasture	5864.54	11092.97	---	16997.51	19.88
4	Miscellaneous	83.45	555.59	---	639.04	---
5	Wildlife and Nature Conservation	2746.36	702.27	584.92	4033.55	---
	Total	52675.40	32050.98	584.92	85311.20	100.00

(1) Coppice-with Reserve Working Circle

This included greater portion of Reserve and ex-proprietary protected forests capable of producing small to medium sized timber, poles and firewood, a few patches capable of producing large sized timber. The forest crop varied from mixed forest to pure teak forests and having density over 0.4. The miscellaneous species consisted of *bhirra*, *dhaora*, *ain*, *tendu*, *lendia*, *aonla*, *moha*, *mowai* and *salai*. The quality varied from IVa to IVb with patches of III. The main objects of management were to get maximum sustained yield of small timber, poles and firewood as well as to provide fodder and grazing, to check soil erosion and to improve proportion of valuable species in the workable areas. The rotation of 48 years was fixed.

The demarcation was to be done one year in advance of main felling and a treatment map was to be prepared. In the treatment map following areas were to be shown as (A) *Protection areas*, (B) *Well stocked areas*, (C) *Old plantations and group of young poles* (D) *Under stocked areas*. Type B was further divided into B(i) and B(ii) with or without established regeneration respectively. The D type

areas were divided into three sub-types viz. D(i) – Rocky and eroded areas; D(ii) – Areas with adequate rootstock and D(iii) – the remaining areas.

In the areas falling in category A, only the dead and uprooted trees were to be removed only. In the category B(i) well stocked areas marking for felling was prescribed after reserving all trees required for protection or for other silvicultural purposes, all healthy fruit trees, healthy trees of economic importance as semal, kullu and salai; all advance growth up to 30 cm in girth at breast height and well grown poles of teak and other valuable miscellaneous species up to 30 cm in girth at breast height and 100 sound and middle aged trees per hectare. In B(ii) areas marking for felling was prescribed after reserving all healthy fruit trees, healthy trees of economic importance as semal, kullu and salai; and 25 to 30 sound and middle aged trees of valuable species per hectare. In C type areas thinning in favour of well grown and healthy poles of superior species were to be carried out so as to attain an average spacement of $1/3^{\text{rd}}$ the height of dominant trees. No marking was prescribed in D(i) areas. In D(ii) and D(iii) areas all the dead and malformed trees over 30 cm gbh were marked for felling except the edible fruit trees.

Regeneration was prescribed through coppice and artificial regeneration. Treatment map for plantation was prescribed to be prepared by the ACF. In type A and C areas bamboo plantations were prescribed. In B(i) bamboo and gap planting by teak and other miscellaneous species was prescribed. In B(ii) and D areas all type of plantations was prescribed as per treatment map. Soil and moisture conservation works were prescribed in the year of main felling.

Cut back operations were to be carried out in the year following the main felling. Cleanings were to be carried out in the 6th year after the main felling. They included climber cutting, cutting of inferior species interfering or likely to interfere with the girth of teak and other valuable species, cutting back of damaged young growth, reduction of multiple coppice shoots on each stump to 2 or 3 well spaced healthy shoots. Two thinning in the 12th and 24th were prescribed. It consisted of improvement felling, singling of coppice shoots and removal of inferior species in favour of poles of more valuable species. Cutting back and dressing of high stumps and spacing the pole crop to $1/3^{\text{rd}}$ of the height.

Result

(i) Coppice-with Reserve Working Circle:Teak is the principal species and its reproduction from seedling origin is confined to patches containing well drained and deep soil. The growth has been hampered by grazing and fire. The young teak seedlings were seen in major parts of Arvi, Hingni and Karanja ranges even on blank areas, but their subsequent establishment is an issue of serious concern. Coppice reproduction of teak is by and large satisfactory in interior areas, but is insufficient to restock the area. Dhaga and Bhawan felling series have reasonably well stocked areas, but the coppice vigour is not good. The growth has become stunted in major parts. The reserves left in the previous openings have now become malformed and over mature and do not coppice after felling. This is creating large opening in the canopy. In the previous working plan, they were under High Forest working system.

Among the miscellaneous species bhirra is the most common and abundant associate followed by dhaora. The seedling reproduction of bhirra is satisfactory in many parts, however, coppice is not satisfactory. The areas vulnerable to illicit felling look like bhirra forests. The typical example is Keljhar felling series. The coppice as well as seedling reproduction of other species is not satisfactory. Seedlings reproduction of dhaora is very good in many areas where it is the major associate of teak.

The thinning prescribed in 12th year and 24th year have not been correctly understood by the field staff. They have either not been carried out all or have been carried out as main felling.

Though prescriptions were made in Dr Nand Kishore's plan to suitably afforest the under stocked and blank areas, no concerted efforts have been taken, to ensure the follow up. Most of the plantations undertaken in the past are not successful due to refractory nature of the tract and the lack of concerted efforts and approach. **Insufficient coppice and seedling reproduction and damage due to illicit felling, grazing and fires have resulted in depletion of the growing stock.**

2) Improvement Working Circle

Hilly areas liable to erosion, forests of poor quality and low density and the surplus areas left out of the nistar zones are included. The crops consisted mainly of miscellaneous species with few patches bearing teak. The quality of the crop was mostly IVb. The density varied from 0.5 to 0.7. Scattered patches of teak of quality IVa with density over 0.7 occurred chiefly along main nalas and along lower gentle hill slopes. Seedlings regeneration of miscellaneous species was practically absent due to heavy grazing, fire and nearness to villages. The major portion of the crop was young with scattered middle aged mature trees which were mostly unsound and malformed. The main objects of management were to improve the growing stock, to check soil erosion and to meet the nistar demands of local people. The yield was regulated by area. The treatment prescribed was improvement felling supplemented by plantations.

The coupe due for felling was to be demarcated one year in advance. In the treatment map following areas were to be shown as; (A) *Protection areas*, (B) *well stocked areas*, (C) *Old plantations and group of young poles* (D) *Under stocked areas*. Type B was further divided into B(i) and B(ii) with or without established regeneration respectively. The D type areas were divided into three sub-types viz. D(i) – *Rocky and eroded areas*; D(ii) – *Areas with adequate rootstock* and D(iii) – *the remaining areas*.

In the areas falling in category A, only the dead and uprooted trees were to be removed. In the category B(i) well stocked areas marking for felling was prescribed after reserving all trees required for protection or for other silvicultural purposes, all healthy fruit trees, healthy trees of economic importance as semal, kullu and salai; all advance growth up to 30 cm in girth at breast height and well grown poles of teak and other valuable miscellaneous species up to 30 cm in girth at breast height and 100 sound and middle aged trees per hectare. In B(ii) areas marking for felling was prescribed after reserving all healthy fruit trees, healthy trees of economic importance as semal, kullu and salai; and 25 to 30 sound and middle aged trees of valuable species per hectare. In C type areas thinning in favour of well grown and healthy poles of superior species were to be carried out so as to

attain an average spacement of $1/3^{\text{rd}}$ the height of dominant trees. No marking was prescribed in D(i) areas. In D(ii) and D(iii) areas all the dead and malformed trees over 30 cm gbh were marked for felling except the edible fruit trees.

Regeneration was prescribed through tending of coppice reproduction and artificial regeneration. Treatment map for plantation was prescribed to be prepared by the ACF. In type A and C areas bamboo plantations were prescribed. In B(i) bamboo and gap planting by teak and other miscellaneous species was prescribed. In B(ii) and D areas all type of plantations was prescribed as per treatment map. Soil and moisture conservation works were prescribed in the year of main felling.

Cut back operations were to be carried out in the year following the main felling. Cleanings were to be carried out in the 6th year after the main felling. They included climber cutting, cutting of inferior species interfering or likely to interfere with the girth of teak and other valuable species, cutting back of damaged young growth, reduction of multiple coppice shoots on each stump to 2 or 3 well spaced healthy shoots. One thinning in the 12th was prescribed. It consisted of improvement felling, singling of coppice shoots and removal of inferior species in favour of poles of more valuable species. Cutting back and dressing of high stumps and spacing the pole crop to $1/3^{\text{rd}}$ of the height.

Result

(ii) Improvement Working Circle: In the main felling coupes dead, dying, malformed and mature and over mature trees were removed. In addition to this, thinning in the congested crop was also carried out. *But the absence of sufficient seedling reproduction and insufficient coppice coupled with heavy grazing and fire resulted in degradation of these areas. The coppice shoots are also hacked for fuel wood resulted in almost blank patches adjoining to habitation. The afforestation works have not been successful. Soil and moisture conservation works were not undertaken to the extent prescribed.*

3) Fuel Wood, Fodder and Pasture Working Circle

This included forest areas which were generally open and incapable of producing timber or fuel and where the grazing demand was heavy and some well stocked, scattered compartments which could not be accommodated in other

working circles. The major portion of the stocked areas was of IVb quality. The density of crop improved along the nala blanks. The main object of management was to provide grazing to the extent consistent with preservation and improvement of pasture. Each grazing series was divided into four coupes viz. A, B, C and D and each coupe was to be closed to grazing in rotation for three years. During the closure period it was prescribed to undertake plantations and fodder development works.

Method of treatment was the rotational grazing, improvement felling and fodder development works. The coupe due for closure was to be marked one year in advance. Besides climber cutting, improvement felling, thinning in the dense crop to stimulate the growth of grasses, retention of trees providing shade, fodder and also edible flowers and fruits were prescribed. Patches containing good soil were to be sown with the seed of better fodder grasses like *sheda*, *paonia*, *marvel*, etc. Uprooting of obnoxious weeds, well before their seeding, in the first year was suggested.

Various improvement works as envisaged in Dr Nand Kisore's plan were not undertaken. Grazing closures as envisaged in the scheme have not been followed. As a result percentage of palatable grass did not increase. On the contrary the uncontrolled and heavy grazing in these areas has resulted in further deterioration of the site. The soil and moisture conservation works and fodder improvement works prescribed in the scheme have not been taken up. Due to heavy grazing the soil erosion has increased and the sites have become poorer. **The plantations of miscellaneous species have been taken up at places, but they all have failed probably due to wrong choice of the species and uncontrolled biotic pressure.**

4) Miscellaneous Working Circle

It included scattered patches which could not be conveniently allotted for regular working. Major portion of the area was under stocked with blank patches. The crop was stunted and malformed due to constant hacking. Moderately stocked areas contained miscellaneous crop with teak trees of quality IVb and varying in

density from 0.4 to 0.6. The common grasses noticed in them were *sheda*, *ghonad*, *kusal* and *gokru*.

No regular working was prescribed in scattered patches. In view of the scattered nature of the patches demarcation of area was prescribed. Protection against illicit cutting, encroachment and afforestation works on suitable areas by involvement of gram panchayats were prescribed.

The plantation and demarcation works prescribed in the plan have also not been followed. The boundaries are not clear. The areas deteriorated due to lack of protection and afforestation.

5) Wildlife and Nature Conservation Working Circle

It includes area of Bor Sanctuary in Wardha Division, extending over to 4033.55 ha. The aim was to protect and preserve the wildlife and its habitat till the preparation of wildlife management plan. Soil and moisture conservation works were proposed along with habitat improvement and maintenance of water holes. Preparation of cover map and habitat utilization map were prescribed. Various protection and awareness generation measures were prescribed.

Now, the area of Bor Sanctuary has been handed over to Nagpur Wildlife division, for its management.

11.2.8: Recent Working Plan of Jarnail Singh and S.D.Sontakke (7th Plan) (Period 2006-07 to 2015-16)

In this Plan, the following independent Working Circles were prescribed:

1. Selection Cum Improvement
2. Improvement Working Circle
3. Afforestation and Root Stock Management
4. Protection & Catchment Area Management
5. Grass and Fodder Resource Management

Working Circle wise Prescription as per Earlier Working Plan:

1. Selection Cum Improvement Working Circle:

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. Old Plantation and Forest area containing 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 fire and grazing control. The area poor in natural regeneration will be artificial regenerated by siwan, sisu, siras, kinhi, semal, khair, and other local suitable species

2. Improvement Working Circle:

The good quality dense forest having young to middle aged crop are aimed at to mature as future productive selection forest. The species whose population in the stand dynamics is less than 1% shall be retained till they reach the rotation age. The improvement felling supplemented by tending of naturally generated crops & root stock. The working circle aims at improvement of the crop and therefore harvesting is not visualised in the area.

3. Afforestation Working Circle:

The area will be regenerated with both the Teak, Miscellaneous trees species and bamboos. No harvesting is required in this Working Circle. Tending of existing root stock viz. the sapling, copies shoots and poles, supplemented by plantation have been proposed as the main activities.

4. Protection & Catchment Area Management Working Circle:

Silvicultural system is proposed on the patterns of watershed management viz, ridge to valley. Soil and moisture conservation works along with the afforestation to prevent further soil erosion, siltation of reservoirs and to enhance the vegetation cover and ground water table. No harvesting is proposed in areas directly darning in to the water bodies. No plantation is prescribed in D type area. Singling and spacing out will be carried out among sapling of teak & other valuable spacing.

5. Grass & Fodder Resources Management Working Circle:

The method of treatment to improve grass shall be two pronged i.e. (a) Rotational grazing in pasture area and (b) Augmenting natural grasses in the grass lands through closure to grazing.

11.2.9: Results:

(i) Selection Cum Improvement Working Circle: Since 2006-07 to 2013-14, a total of 128 coupes were due for felling. Out of this, 34 coupes were within 10 KM radius of protected areas and hence was not worked. Out of remaining 94 coupes, 85 coupes were worked. The average yield realised per ha was 3.57 cum.

(ii) Improvement Working Circle: A total of 20626 ha was allotted to this working circle. Since 2006-07 to 2013-14, a total of 88 coupes were available for working. Of which, 30 coupes were within 10 Km from the boundary of Protected area and hence, not worked. In the remaining 57 coupes, 45 were worked. Average yield realised per ha is 1.59 cum.

(iii) Afforestation & Rootstock Management Working Circle: Areas allotted to this management unit were forest blanks, poor quality open forests with shrubby vegetation. No yield was prescribed for this working circle. Since 2006-07 to 2013-14, a total of 32 coupes were available for working. Total area treated under Artificial Regeneration and Natural Regeneration is 163 ha and 40 ha respectively. As per the evaluation reports published by the Evaluation Wing of FD, the results are not satisfactory.

(iv) Protection & Catchment Area Management: Compartments having large areas under steep slopes and are in the catchment of major and medium irrigation projects were included in this Working Circle. The objective was to check soil erosion and arrest water runoff. Since, 2006-07 to 2013-14, a total of 43 coupes were available for working. Of which, 6 coupes were worked. The field staff did not understand the objectives of this working circle and hence, rather than focussing on Soil and Moisture Conservation measures, yield was extracted to some extent.

(v) Grass & Fodder Resources Management Working Circle: A total of 10379.82 ha area was allotted to this Working Circle. These areas were with poor site quality and heavy biotic pressure. The prescriptions of this Working Circle were not implemented. Special focus from territorial staff is required to implement prescriptions.

11.3: SPECIAL WORKS OF IMPROVEMENT UNDERTAKEN

Some special works of improvement in the management of forests have been taken in the last few years. Notable among these are,

- 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) A total of 189 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 bridged. Real-time reporting of illicit incidences has become a possibility if the technology is being used properly.

11.4: PAST YIELD, REVENUE AND EXPENDITURE

Table No. 11.13: Annual out-turn of Timber and Fire Wood and their revenue realised

Year	Timber		Firewood		Total Out-Turn	
	Quantity (Cum.)	Value (Lac)	Quantity (Cum.)	Value (Lac)	Quantity (Cum.)	Value (Lac)
2004-05	3443	475.84	13228	142.22	16671	618.06
2005-06	734	138.06	3435	4.80	4169	142.86
2006-07	304	39.67	298	7.55	602	47.22
2007-08	3309	380.66	1009	11.33	4318	391.99
2008-09	3571	546.29	3001	65.53	6572	611.82
2009-10	2607	617.88	4416	121.74	7023	739.62
2010-11	3872	725.34	2701	10.11	6573	735.45
2011-12	2946	540.55	8638	130.16	11584	670.71
2012-13	7933.600	184.71	3807.980	742.51	11741.58	927.22
2013-14	1990.076	522.56	2803	143.20	4793.076	665.76
Total	30709.676	4171.56	43336.98	1379.15	74046.656	5550.71

**Table No. 11.14: Statement showing the Revenue,
Expenditure & Surplus**

Year	Revenue (Rs in lakh)	Expenditure (Rs in lakh)			Total expenditure (col. 3+4+5)	Surplus (+) or Deficit (-) (Rs)
		Conservancy & Works (Rs in lakh)	Establishment (Rs in lakh)	Plan (Rs in lakh)		
2004-05	268.24	82.6	371.18	77.68	531.46	-263.22
2005-06	723.19	63.49	404.40	91.32	559.21	163.98
2006-07	552.23	34.9	378.55	96.34	509.79	42.44
2007-08	837.12	88.78	492.49	100	681.27	155.85
2008-09	155.28	86.83	589.12	162.46	838.41	-683.13
2009-10	169.52	92.08	762.85	166.92	1021.85	-852.33
2010-11	470.97	184.84	860.93	213.86	1259.63	-788.66
2011-12	588.15	166.28	955.89	437.62	1559.79	-971.64
2012-13	385.14	156.19	1071.69	404.51	1632.39	-1247.25
2013-14	561.29	132.31	1320.74	552.81	2005.86	-1444.57
Total	4711.13	1088.30	7207.84	2303.52	10599.66	-5888.53

CHAPTER-12

STATISTIC OF GROWTH AND YIELD

The main species in Wardha Forest Division is Teak. As per FSI Report of 1997 on the Forest of Wardha 57.74% of the Forests in the District is of Teak. It may be mentioned that the division already has a local volume table which is given below:

Table No. 12.1: Local Volume Table for Teak, Ain, Bija, Dhaora and Garari (IVa quality areas)

Girth class (in cms)	Mid-girth in cms.	Volume per tree in cubic meters		
		Teak	Ain, bija, dhaora, and tendu	Garari
16-30	23	0.0166	0.0185	0.0134
31-45	38	0.0340	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	0.1950
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 cms	158	1.1036	1.2140	0.8829

12.1: STATISTICS OF FOREST CARBON STOCK

Carbon Stock Estimation:

Forests play an important role in combating climate change. In addition, it has the potential to provide ecosystem services, such as carbon storage. Carbon sequestered in the forests of Wardha has been derived by extrapolating from the

Growing Stock calculated from the Enumeration data. The Working circle wise estimation of Carbon Stock is given below.

Table No. 12.2: Working Circle Wise Carbon Stock

Sr.No	Working Circle	Total Area in Ha.	Avg.Growing Stock per ha (m3/ha.)	Total Growing Stock (m3)	Total Carbon Stock (Metric tone)
1	SCI	32852.96	44.68442	1468015.508	440404.65
2	IWC	19239.01	31.27167	601635.971	180490.791
3	Afforestation	21929.61	63.8296	1399758.234	419927.4703
4	Protection	12320.57	26.7739	329869.7091	98960.912
5	G&FRM	6349.9	5.7969	36803.37382	11041.01
Total		92692.05		3836082.796	1150824.833

Soil Carbon Analysis: Quantum of soil carbon is a good indicator of nutrient status of soil. During the enumeration exercise, SOFR unit collected soil samples (50) and they were analysed for Soil Carbon. The range of soil carbon varied from 0.4% to 4.4%.

The above efforts have been made but it is apparently inadequate. With the current manpower and the level of expertise available with the Department, it will not be possible to immediately come up with definite figures of Carbon Stock taking into consideration the different pool of Carbon, as is expected to be estimated.

Considering the fact that 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 Wardha 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 CO₂fertilization 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 12.1) 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 appropriate 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.

Data Acquisition for Forest Carbon Accounting

(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 complete 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

(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 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 includes 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 Wardha:

Forest Carbon Stock under different carbon pools in the Tropical Dry Deciduous forest type area in Maharashtra State as calculated by the FSI is reproduced as under:

Table No. 12.5: Forest Carbon Stock Of Tropical Dry Deciduous Forests in Maharashtra

(In '000 tonnes)

Forest type stratum	Density	Area in sq.km.	ABG	BGB	Dead wood	Litter	SOM	Total	C Stock /ha. (tonnes)
Tropical Dry Deciduous Forests	VDF	4707.9	29331.3	11517.2	215.7	3134.0	27713.2	71911.5	152.75
Tropical Dry Deciduous Forests	MDF	10351.4	61047.4	23970.9	152.6	773.5	57679.5	143623.9	138.75
Tropical Dry Deciduous Forests	OF	10804.3	12816.5	5032.5	142.1	343.0	49471.8	67805.9	62.76
Total		25863.6	103195	40521	510.4	4250.5	134865	283341.3	109.55

The Forests of Wardha Division mainly falls in Tropical Dry Deciduous Forests. On the basis of above data for forest type of Tropical Dry Deciduous Forests in Maharashtra, the Carbon Stock in Wardha Forest Division is calculated to be as under:

Table No. 12.6: Forest Carbon Stock In Wardha Forest Division
(In '000 tonnes)

Forest type stratum	Density	Area in sq.km.	ABG	BGB	Dead wood	Litter	SOM	Total	C Stock /ha. (tonnes)
Tropical Dry Deciduous Forests	VDF	10	62.302	24.463	0.458	6.656	58.865	152.744	152.744
Tropical Dry Deciduous Forests	MDF	419	2471.053	970.284	6.155	31.309	2334.728	5813.529	138.757
Tropical Dry Deciduous Forests	OF	430	510.083	200.288	5.655	13.651	1968.926	2698.603	62.758
Total		859	3043.4	1195	12.268	51.616	4362.52	8664.876	100.87

Thus the Wardha Forest Division holds/ stores 8664876 tonnes of Carbon in its forests at an average of 100.87 tonnes/hectare. This data can be used as the baseline data for the future monitoring of the Carbon stock in the District/Division.

CHAPTER-1

BASIS OF PROPOSALS

1.1: OBJECTIVES OF MANAGEMENT

Introduction: This Working Plan is prepared for the scientific management of the Forests and Wildlife of Wardha forest division which is co-terminus with Wardha district. The primary management objective for the Forests of Wardha Division is to treat forests as per the requirement of site so as to optimise Growing Stock and in a manner as mentioned in the Introduction.

1.1.1: Factors Influencing the General Objectives of Management: Working Plans are technical documents prepared to manage a particular area of forest land on a sustainable basis, with an objective to conserve the bio-diversity, soil and water regime, optimise production of forest products to meet the market needs and also bonafide needs of local people. Various standard scientific treatments, suitable for a particular area, 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 Government of India and Maharashtra, so that all the prescriptions are brought under the umbrella of existing policy framework.

1.1.2: The National Forest Policy: The National Forest Policy was first enunciated in 1894 and was revised in 1952, after independence. It was again revised in shape of the National Forest Policy 1988, which is, presently, in force.

The basic objectives and thrust areas enshrined in the National Forest Policy 1988 are given as under:

- Maintenance of environmental stability through preservation and where necessary, restoration of the ecological balance that has been adversely disturbed by serious depletion of forests.

- Conserving the natural heritage of the country by preserving the remaining natural forests with the vast variety of flora and fauna, which represent the remarkable biodiversity and genetic resources of the country.
- Checking the soil erosion and denudation in the catchment 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 is 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 is secondary to this principal aim.

Essentials of Forest Management embodied in the National Forest Policy 1988 are mentioned below:

- 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 and directions of the Hon'ble Apex court.
- 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 forests, 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 recognised by the state:-

- a. **Protection Forests:** It include forests on steep slopes (25^0 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.

Based on the functional classification of Forests, 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 25⁰), 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. These prescriptions have been included for treatment of A-1 type areas of different Working Circles.
- B. Tree Forest:** This type of forest includes the better quality forests, especially of good site quality, capable of producing medium to large-

sized timber, which are comparatively away from local habitations. 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. These areas have been included 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. The density varies from 0 to 0.4 and natural regeneration is deficient in open areas. These forests have been worked under Afforestation Working Circle in the previous plans. 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 Afforestation Working Circle, where only hygienic fellings are prescribed.
- 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 is prescribed. Soil and moisture conservation works will be taken along with planting and sowing of grass seeds. These areas are included in the Grass & Fodder Resources Management 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 patches are not demarcated on ground. Hence, it is prescribed to demarcate these areas and ensure territorial integrity.

Treatments Prescribed:

- i. Management treatments will depend upon requirements of environmental stability, protection of topography, biodiversity conservation, and characteristics of growing stock in the forest and the objectives of management.
- ii. Existing protection forests will be preserved. Soil and moisture conservation works should improve the moisture content and prevent soil erosion and siltation of the water bodies.
- iii. Suitable tending and soil working operations will be carried out to stimulate the growth of the naturally regenerated seedlings and rootstock.
- iv. Timber, if silviculturally available, will be extracted from the dense tree forests capable of producing medium to large-sized timber and poles on sustained basis.
- v. Open forest areas and traditional pastures will be managed with active participation of tribal and village communities for improving the productivity of the land to meet the local domestic needs of fodder and fire wood.
- vi. Uncontrolled grazing, fire, poaching, illicit cutting and uncontrolled encroachment, the major threats for sustainable growth for forest, shall be curbed.

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 sides of streams and watercourses will also be protected from harvesting in the similar manner.
- ii. 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.

- iii. The forests of Wardha Dn. are extremely important from wildlife management point of view as they intersperse with Bor Tiger Reserve.
- iv. 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. Due to poor natural regeneration, Aided NR had to be carried out. Areas treated under natural regeneration 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.
- v. 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.
- vi. 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.
- vii. 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.

- viii. Involving local people in managing forests and generating awareness in rural and tribal areas is considered indispensable for the forest conservation.
- ix. Reducing biotic pressure on forests, particularly, illicit felling, unsustainable grazing, fire and encroachment near villages will be considered on priority basis.
- x. Forests capable of producing medium to large sized timber will be harvested under the Selection-Cum-Improvement management system.
- xi. Boundary demarcation will be carried out in time-bound manner for ensuring territorial integrity of forests.
- xii. 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 CIRCLES

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 and Stock Maps prepared by the Staff of Wardha division has been used for preparing this Working Plan.

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, firewood and poles.

Areas having sparse tree crops, open areas without tree growth and isolated small forest patches are included in the Afforestation Working Circle (AWC). 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.

The compartments and areas close to the habitations which are unsuitable for raising timber crops due to their refractory nature, heavy biotic pressure and grass birs have been proposed to be managed under Grass and Fodder Management Working Circle to cater to the needs of Wildlife and also local people.

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 Five area-specific and three overlapping, working circles are prescribed. (Abstract of allotment of compartment to various Working Circles and Felling series is given in **Appendix XXV**)

Distribution of Area to Various Working Circles: The allocation of forest areas under various working circles of the current working plan has been given in **Table No. 1.1**

Table No.1.1: Area Allocation to Different Working Circles

Sr. No.	Name of Working Circle	Area allocated (Ha)
1	Selection-Cum-Improvement	32852.96
2	Improvement Working Circle	19239.01
3	Afforestation Working Circle	21929.61
4	Protection Working Circle	12320.57
5	Grass and Fodder Management WC	6349.90
6	Wildlife (Overlapping) Working Circle	Entire area
7	NTPF (Overlapping) Working Circle	Entire area
8	JFM (Overlapping) Working Circle	Entire area
	Total	92692.05

Table No. 1.2: Table of Comparison Between Earlier and Present Plan

Working Circle Wise Distribution:

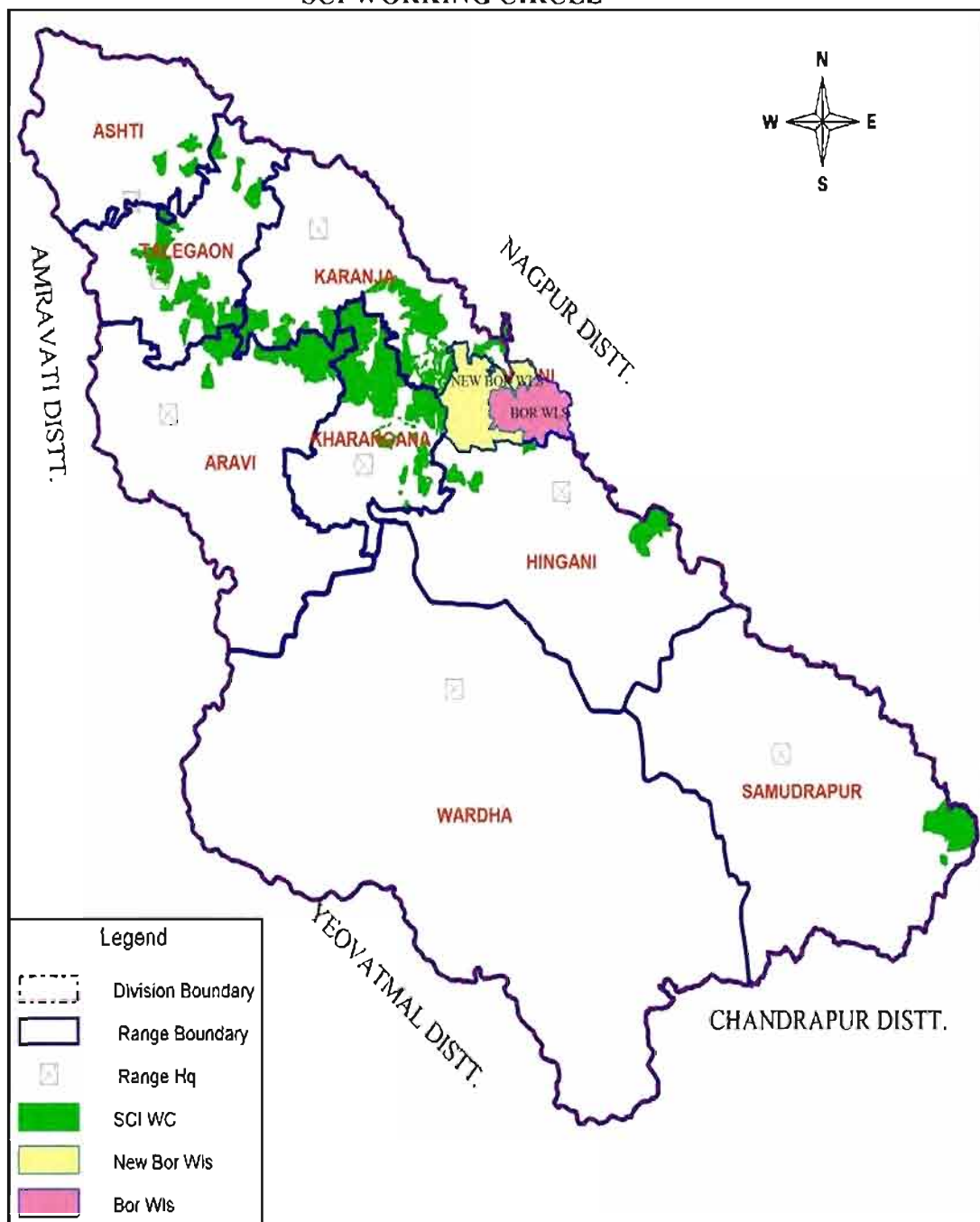
Sr. No.	As per Old Plan	Total Area (Ha.)	As per proposed Plan	Total Area (Ha.)
1	Selection-cum Improvement Working Circle	34831.28	Selection-cum Improvement W C	32852.96
2	Improvement Working Circle	20626.637	Improvement W C	19239.01
3	A & RSM Working Circle	3861.322	Afforestation W C	21929.61
4	G&FRM Working Circle	10379.821	G&FRM W C	6349.90

Sr. No.	As per Old Plan	Total Area (Ha.)	As per proposed Plan	Total Area (Ha.)
5	Protection & CAM W C	11896.211	ProtectionW C	12320.57
6	MiscellaneousW C	11773.074	-	-
	Total	93368.345		92692.05
7	Wildlife (o)W C	Entire area	Wildlife (o)W C	Entire area
8	NWFP (o)W C	Entire area	NTFP (o)W C	Entire area
9	JFM (o)W C	Entire area	JFM (o)W C	Entire area
10	Protection (o)W C	Entire area	Protection (o)W C	0

1.4: PERIOD OF WORKING PLAN AND NECESSITY FORINTERMEDIATE REVISION

Period of the Plan: This plan will be implemented for a period of 10 (Ten) years from the year 2016-17 to 2025-26. However, the mid-term review shall be carried out as per SCC Meeting Minutes No. Desk-14/WP/SCC Meeting (16.03.2016)/95/2016-17, Dt.03.05.2016 held on 16.03.2016. Concerned Chief Conservator of Forests (Territorial) should come forward with a proposal for review.

MAP OF WARDHA FOREST DIVISION SCI WORKING CIRCLE



CHAPTER-2

SELECTION-CUM-IMPROVEMENT WORKING CIRCLE

2.1: SELECTION-CUM-IMPROVEMENT WORKING: The area of this Working Circle has been clearly marked on the GIS based map of 1:50000 which is 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 primarily large timber are allotted to this working circle. It predominantly includes areas which support straight bole and sound trees of both seedling and coppice origin. It includes 32852.96 ha of total area comprising of 23553.48 ha. of reserved forests and 9299.48 ha of protected forests. It constitutes an area of about 30% of the total forest area of the division.

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

- Compartments suitable for producing marketable timber.
- Compartments having dense Teak forest of IVA site quality having patches of quality III and IVB mixed in the crop.
- Areas which are dense and supporting good Growing Stock.

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

Table No.2.1: Range-wise Allocation of Compartments and Area

Sl. No.	Range	RF		PF		Total Comptt	Total area in ha.
		No. of Comptt	Area in ha.	No. of Comptt	Area in ha.		
1	Arvi	19	4388.81	8	1383.885	27	5772.695
2	Ashti	4	961.14	3	527.163	7	1488.303

Sl. No.	Range	RF		PF		Total Comptt	Total area in ha.
		No. of Comptt	Area in ha.	No. of Comptt	Area in ha.		
3	Hingni	8	1891.5	7	787.196	15	2678.696
4	Karanja	26	5557.004	7	1239.161	33	6796.165
5	Kharangana	27	4648.98	16	3698.027	43	8347.007
6	Samudrapur	8	2276.36	1	70.07	9	2346.43
7	Talegaon	17	3829.69	9	1593.976	26	5423.666
	Grand Total	109	23553.48	51	9299.48	160	32852.96

2.3: GENERAL CHARACTERISICS OF VEGETATION

The forest areas are predominantly stocked with Teak and in smaller proportion with other species. Proportion of Teak is about 60 percent. . The major mixed species are Saja, Bija, Kalam, Haldu, Tiwas, Dhaoda, Garadi, Mowai, Rohan, Bhirra, Garadi, Lendia, Palas, Salai etc. In the fruit bearing species, Tendu, Moha, Char, Aonla, Bel, Harra and Beheda are the main species. Natural Bamboo is limited to few compartments. Bamboo plantations have come up very well. Kuda, Garadi, Decamali are the main species in the understorey. The crop is predominantly young to middle aged with occasional mature trees. The density of the crop is 0.4 to 0.8. The dominant site quality is IVA with some patches of site quality III and IVB occurring in patches. 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. The overall position of the natural regeneration is not satisfactory. The advantage of this regeneration will be taken to regenerate the area.

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

Table No. 2.2: Species and Girth- Class wise Distribution (Per Ha.) in SCI Working Circle

Sr. No.	Species	15 - 30	31 - 45	46 - 60	61 - 75	76 - 90	91 - 105	106 - 120	121 - 135	136- 150	151 up	Total
1	Teak	2.18	61.70	49.09	35.03	18.73	8.30	3.15	1.27	0.85	0.36	180.67
2	Aal	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
3	Ain/Saja/Sajad	0.00	0.55	1.09	0.79	0.48	0.36	0.30	0.18	0.06	0.06	3.88
4	Ajan	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.12
5	Amaltas/Bahawa	0.06	0.48	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.61
6	Apta	0.06	0.24	0.18	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.55
7	Aran	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.06
8	Arjun/Anjan/Kahu	0.00	0.00	0.06	0.00	0.00	0.00	0.12	0.06	0.12	0.00	0.36
9	Awla	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.12
10	Behada	0.00	0.06	0.12	0.00	0.12	0.06	0.06	0.06	0.00	0.06	0.55
11	Bel	0.00	1.27	1.09	0.79	0.61	0.18	0.18	0.00	0.00	0.00	4.12
12	Bharati	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36
13	Bhera/Bhira	0.18	9.58	7.09	5.09	3.15	1.27	0.67	0.48	0.12	0.12	27.76
14	Biba	0.00	0.00	0.12	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.24
15	Bor	0.06	0.24	0.18	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.61
16	Char	0.00	0.06	0.06	0.12	0.06	0.00	0.12	0.00	0.00	0.12	0.55
17	Chichwa	0.00	0.06	0.00	0.00	0.06	0.00	0.06	0.00	0.00	0.00	0.18
18	Chinch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.12	0.18
19	Dhaman	0.06	0.00	0.00	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.18
20	Dhaora	0.00	1.21	1.27	1.52	1.15	0.67	0.36	0.67	0.12	0.24	7.21
21	Dhoban	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
22	Dudhi	0.00	0.12	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.18
23	Feter	0.00	0.06	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.12
24	Garadi	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
25	Gbogal	0.00	0.06	0.12	0.06	0.00	0.06	0.06	0.00	0.00	0.06	0.42
26	Ghoti	0.00	0.12	0.06	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.30
21	Dhoban	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
22	Dudhi	0.00	0.12	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.18
23	Feter	0.00	0.06	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.12
24	Garadi	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
25	Ghogal	0.00	0.06	0.12	0.06	0.00	0.06	0.06	0.00	0.00	0.06	0.42
26	Ghoti	0.00	0.12	0.06	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.30

Sr. No.	Species	15 - 30	31 - 45	46 - 60	61 - 75	76 - 90	91 - 105	106 - 120	121 - 135	136 - 150	151 up	Total
27	Gondan (Shebli)	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.06
28	Hinganbor	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
29	Hiwar	0.00	0.12	0.12	0.18	0.18	0.06	0.00	0.00	0.00	0.00	0.67
30	Kahu	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06
31	Kakai	0.12	0.61	0.55	0.18	0.00	0.06	0.00	0.00	0.00	0.00	1.52
32	Kalumb	0.00	0.00	0.18	0.24	0.24	0.18	0.18	0.00	0.06	0.12	1.21
33	Karanj	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
34	Katsawar	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.06
35	Khair	0.12	2.79	3.27	1.27	0.48	0.06	0.06	0.00	0.00	0.00	8.06
36	Kuda	0.00	2.55	1.09	0.30	0.06	0.00	0.06	0.00	0.00	0.00	4.06
37	Kusum	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.12
38	Lendia	0.06	2.12	1.45	0.85	0.24	0.30	0.06	0.00	0.00	0.06	5.15
39	Lokhandi	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
40	Medsing	0.00	0.06	0.12	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.42
41	Moha	0.00	0.00	0.00	0.06	0.06	0.00	0.06	0.00	0.06	0.06	0.30
42	Mowai	0.00	0.36	0.73	0.18	0.42	0.30	0.48	0.18	0.12	0.00	2.79
43	Neem	0.00	0.00	0.00	0.06	0.00	0.06	0.00	0.00	0.00	0.00	0.12
44	Palas	0.24	8.24	7.09	4.67	1.82	1.15	0.55	0.24	0.00	0.12	24.12
45	Pandharakuda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.06
46	Panjara	0.00	0.00	0.00	0.00	0.06	0.00	0.06	0.00	0.00	0.00	0.12
47	Rohan	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.18
48	Salai	0.00	0.00	0.00	0.00	0.06	0.06	0.18	0.18	0.12	0.06	0.67
49	Satpuda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06
50	Sisam	0.00	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
51	Tendu	0.00	1.33	0.36	0.12	0.06	0.24	0.18	0.12	0.00	0.06	2.48
52	Tiwas	0.00	0.00	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.12
53	Umbar/Gullar	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
	Total	3.15	94.73	76.00	52.30	28.48	13.58	6.97	3.58	1.76	1.82	282.3

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 15 Felling Series with an average area of 2190 ha. and each felling series is further divided into 20 coupes with an average area of 109 ha. (Details in Appendix – XXIX)

2.5: BLOCKS, COMPARTMENTS AND JFM AREA (MARKED ON GIS BASED MAPS): Details of block and compartment wise area distribution is given in the **Appendix- XXVII.**

2.6: SPECIAL OBJECTIVES OF MANAGEMENT: The special objects of management of the forest areas under the SCI Working Circle are as follows:

- i. Primarily to obtain sustained supply of medium to large-sized timber and poles.
- ii. To maintain mixed forest composition and High Forest character of the forest crop and improve density of stocking by tending existing natural regeneration.
- iii. To conserve the local bio-diversity.

2.6.1: ANALYSIS OF THE CROP

Stock Mapping: The conventional stock mapping has been carried out by the field staff of Wardha forest division, besides the extensive enumeration exercise conducted by SOFR unit and crown density mapping through satellite classified data obtained from Forest Survey of India, Nagpur has been utilized.

Age and Density: The crop is mostly young to middle aged to small proportion of mature and over-mature trees. Crop density varies from 0.4 to 0.7.

Site Quality: Site quality governs the harvestable girth. The dominant Site quality is IVa and IVb, with rare patches of Site quality III.

Enumeration: Enumeration was carried out by SOFR unit as per the procedure laid down in the National Working Plan Code 2014. Analysis of the data collected from these sample plots is given in **Appendix - LXXXI.**

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 2.4. 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 coppice regeneration. 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 suitable for afforestation (excluding natural blanks). The Status of Natural Regeneration in SCI areas as in other areas of the Division is extremely poor. The table of regeneration in the eight ranges area shown below:

Table No.2.4: Categories of Seedlings& Sapling per ha.in SCI WC

Range	No. of Plots	R1 per ha.	R2 per ha.	R3 per ha.	Total per ha.
Arvi	28	92.00	37.50	1.78	131.00
Ashti	7	43.00	14.28	0.00	57.00
Hingni	15	34.00	37.30	0.66	72.00
Karanja	38	36.00	22.89	2.37	60.79
Kharangana	39	38.46	49.23	2.56	90.25
Samudrapur	9	32.22	10.00	0.00	42.22
Talegaon	29	30.00	24.13	4.14	58.27
Average		45.00	32.00	2.00	79.00

With only about 79 seedlings/saplings available per hectare in these forests, it is necessary that the forests be treated more rigorously. Hence, apart from the normal treatment accompanying the SCI coupes, the forests of Wardha will also be treated with Aided Natural Regeneration for all felled areas.

2.6.2: SILVICULTURAL SYSTEM

- i. Selection-Cum-Improvement System prescribes removal of mature trees above the harvestable girth to create openings in the tree canopy, thereby, facilitates tree growth in the lower girth classes. It supports establishment of natural regeneration of Teak and other valuable light demander species. This system has advantages over, the clear felling and coppice systems, in its ability to address the issues related to the biodiversity conservation and maintenance of site conditions and Mixed and High Forest nature of the forest crops.
- ii. 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.

- iii. The natural regeneration will be given suitable treatments to regenerate the area.
- iv. The areas poor in natural regeneration will be artificially regenerated by suitable species as per requirement of site. Plantations will not be taken up in SCI areas unless a minimum 5 hectares of clear open patch suitable for afforestation is available.

Most of the forest areas under this working circle have been worked under coppice with reserve silvicultural system in the past. Due to this, coppice vigor has decreased and defects in wood such as hollowness are seen. To assess the extent of hollowness in teak, the available data with the division was analysed and the findings are given below.

Table No.2.5: Extent of Hollowness in Teak in Wardha Division.

Girth Class	No. of trees studied	No. of hollow trees	Percent hollow trees
46-60	6142	1088	17.7
61-75	3642	946	25.97
76-90	1580	549	34.74
91-105	640	247	38.59
106-120	341	131	38.41
121-135	118	60	50.84
136-150	36	21	58.33
>150	21	9	42.85

From the above table, it is evident that, there is progressive increase in hollowness with increase in girth.

2.6.3: ROTATION PERIOD: Rotation Period has been fixed for 80 years.

2.6.4: HARVESTABLE DIAMETERS:

Harvestable girth for various important species, in SCI working circle, has been determined at maximum volume production as per the CAI & MAI curves in stem analysis exercises, carried out in the past. (For the convenience of the working staff and the ease of execution, the girth and not the diameter is taken as the measure for harvestable size trees in this Plan).

Table No. 2.6: Harvestable Girth for Various Species in the Division

Group	Species	Harvestable Girth
Group 1	Teak	120 cm. for quality III 105 cm. for quality IV
Group 2	Ain, Bija, Haldu, Kalam	120 cm.
Group 3	Dhaora, Tiwas, Surya, Karam, Rohan, Bhirra, Kasai, Mokha, Palas, Dhaman, Bhilawa, Chichwa, etc.	90 cm.
Group 4	Garadi, Lendia	45 cm
Group 5	Species protected from felling (Semal, Kulu, , Behada, Karai, Shisam, Haldu etc. and all fruit trees)	No felling (less than 1%)

In the past, substantial areas of S.C.I. Working Circle have been worked under Coppice with Reserve Silvicultural system. Hence, the proportion of coppice teak is significant. Timber obtained from coppice origin attains hollowness at an early age and therefore, the market value of Teak timber gets reduced.

2.6.5: REDUCING FACTORS AND REDUCED AREAS: Not applicable.

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 about 105 ha.each, will be laid down. From the enumeration data below, it is seen that the trees of Group 2 have the least presence in the distribution of species and they ought to be retained as far as possible. For the purpose of yield, data of each species representing a particular Group is used for Yield calculation. Group-wise enumeration data is summarized as under:

Table No.2.7: Table Showing Abstract of Enumeration Data

Girth Class (cm.)	Group - I Teak	Group - II Ain, BijaHaldu, Kalam	Group - III Bhirra, Chichwa, Salai, Mowai, Rohan, Shiwan, Shisham, Tiwas, Surya etc.	Group - IV Lendia, Garadi&Khair	Total
15 -30	2.18	0	0.18	0.18	2.54
31 -45	61.70	0.55	10.18	4.91	77.34
46 -60	49.09	1.27	7.94	4.78	63.08
61 -75	35.03	1.03	5.33	2.12	43.51
76 -90	18.73	0.72	3.69	0.72	23.86
91 -105	8.30	0.54	1.63	0.36	10.83
106 -120	3.15	0.48	1.39	0.12	5.14
121 -135	1.27	0.18	0.84	0	2.29
136 150	0.85	0.12	0.36	0	1.33
151 up	0.36	0.18	0.24	0.06	0.84
Total	180.67	5.09	31.82	13.27	230.85

Yield Regulation by Smythies' Safe-guarding Formula:-

Smythies evolved this formula for regulating yield in Selection forests of U.P in the thirties. This formula has been used in the past for Selection Forests of Maharashtra. This formula considers the essentiality of maintaining sustained yield, mostly from Selection Class of trees which is termed as Selection Yield. The method stipulates the following procedure:

- Fixing the felling cycle and Exploitable Girth.
- Fixing the Girth Classes starting from Selection Girth (Class-I) to successively below it to the youngest.
- Carrying out enumerations in various Girth classes.
- Every Selection tree is prescribed for felling subject to the limitation fixed to safe-guard the Selection Yield; this limitation is the number of approach class (Class II) trees which pass into Class I during the felling cycle ϕX .
- The value of ϕX determined by the formula:

$$X = f/t (II-Z\%II), \text{ where}$$

ϕf = felling cycle

t_0 = time taken by a Approach class tree to pass into Selection Girth.

Z = Percentage of approach class trees that do not pass into Selection Girth in t_0 years; due to mortality or removal in thinning, etc. Values of Z has been calculated based on long term data obtained from preservation plots maintained by Research division.

f) Yield is calculated by the formula:

$$Y = [X/I + X/2 * 100 \pm A] \% N$$

Applying the above formula, Yield for different groups of species is as under:

Group I : Teak belongs to this group. The exploitable girth for Teak in Site quality IV is 120 cm. Time required to pass from approach class to Selection class is 20 years. By applying, Smythies's formula, the Yield per Ha is 1.57 cu.m. To safe-guard future yield, the numbers of Selection Girth trees to be marked (if silviculturally available) are 2 out of 5.

Group II: Species representing this group are Ain, Bija, Haldu and Kalam. The exploitable girth for these species in Site quality IV is 120 cm. Time required to pass from approach class to Selection class is 24 years. By applying, Smythies's formula, the Yield per Ha is 0.24 cu.m. To safe-guard future yield, the number of Selection Girth trees to be marked (if Silviculturally available) are 1 out of 2 i.e. 50% of Selection trees are to be marked if Silviculturally available. **Provided that ,the Group II Species of Ain, Bija, Haldu&Kalamb should not be felled from the Coupe, where the number of these species individually and collectively is less than 5% of the total stand.**

Group III: Species representing this group are Chichwa, Bhirra, Rohan, Dhaoda, Salai, Mowai etc. The exploitable girth for these species in Site quality IV is 90 cm. Time required to pass from approach class to Selection class is 22 years. By applying, Smythies's formula, the Yield per Ha is 2.00 cu.m. To safe-guard future yield, the number of Selection Girth trees to be marked (if silviculturally available) is 1 out of 2.

Group IV: Species representing this group are Lendia and Garadi. The exploitable girth for these species in Site quality IV is 45 cm. Time required to pass from approach class to Selection class is 19 years. By applying, Smythies's formula, the Yield per Ha is 0.21 cu.m. To safe-guard future yield, the number of Selection Girth trees to be marked (if silviculturally available) is 1 out of 3.

From the above calculations for different groups of species, the expected average yield per hectare is 4.02 cu.m. This may vary from coupe to coupe due to differences in growth conditions, distribution of selection girth trees and their silvicultural availability.

2.6.9: TABLE OF FELLING: The abstract of the Table of Felling is given below but the detailed schedule is given in Appendix No.XXIX

Table No.2.8: Year wise working of Coupes

SCI Working Circle						
Year	Range	Nos. Total F.S	Coupe No	Total nos. of Coupes	Total Nos. of Comptt.Involved	Total Area in Ha.
2016-17	Arvi	2	I	2	2	230.244
	Ashti	1	I	1	1	85.259
	Hingni	1	I	1	1	115.145
	Karanja	3	I	3	4	287.36
	Kharangana	5	I	5	5	546.801
	Samudrapur	1	I	1	1	144.786
	Talegaon	2	I	2	2	178.602
Total		15		15	16	1588.197
Year	Range	Nos. Total F.S	Coupe No	Total nos. of Coupes	Total Nos. of Comptt. Involved	Total Area in Ha.
2017-18	Arvi	3	II	3	3	346.949
	Hingni	1	II	1	1	164.52
	Karanja	3	II	3	3	332.484
	Kharangana	4	II	4	4	428.802
	Samudrapur	1	II	1	1	115.118
	Talegaon	3	II	3	3	266.431
Total		1		15	15	1654.304

Year	Range	Nos. Total F.S	Coupe No	Total nos. of Coupes	Total Nos. of Comptt. Involved	Total Area in Ha.
2018-19	Arvi	3	III	3	3	336.933
	Ashti	1	III	1	1	81.013
	Hingni	1	III	1	1	80.02
	Karanja	4	III	4	4	473.543
	Kharangana	3	III	3	3	375.183
	Samudrapur	1	III	1	1	131.614
	Talegaon	2	III	2	2	197.276
Total		15		15	15	1675.582

Year	Range	Nos. Total F.S	Coupe No	Total nos. of Coupes	Total Nos. of Comptt. Involved	Total Area in Ha.
2019-20	Arvi	2	IV	2	2	262.585
	Hingni	1	IV	1	1	108.909
	Karanja	2	IV	2	2	242.217
	Kharangana	6	IV	6	7	653.519
	Samudrapur	1	IV	1	1	112.032
	Talegaon	3	IV	3	3	241.475
Total		15		15	16	1620.737

Year	Range	Nos. Total F.S	Coupe No	Total nos. of Coupes	Total Nos. of Comptt. Involved	Total Area in Ha.
2020-21	Arvi	3	V	3	3	355.212
	Hingni	1	V	1	1	123.210
	Karanja	3	V	3	3	348.452
	Kharangana	4	V	4	4	374.500
	Samudrapur	1	V	1	1	116.661
	Talegaon	3	V	3	3	261.556
Total		15		15	15	1579.591

Year	Range	Nos. Total F.S	Coupe No	Total nos. of Coupes	Total Nos. of Comptt. Involved	Total Area in Ha.
2021-22	Arvi	3	VI	3	3	345.51
	Hingni	1	VI	1	1	164.232
	Karanja	4	VI	4	4	434.764
	Kharangana	3	VI	3	3	347.897
	Samudrapur	1	VI	1	1	113.777
	Talegaon	3	VI	3	3	292.882
Total		15		15	15	1699.062

Year	Range	Nos. Total F.S	Coupe No	Total nos. of Coupes	Total Nos. of Comptt. Involved	Total Area in Ha.
2022-23	Arvi	3	VII	3	4	331.426
	Ashti	1	VII	1	1	78.158
	Hingni	1	VII	1	1	113.046
	Karanja	4	VII	4	5	397.454
	Kharangana	3	VII	3	3	321.279
	Samudrapur	1	VII	1	1	116.981
	Talegaon	2	VII	2	2	167.281
Total		15		15	17	1525.625

Year	Range	Nos. Total F.S	Coupe No	Total nos. of Coupes	Total Nos. of Comptt. Involved	Total Area in Ha.
2023-24	Arvi	1	VIII	1	1	92.706
	Hingni	1	VIII	1	1	115.902
	Karanja	3	VIII	3	3	285.645
	Kharangana	5	VIII	5	6	501.119
	Samudrapur	1	VIII	1	1	115.706
	Talegaon	4	VIII	4	4	381.71
Total		15		15	16	1492.788

Year	Range	Nos. Total F.S	Coupe No	Total nos. of Coupes	Total Nos. of Comptt. Involved	Total Area in Ha.
2024-25	Arvi	1	IX	1	1	149.700
	Hingni	1	IX	1	2	96.972
	Karanja	3	IX	3	4	324.960
	Kharangana	5	IX	5	7	478.948
	Samudrapur	1	IX	1	2	127.958
	Talegaon	4	IX	4	5	362.015
Total		15		15	21	1540.553

Year	Range	Nos. Total F.S	Coupe No	Total nos. of Coupes	Total Nos. of Comptt. Involved	Total Area in Ha.
2025-26	Arvi	1.5	X	1.5	2	181.661
	Hingni	1	X	1	1	82.380
	Karanja	3.5	X	3.5	4	344.141
	Kharangana	4	X	4	6	267.230
	Samudrapur	1	X	1	2	107.342
	Talegaon	4	X	4	6	308.574
Total		15		15	21	1291.328

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 will be carried out either by Department or by Forest Labour Co-operative Society (FLCS) as per the existing Govt. directives. 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.

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

Demarcation: The coupe demarcation, preparation of treatment maps and marking will be carried out as per the prescriptions mentioned in the chapter on Miscellaneous Regulations.

The main annual coupes shall be demarcated one year in advance. 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.

Preparation of Treatment Maps: Treatment maps shall be prepared by the RFO and verified by the ACF. All the treatment type areas shall be shown distinctively on the map, including the areas suitable for planting, areas having adequate promising natural regeneration and areas prone to soil erosion.

The Treatments Proposed for Various Areas:

A-Type Areas: Protection Areas

- An area having more than 25° slopes and more than a quarter hectare in extent must be shown on the map as the **A1-type i.e. steep slope**. Smaller areas of steep slope, even if not marked on the map, will also receive the prescribed treatment.
- 20 meter wide buffer along streams will be measured from the bank or the high flood mark. Similar buffer of the **A2-type** areas will be marked along all water bodies and Nallas.

- The **A3-type** areas are excessively erosion prone and include seasonally flooded areas.

Treatments Recommended for A-Type Areas:

- i) Soil and Moisture Conservation:** Gully plugging and other soil and moisture conservation works, as described in the chapter of Miscellaneous Regulations shall be taken in the A3-type areas. Such works may be taken up in the A2-type areas, as per requirement of site.
- ii) Stake Planting:** In the areas around water bodies and along watercourses(A2-type) , stakes of *Ficus* spp., Pangara, Salai or other suitable species will be planted at six-meter interval, and tussocks of *Khas grass* will be planted on suitable sites, as per Misc. Regulations.

Harvesting Prohibited: Harvesting of standing trees (dead or alive) is strictly prohibited in the A-type areas.

B-Type Areas: Under-stocked & Blank Areas: Under stocked areas can be categorised into 2 types:

- **B1-type:** Open forests (density < 0.4) with Natural Regeneration (around saplings per hectare)
- **B2-type:** Open forests (density < 0.4) without Natural Regeneration.

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. From the regeneration data it is seen that such B1 areas may be hard to find, but the possibility of finding such areas cannot be ruled out.

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.

Progress of Natural Regeneration should be monitored by the division from time to time and data should be collected for further analysis.

- ii. **Singling of Coppice Shoots:** 1 to 2 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.

However, from the data collected during the sampling in the Division which reveals that the regeneration in the forests of Wardha as extremely poor, areas that can be considered as B1 areas may be very little. If such areas exist, Aided Natural Regeneration as prescribed for post-harvest operations in D areas may also be carried out to augment the natural regeneration as per local conditions.

B. Artificial Regeneration in B2-Type Areas: Plantations will not be taken up in SCI areas unless a minimum of 5 hectares of clear open patch fit for plantation is available in an annual coupe. The choice of species will be decided as per the site. Teak and valuable mixed local spp. should be given preference in the plantation. Stump planting of Teak should be taken only in well drained areas with clear open patches.

C. Soil and Moisture Conservation Works: Required soil and moisture conservation works will be carried out as mentioned in the miscellaneous regulations.

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
- b. Artificial Regeneration is not prescribed in this area.

The Following Operations are Recommended:

- i. **Enumeration in Annual Coupes:** Species and girth-class of all trees above harvestable girth class and approach class are prescribed to be recorded in 15 cm. girth class for enumeration.

- ii. **Harvesting:** The extent of Harvesting in different Groups is as under:

Group I species: For Teak, 2 out of 5 trees above Selection Girth (120 cm) are to be harvested if they are Silviculturally available.

Group II species: For Ain, Bija, Haldu and Kalam, the exploitable girth for these species in Site quality IV is 120 cm. To safe-guard future yield, the number of Selection Girth trees to be marked (if silviculturally available) are 1 out of 2 i.e. 50% of Selection trees are to be marked if silviculturally available.

Group III: For Chichwa, Bhirra, Rohan, Dhaoda, Salai, Mowai and other timber yielding species, the exploitable girth in Site quality IV is 90 cm. To safe-guard future yield, the number of Selection Girth trees to be marked (if silviculturally available) is 1 out of 2.

Group IV: The exploitable girth for these species in Site quality IV is 45 cm. To safe-guard future yield, the number of Selection Girth trees to be marked (if silviculturally available) is 1 out of 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 (area specific) shall be observed strictly for marking in different types of areas.

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

B-Type Areas (Under Stocked Areas):

1. All dead and diseased trees, retaining 2 dead trees/ha., as snags and dens shall be marked.
2. All live high stumps shall be marked.
3. All multiple coppice shoots; retaining 1 or 2 promising shoots, shall be marked.
4. All NTFP trees, fruit bearing trees and trees useful for wild life are to be reserved.

C-Type Areas (Congested group of young poles):

1. The congested pole crop shall be marked for thinning to maintain a spacing equal to $1/3^{\text{rd}}$ of the crop height and/or to bring down stem number as per the yield table.
2. All high stumps, dead and diseased poles shall be marked for harvesting.
3. Unwanted undergrowth interfering or likely to interfere, the seed based NR of Teak and other valuable species, shall be removed.
4. All NTFP trees, fruit bearing trees and trees useful for wild life are to be reserved.

D-Type Areas (Well-stocked Areas):

1. All Teak (group I), Ain, Bija, Haldu & Kalam (group II) and the group III & IV (listed species), trees above the harvestable girth and approach class are prescribed to be enumerated in 15 cm girth-classes, before marking.
2. Marking of trees above Selection Girth for different Groups of Species (Group I to IV) has been discussed above. Felling marking is prescribed

to proceed from highest girth-class to lower girth-classes. No tree shall be marked for felling unless it is 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 wildlife, shall be reserved against felling.
4. All dead trees, retaining 2 dead trees per hectare, shall be marked for felling.
5. All live high stumps and all but 1 or 2 vigorously growing coppice pole per stool shall be marked for felling.
6. The marking of trees whose population is less than one percent is prohibited. However in the case of Group 2 trees, marking should not be done where the number of these trees individually and collectively is less than 5% of the total stand.

2.6.11: SUBSIDIARY SILVICULTURAL OPERATIONS CLEANING AND THINNING

- **Cutback Operations:** Cutback operations shall be carried out, in the next year of coupe working in the annual coupes (**Appendix– XXVIII**). 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 1 or 2 per stool. All newly risen coppice shoots shall be removed to encourage establishment of seedling regeneration.
- **Natural Regeneration:** One of the main purposes of felling carried out in SCI areas is for opening up the canopy for Natural Regeneration. Operation like identification of Natural Regeneration and keeping proper spacing, soil

working, soil working around the seedlings, etc should NECESSARILY be carried out in D-areas after felling along with CBO.

From the survey data available it is seen that the natural regeneration is very poor and an average of 79 seedlings only are found per hectare and the figure varies from 0 to 360. Under these circumstances, it is prescribed that Aided Natural Regeneration by planting nursery-raised well established seedlings of miscellaneous species and associates of Teak should be carried out in the areas felled as part of the post-harvest operations. The actual no of such Seedlings will depend on the number of Natural Regeneration occurring in the coupe which should be determined after surveying the area, such that the total no of Natural occurring seedlings and the planted numbers should be 625. The details of the same are given in the Chapter Miscellaneous Regulations.

- **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. 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, should be carried out in the entire coupe. Coppicing of damaged and malformed saplings and singling of coppice shoots shall be carried out. 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.

2.6.12 : REGENERATION :

Natural Regeneration, including rootstock management, is prescribed to be given preference over Artificial Regeneration. 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.

Artificial Regeneration shall be taken only in the B-type areas, (except natural blanks) having inadequate NR in a patch of a minimum of 5 ha area. It shall be ensured that no seedling is planted within 3 meters distance from an established seedling or existing trees. The standing trees have influence zone of spreading shadow and pits should not be dug either in the shadow or in the influence zone of the standing trees. Influence zone for various sizes of trees is given below:

Table No.2.9: Zone of Influence of trees

Sr. No	Girth class (cm)	Influence zone (meter)
1	<30	2
2	30-60	3
3	60-90	4
4	90-120	5
5	>120	6

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 suitable local species as per requirement of site. In any case in areas where Teak is more than 50%, teak planting should be avoided if possible.

Soil and Moisture Conservation: The soil and moisture conservation works will be taken up along with marking operation and completed before on set of monsoon. The soil and moisture conservation works are to be based on the requirement of site. 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. Continuous Contour Trenches/Staggered Contour Trenches should be taken only if it is necessary, with the approval of Chief Conservator of Forest (Territorial).

Choice of Species:

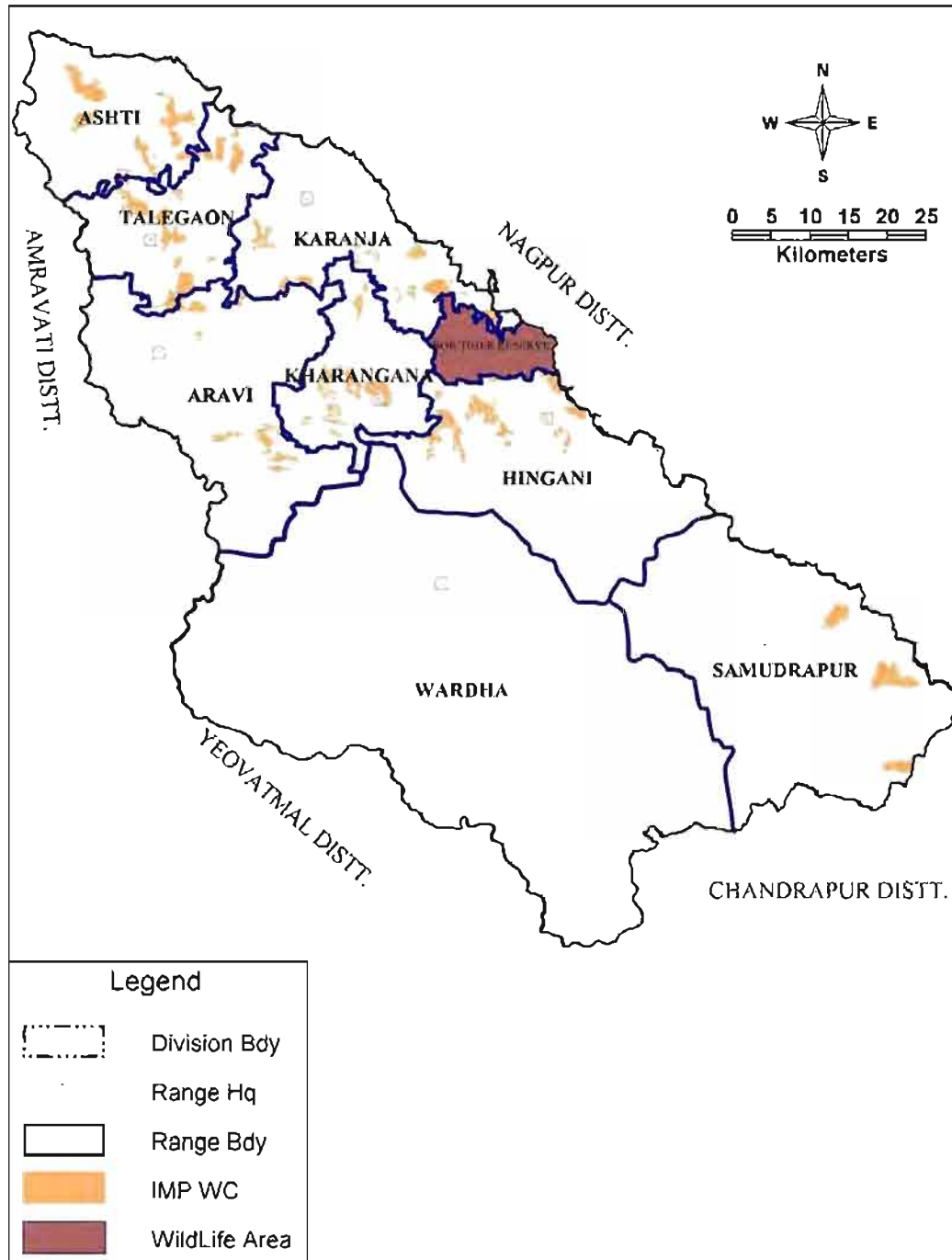
Since Teak is the most valuable species and comes above all the mixed timber species; it will be given priority, wherever present. The miscellaneous

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. 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, Beret 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 people.

2.6.13 : ASSOCIATED REGULATIONS AND MEASURES

Other regulations: Protection from Fire and Grazing is essential for the success of Natural and Artificial regeneration. All annual coupes shall remain closed to Grazing; and shall be provided strict fire protection, at least till completion of the 6th year coupe cleaning works.

MAP OF WARDHA FOREST DIVISION IMPROVEMENT WORKING CIRCLE



CHAPTER-3

IMPROVEMENT WORKING CIRCLE

3.1: NAME OF WORKING CIRCLE CLEARLY MARKED ON GIS BASED MAPS (1:50,000): 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

The Improvement Working Circle (IWC) covers an area 19239.01 hectares comprising 9483.47 ha. of Reserved Forests and 9660.31 ha. of Protected Forests and Acquired Private Forest 95.230 ha.

This working circle is expected to serve as transition to SCI. Forest areas capable of producing medium to large-sized timber but not considered fit for harvesting due to preponderance of young to middle aged crop has been included in this working circle.

Following criteria have been used for allocation of compartments to the IWC.

- ☒ Areas having basal area from 4 to 8 Sq.mt per ha. are included.
- ☒ Areas having preponderance of middle aged crop are included

The distribution of areas by Ranges is given in the table below:

Table 3.1: Compartments allocation to Improvement Working Circle

Sr. No.	Range	RF		PF		Acquired Private forest	Total Comptt	Total area in ha.
		No. of Comptt	Area in ha.	No. of Comptt	Area in ha.			
1	Arvi	3	508.84	6	1176.747	0	9	1685.587
2	Ashti	13	2835.63	4	295.336	0	17	3130.966
3	Hingni	4	425.66	26	3214.671	31.07	30	3671.401
4	Karanja	5	1161.85	10	1364.81	0	15	2526.66
5	Kharangana	0	0	14	2105.477	0	14	2105.477
6	Samudrapur	8	2054.99	1	210.15	0	9	2265.14
7	Talegaon	9	2496.5	12	1293.119	64.16	21	3853.779
8	Wardha	0	0	0	0	0	0	0
Grand Total		42	9483.47	73	9660.31	95.23	115	19239.01

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 below:

Table 3.2: Species and Girth Distribution from Enumeration Data in IWC areas.

Sr No	Species	15 - 30	31 - 45	46 - 60	61 - 75	76 - 90	91 - 105	106 - 120	121 - 135	136 - 150	151 up	Total
1	Ain/Saja/Sajad	0.10	1.65	1.65	1.46	1.07	0.87	0.39	0.29	0.19	0.10	7.77
2	Amaltas/Bahawa	0.10	0.68	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.97
3	Apta/Bhosa/Selra	0.00	0.58	0.19	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.87
4	Arjun/AnjanKahu	0.00	0.00	0.00	0.10	0.00	0.19	0.00	0.00	0.00	0.00	0.29
5	Babhul	0.00	0.10	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.19
6	Behada	0.00	0.10	0.10	0.19	0.10	0.00	0.10	0.00	0.10	0.00	0.68
7	Bel	0.00	0.49	0.97	0.68	0.39	0.00	0.00	0.00	0.10	0.00	2.62
8	Bharati	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
9	Bhera/Bhirra	0.10	9.03	5.34	2.91	2.23	1.36	0.58	0.19	0.10	0.10	21.94
10	Bor	0.01	0.88	0.52	0.28	0.22	0.13	0.06	0.02	0.01	0.01	2.13
11	Char	0.00	0.29	0.58	0.19	0.10	0.00	0.00	0.00	0.00	0.00	1.17
12	Chilati	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
13	Dahipalas	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
14	Dhaora	0.00	2.52	1.94	1.46	0.29	0.49	0.49	0.19	0.10	0.00	7.48
15	Ghoti	0.00	0.19	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39
16	Godavarny	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
17	Hiwar	0.00	0.10	0.00	0.00	0.29	0.00	0.00	0.19	0.00	0.00	0.58
18	Kakai	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.29
19	Kalumb	0.00	0.19	0.68	0.87	0.68	0.10	0.10	0.00	0.00	0.00	2.62
20	Karanj	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.10
21	Khair	0.19	6.80	5.44	2.04	1.07	0.10	0.19	0.10	0.00	0.00	15.92
22	Kuda	0.00	1.17	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	1.26
23	Kumbhi	0.00	0.00	0.19	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.29
24	Kusum	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
25	Lendia	0.00	2.23	1.55	0.49	0.39	0.10	0.10	0.00	0.00	0.00	4.85
26	Lokhandi	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
27	Medsing	0.00	0.10	0.00	0.10	0.00	0.10	0.10	0.00	0.00	0.10	0.49
28	Moha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.10
29	Mowai	0.00	0.10	0.19	0.19	0.97	0.49	0.19	0.10	0.00	0.00	2.23
30	Neem	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.10

31	Palas	0.49	13.11	7.09	3.30	1.84	0.78	0.68	0.10	0.00	0.00	27.38
Sr No	Species	15 - 30	31 - 45	46 - 60	61 - 75	76 - 90	91 - 105	106 - 120	121 - 135	136 - 150	151 up	Total
32	Rohan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.10
33	Salai	0.00	0.00	0.10	0.29	0.29	0.10	0.00	0.00	0.10	0.10	0.97
34	Teak	1.07	50.00	36.99	24.08	13.59	5.63	1.75	0.39	0.39	0.49	134.37
35	Tendu	0.19	1.75	0.49	0.00	0.10	0.00	0.00	0.00	0.00	0.00	2.52
36	Wad	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.10	0.19
	Total	2.24	92.72	64.79	39.21	23.61	10.52	4.72	1.67	1.17	1.08	241.74

The crop consists Teak as the predominant species. The prominent associates of *Teak* are; *Bhirra, Saja, Dhaora, Lendia, Mowai, Salai, Tendu, Rohan, Char, Karam, Khair, etc.* Proportion of teak is high (more than 50%).

The site quality ranges from IVa to IVb. The density of forests varies from 0.4 to 0.6. The crop is young to middle aged with occasional mature trees. Stems in lower girth classes are proportionately higher in number.

3.4: FELLING SERIES, CUTTING SECTIONS AND JFM AREAS

Treatment series and annual coupes: The entire area of this working circle is divided into 10 treatment series with an **average area of 1923 ha**. The area of each treatment series is further divided into 20 coupes with **average coupe area as 96 ha.**(Appendix XXXII)

3.5: BLOCKS, COMPARTMENTS AND JFM AREA (Marked On GIS Based Maps):

Details of the allotment of compartments to Improvement Working Circle have been given in **Appendix XXX**

3.6: SPECIAL OBJECTIVES OF MANAGEMENT

The special object of management for this working circle is to improve the existing crops by tending operations. Improvement measures aim at nursing back these forests to normalcy.

To check soil erosion and conserve soil moisture, essential for creating conditions conducive for rejuvenation and growth of NR and rootstock.

The hygienic tending and thinning operations are expected to provide small timber, poles and firewood to meet bona fide needs of the local people.

3.6.1: ANALYSIS OF THE CROP

Stock mapping: The conventional stock mapping has been replaced by the extensive enumeration exercise and crown density mapping through image analysis of satellite imageries has been done.

Age and density: The crop is mostly young to middle with scattered mature trees having density 0.4 to 0.6.

SiteQuality: Site quality governs the harvestable girth. 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.

Enumeration: Enumeration was carried out by SOFR unit of Amravati by following the procedure laid down in National Working Plan Code 2014.

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. The table below clearly shows that the regeneration is very poor.

Table 3.3: Regeneration recorded in the Improvement Working Circle

Range	No. of Plots	R1 per ha.	R2 per ha.	R3 per ha.	Total per ha.
Arvi	10	87.00	22.00	2.00	111.00
Ashti	18	15.00	13.33	0.00	28.00
Hingni	24	32.50	20.41	0.42	53.33
Karanja	11	21.00	20.00	2.73	44.00
Kharangana	10	36.00	28.00	12.00	76.00
Samudrapur	12	47.50	13.33	0.83	61.67
Talegaon	20	39.00	63.50	6.00	109.00
Average		36.76	27.42	2.95	67.14

3.6.2: SILVICULTURAL SYSTEM

The good quality dense forests having young to middle aged crop are aimed to progress towards maturity as future productive selection forests, if hygienic operation of improvement felling is carried out and adequate growing space is provided to trees of valuable species such as Teak, *Chichwa*, *Dhaman*,

Haldu, Kasai, Kullu, Mokha, Semal, Shisam, Shivan, Tiwas, Behda. The species whose population in the stand dynamics is less than 1% shall be retained till they reach the rotation age. The improvement felling supplemented by tending of naturally generated crop and rootstock will aid in transition of middle aged stems to maturity.

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 crop.

3.6.5: REDUCING FACTORS AND REDUCED 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. XXXII.

Table No.3.4: Year wise working of coupes

Improvement Working Circle						
Year	Range	Nos. Total F.S	Coupe No	Total nos of Coupes	Total Nos of Comptt involved	Total Area in Ha.
2016-17	Ashti	2	1	2	2	205.165
	Hingni	2	I	2	3	182.346
	Karanja	1	1	1	1	53.706
	Kharangana	2	I	2	2	170.433
	Samudrapur	1	I	1	1	101.75
	Talegaon	2	I	2	2	178.986
Total		10		10	11	892.386

Year	Range	Nos. Total F.S	Coupe No	Total nos of Coupes	Total Nos of Comptt involved	Total Area in Ha.
2017-18	Arvi	1	II	1	2	85.301
	Ashti	2	II	2	2	216.975
	Hingni	2	II	2	2	174.084
	Karanja	2	II	2	2	177.172
	Kharangana	1	II	1	1	81.23
	Samudrapur	1	II	1	1	160.326
	Talegaon	1	II	1	1	95.445
Total		10		10	11	990.533

Year	Range	Nos. Total F.S	Coupe No	Total nos of Coupes	Total Nos of Comptt involved	Total Area in Ha.
2018-19	Arvi	1	III	1	1	85.220
	Ashti	2	III	2	2	197.961
	Hingni	2	III	2	2	171.263
	Karanja	1.5	III	1.5	2	148.518
	Kharangana	0.5	III	0.5	1	44.575
	Samudrapur	1	III	1	1	96.572
	Talegaon	2	III	2	3	190.377
Total		10		10	12	934.486

Year	Range	Nos. Total F.S	Coupe No	Total nos of Coupes	Total Nos of Comptt involved	Total Area in Ha.
2019-20	Arvi	1	IV	1	1	72.967
	Ashti	2	IV	2	2	202.191
	Hingni	2	IV	2	4	170.857
	Karanja	1.5	IV	1.5	2	149.696
	Kharangana	1.5	IV	1.5	2	130.668
	Samudrapur	1	IV	1	1	102.61
	Talegaon	1	IV	1	1	94.582
Total		10		10	13	923.571

Year	Range	Nos. Total F.S	Coupe No	Total nos of Coupes	Total Nos of Comptt involved	Total Area in Ha.
2020-21	Arvi	1	V	1	1	91.740
	Ashti	2	V	2	2	197.091
2020-21	Hingni	2	V	2	2	178.284
	Karanja	0.5	V	0.5	1	50.743
	Kharangana	2.5	V	2.5	4	221.698
	Samudrapur	1	V	1	1	105.112
	Talegaon	1	V	1	1	83.216
Total		10		10	12	927.884

Year	Range	Nos. Total F.S	Coupe No	Total nos of Coupes	Total Nos of Comptt involved	Total Area in Ha.
2021-22	Arvi	1	VI	1	1	85.554
	Ashti	1	VI	1	2	126.004
	Hingni	2	VI	2	2	176.331
	Karanja	1	VI	1	1	76.095
	Kharangana	2	VI	2	3	175.856
	Samudrapur	1	VI	1	1	116.56
	Talegaon	2	VI	2	2	185.696
Total		10		10	12	942.096

Year	Range	Nos. Total F.S	Coupe No	Total nos of Coupes	Total Nos of Comptt involved	Total Area in Ha.
2022-23	Arvi	1	VII	1	1	84.283
	Ashti	1	VII	1	1	97.271
	Hingni	2	VII	2	2	139.468
	Karanja	2	VII	2	2	159.561
	Kharangana	0	VII	0	0	0.00
	Samudrapur	1	VII	1	1	124.781
	Talegaon	3	VII	3	3	269.871
Total		10		10	10	875.235

Year	Range	Nos. Total F.S	Coupe No	Total nos of Coupes	Total Nos of Comptt involved	Total Area in Ha.
2023-24	Arvi	1	VIII	1	1	79.345
	Ashti	1	VIII	1	2	95.123
	Hingni	2	VIII	2	3	171.585
	Karanja	1	VIII	1	1	92.099

Year	Range	Nos. Total F.S	Coupe No	Total nos of Coupes	Total Nos of Comptt involved	Total Area in Ha.
2023-24	Kharangana	2	VIII	2	2	134.04
	Samudrapur	1	VIII	1	1	98.373
	Talegaon	2	VIII	2	3	227.434
Total		10		10	13	897.996

Year	Range	Nos. Total F.S	Coupe No	Total nos of Coupes	Total Nos of Comptt involved	Total Area in Ha.
2024-25	Arvi	1.5	IX	1.5	2	69.289
	Ashti	0.5	IX	0.5	1	36.079
	Hingni	2	IX	2	3	157.718
	Karanja	1.5	IX	1.5	2	113.511
	Kharangana	0.5	IX	0.5	2	98.10
	Samudrapur	1	IX	1	1	91.305
	Talegaon	3	IX	3	6	324.05
Total		10		10	17	890.048

Year	Range	Nos. Total F.S	Coupe No	Total nos of Coupes	Total Nos of Comptt involved	Total Area in Ha.
2025-26	Arvi	1	X	1	2	72.353
	Ashti	1.5	X	1.5	3	125.384
	Hingni	2	X	2	4	150.405
	Karanja	1	X	1	4	132.373
	Kharangana	2	X	2	5	154.92
	Samudrapur	1	X	1	2	87.131
	Talegaon	1.5	X	1.5	3	180.27
Total		10		10	23	902.839

3.6.10: METHOD OF EXECUTING THE TREATMENT

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

- 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 works/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 stems 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) **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.

II) 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 $1/3^{\text{rd}}$ 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, *Kullu, Semal and Salai* shall be reserved.

2. All dead and malformed trees, retaining 2 trees per hectare and all live high stumps shall be marked for felling.
3. Mature trees that have developed hollowness and show visual sign of decay will be marked for felling if, silviculturally, available.
4. All, but one or two, vigorously, growing coppice pole per stool shall be marked for felling.
5. However, in this working circle no commercial felling except for improvement felling shall be carried out.

3.6.11: SUBSIDIARY SILVICULTURAL OPERATIONS CLEANING AND THINNING

- **Natural Regeneration:** The main purpose of improvement felling carried out in Improvement Working Circle (D areas) is to improve the crop. Operation like identification of Natural Regeneration and keeping proper spacing, soil working, soil working around the seedlings, etc should, wherever possible, be carried out in D-areas after improvement felling.

From the survey data available it is seen that the natural regeneration is very poor and an average of 67 seedlings only are found per hectare. Under these circumstances, it is prescribed that Aided Natural Regeneration by planting nursery-raised well established seedlings of miscellaneous species and associates of Teak should be carried out in the areas felled as part of the post-harvest operations. The actual number of such Seedlings will depend on the number of Natural Regeneration occurring in the coupe which should be determined after surveying the area, such that the total no of Naturally occurring seedlings and the planted numbers should be 625. The details of the same are given in the Chapter Miscellaneous Regulations.

- **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. 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, should be carried out in the entire coupe. Coppicing of damaged and malformed saplings and singling of coppice shoots shall be carried out. Established seedling regeneration of Teak and other miscellaneous species shall be spaced out suitably. Spacing of dense growth will follow the stand table of the concerned species. In absence of the stand table, thumb-rule of keeping the spacing at one-third of the average height will be followed.

- **Thinning:** Thinning is proposed to be carried out in patches of dense pole crop by maintaining average spacing of $1/3^{\text{rd}}$ of the crop height as prescribed in C-Type areas. The post-thinning crop should have basal area and number as close to the relevant stand table or yield table for that site quality as possible.

Poles of vigorously growing non-teak trees should be preferred for retention, particularly those of Group 2 species and Group 3 species.

3.6.12: REGENERATION:

3.6.12.1: Choice of Species:

The choice of species for retention in order of importance will be Bija, Saja, Shisham, Tiwas, *Teak*, karam, Bhirra, Dhaora, Lendia, Salai, Mowai, *etc.*

3.6.12.2: Methods of Regeneration:

Natural Regeneration

Natural regeneration shall be given preference over the plantations. The existing NR and rootstock shall be tended. Plantations shall be taken as a supplementary activity to NR in the under stocked areas.

Tending operations for natural regeneration for rootstock management in the B1-type shall be taken up along with the coupe operations. While from the regeneration data such B1 areas may be hard to find, but the possibility of finding such areas cannot be ruled out.

- 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, 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:** All seedlings and saplings of valuable species *more than one meter in height will be nursed as future crop*. Spacing operations, if required, will be carried out to leave atleast 250 saplings per hectare. Wherever possible, the Aided Natural Regeneration by planting seedlings may be carried out. 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.
 - c) **Third year operations:** Singling of coppice shoots, management of damaged and malformed saplings, climber cutting and shrub clearance shall be done.

Artificial Regeneration

Plantations in the B2-type: Areas with clear open patches and fit for plantation will be taken up for artificial regeneration.

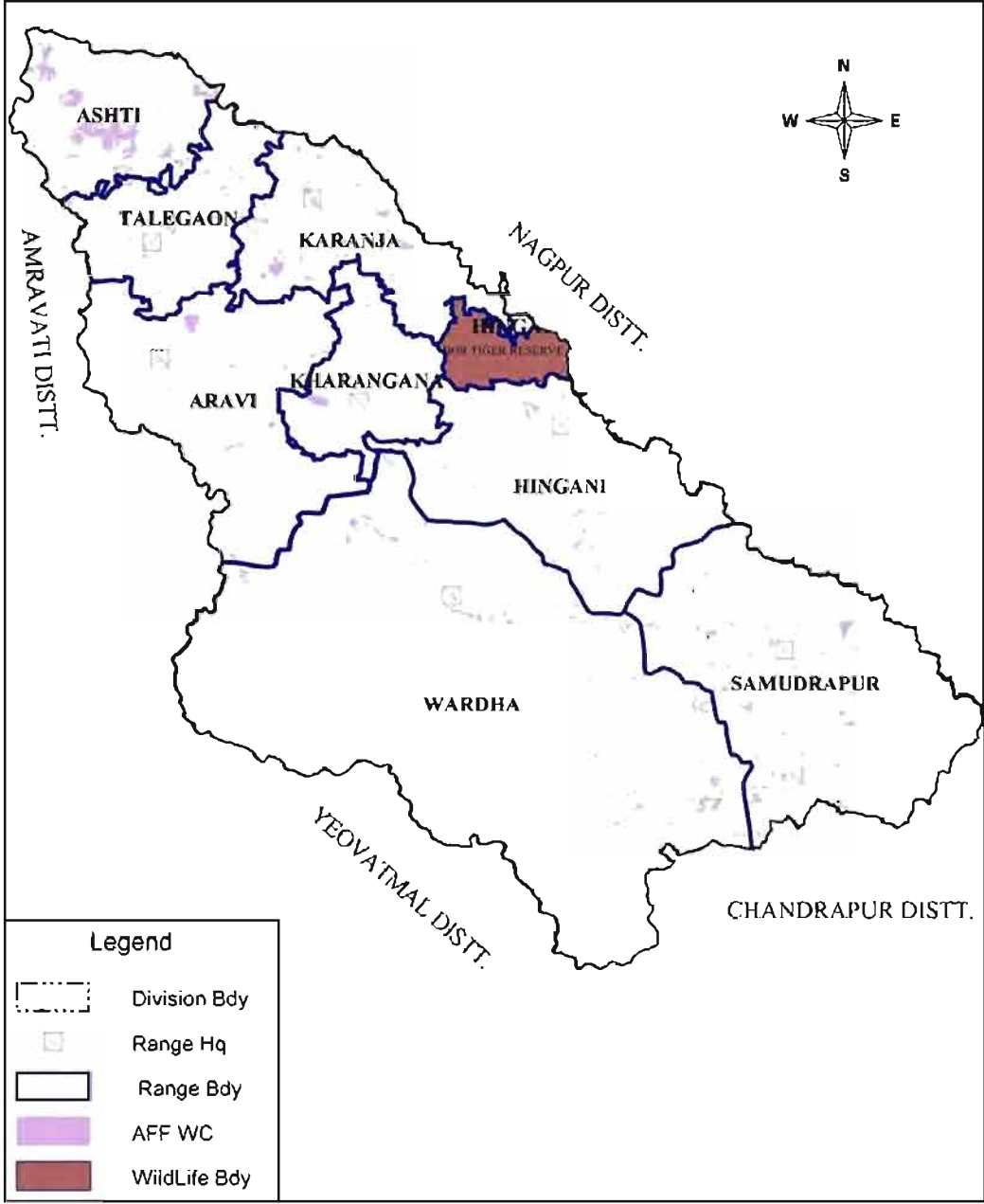
3.6.13: ASSOCIATED REGULATIONS AND MEASURES

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.

**MAP OF WARDHA FOREST DIVISION
AFFORESTATION WORKING CIRCLE**



CHAPTER-4

AFFORESTATION WORKING CIRCLE

4.1: NAME OF WORKING CIRCLE CLEARLY MARKED ON GIS BASED MAPS (1:50,000): The area of this Working Circle has been clearly marked on the GIS based map of 1:50000 which is appended 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 with sparse vegetation and inadequate natural regeneration and shrubby growth have been included in this Working Circle.

Afforestation Working Circle (AFF) forms about 13% of the entire forest area of the division. It includes 21929.61 ha. of the forest area comprising the Reserved Forests to the extent of 1142.99 ha and Protected Forests to the extent of 4102.29ha., Acquired Pvt. Forest 15.77 ha., Non Forest land taken over for C.A. 1327.89 ha. and Zudpi Jungle 15340.68 ha.

The following criteria have been applied for allocation of compartments to the AFF Working Circle:

- Compartments having large proportion of area under forest blanks.
- Compartments having poor quality open forests, which need to be afforested.

The allotment of these compartments has been done on the basis of the Forest Cover map of the latest Forest Survey of India reports and on the basis of the ground-survey/verifications. This is a very important Working Circle in which the forest areas that is in the possession of the Forest Department will be reclaimed to enhance the forest cover in the Division and the District. It assumes greater significance in view of the addition of the Jhudpi Jungle into this Working Circle in which the capacity of the Division will be tested in its efficiency to deal with the newly added area rife with problems of demarcation, possible encroachments etc.

Table 4.1: Compartments allocation to Afforestation Working Circle

Sr. No.	Range	RF		PF		Acquired Private forest	Non Forest Land Tekan over for C.A.	Zudpi Jungle	Total Co m- ptt.	Total area in ha.
		No. of Com- ptt	Area in ha.	No. of Com- ptt	Area in ha.					
1	Arvi	1	35.61	4	117.917	0	377.58	988.63	5	1519.737
2	Ashti	1	172.8	15	2828.348	0	772.64	828.70	16	4602.488
3	Hingni	1	147.67	1	87.863	0	40.89	1560.39	2	1836.813
4	Karanja	3	469.64	17	620.935	15.77	0	1779.35	20	2885.695
5	Kharangana	1	317.27	1	6.95	0	136.78	254.79	2	715.79
6	Samudrapur	0	0	0	0	0	0	2962.04	0	2962.04
7	Talegaon	0	0	4	358.233	0	0	994.94	4	1353.173
8	Wardha	0	0	1	82.04	0	0	5971.84	1	6053.88
Grand Total		7	1142.99	43	4102.29	15.77	1327.89	15340.68	50	21929.61

4.3: GENERAL CHARACTERISTICS OF VEGETATION

This working circle generally comprises of degraded open forest areas interspersed with forest blanks or brushwood. The blank areas have dominance of Khair, Palas and Bhirra.

The allotted areas in general are under stocked and open with crop density usually less than 0.4, though patches of better stocked areas are also met with in some compartments. The most of the PF areas allotted to this WC, especially, those near the villages are highly degraded and lays bare without any significant tree crop.

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

TableNo.4.2: Species and Girth Distribution in the AWC areas per ha

Sr. No	Species	15- 30	31 - 45	46 - 60	61 - 75	76 - 90	91 - 105	106- 120	121 135	136 - 150	151 up	Total
1	Ain/Saja/ Sajad	0.0	0.00	1.92	0.38	0.00	0.00	0.00	0.00	0.00	0.00	2.31
2	Apta/Bhosa /Sehra	0.0	1.54	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92
3	Aran	0.0	0.00	0.00	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.38

Sr. No	Species	15-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-150	151 up	Total
4	Bhera/Bhirra	0.0	2.31	0.77	0.38	0.00	0.00	0.00	0.00	0.00	0.00	3.46
5	Biba	0.0	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38
6	Bor	0.4	1.15	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92
7	Dhaman	0.0	0.38	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.15
8	Dhaora	0.0	6.92	2.31	0.77	1.92	0.38	0.38	0.00	0.00	0.00	12.69
9	Ghoti	0.0	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38
10	Kalumb	0.0	0.38	0.38	1.15	0.38	0.38	0.00	0.00	0.00	0.00	2.69
11	Khair	0.4	33.46	15.77	4.23	1.54	0.38	0.00	0.00	0.00	0.00	55.77
12	Kharasi	0.0	1.92	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.69
13	Lendia	0.0	1.54	1.54	0.77	0.00	0.00	0.00	0.00	0.00	0.00	3.85
14	Medsing	0.0	0.00	0.38	0.00	0.00	0.00	0.00	0.38	0.00	0.00	0.77
15	Mowai	0.0	2.69	0.77	1.92	1.54	1.54	0.38	0.38	0.00	0.00	9.23
16	Pakad	0.0	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38
17	Palas	0.0	2.31	3.08	2.69	1.92	0.00	0.00	0.00	0.00	0.00	10.00
18	Rohan	0.0	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	1.15
19	Salai	0.0	0.00	0.00	0.38	0.00	0.38	0.00	0.38	0.00	0.00	1.15
20	Teak	0.0	8.85	10.00	3.08	2.31	0.77	1.54	0.00	0.00	0.00	26.54
21	Tendu	0.0	1.15	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.54
22	Waghati	0.0	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38
	Total	0.77	66.54	40.00	15.77	10.00	3.85	2.31	1.15	0.00	0.38	140.77

The site quality varies between IVb and IVa. The canopy density of the vegetation varies from 0 to 0.3. Natural regeneration of common species is present but its extent is far from being adequate (**Table 4.2**). 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. Due to excessive grazing, fires and refractory nature of areas, establishment of Natural Regeneration is inadequate.

Khair appears to have the greatest presence in the Afforestation Working Circle followed by Teak. Overall in the Division however, Teak has the greatest abundance contributing about 53% of the total Growing Stock as per FSI report. Hence wherever possible, the planting of Teak should be limited to the barest minimum in the Afforestation Working Circle so as to improve crop composition.

**Table No.4.3: Natural Regeneration per ha.Recorded in the
Afforestation Working Circle**

Range	No of Plots	R1 per ha.	R2 per ha.	R3 per ha.	Total per ha.
Ashti	17	19.00	17.00	5.00	42.00
Karanja	2	25.00	60.00	35.00	120.00
Kharangana	2	30.00	10.00	0.00	40.00
Samudrapur	1	70.00	20.00	0.00	90.00
Talegaon	2	0.00	0.00	0.00	0.00
Average		21.00	25.00	6.25	47.08

Extent of natural regeneration is inadequate.

4.4: FELLING SERIES, CUTTING SECTIONS AND JFM AREAS

Felling series and annual coupes: The entire area of this working circle has been divided into 24 felling series. Each felling series has been further divided into 10 annual coupes. Details are provided in the **Appendix XXXV**.

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

Details of the compartment in the working circle have been given in Appendix XXXIII.

4.6: SPECIAL OBJECTIVES OF MANAGEMENT

The special objectives of management of this WorkingCircle are as follows:

- 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 OF THE CROP

Stock mapping: The stock maps were prepared by territorial staff and were correlated with the enumeration results of SOFR Unit and Satellite imagery classified data obtained from Forest Survey of India, Nagpur.

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 which were reflected by stock mapping and satellite imageries.

Enumeration: Most of the areas under this Working Circle fall in PF, which are mainly barren with little growth. Khair species is in higher proportion (30%) followed by Teak, Palas etc. Enumeration work was conducted by SoFR unit as per the National Working Plan Code 2014.

4.6.2: SILVICULTURAL SYSTEM

The area will be regenerated with suitable tree species depending on the site conditions. Tending of existing rootstock viz. the saplings, coppice shoots and poles, supplemented by plantations have been proposed as the main activities in this working circle. Yield removal is not prescribed except for removal of wind fallen, dead trees.

In view of vicinity of these areas to habitations, fuel wood and fodder availability will be expanded through plantation of fuel wood and fodder species and by involving JFM committees.

The areas of this working circle are, primarily, in bad shape. Inadequate sub-soil moisture, highly compact soil structure and heavy biotic pressure are the main limiting factors for the establishment of seedling in this area. Top soil has been washed away and as a result vast areas do not have even adequate soil-depth to support tree crop. As a consequence, a large chunk of these areas lay bare without any significant vegetation. Hence, intensive soil and moisture conservation measures and tending of existing rootstock should go hand in hand with the efforts of artificial regeneration.

4.6.3: ROTATION PERIOD: No rotation period is fixed.

4.6.4: HARVESTABLE DIAMETERS: Not Applicable

4.6.5: REDUCING FACTORS AND REDUCED AREAS: Not Applicable

4.6.6: FELLING CYCLE: Treatment cycle is fixed as Ten years. The entire area of this working circle will be covered in a period of Ten years.

4.6.7: DIVISION INTO PERIODS AND ALLOTMENT TO PERIODICBLOCK (PB): Not Applicable.

4.6.8: CALCULATION OF THE 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 TREATMENT:

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. (Note: In the case of Jhudpi Jungle, the boundary demarcation will precede the coupe demarcation for the coupes falling on the first year.)

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)

- The open forests with root stock as well as without root stock shall be shown in the treatment map.
- 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.

Extent of plantation: Requirement of site would be the prime consideration for deciding the extent of plantation. However, in each coupe, not more than 50 ha be taken up for plantation. While taking plantations under special schemes such as NREGA, FDA, DPDC etc the areas under due coupes should be invariably considered.

4.6.10.2: Marking Rules and Prescriptions

Marking technique and prescriptions described in the Chapter of the Miscellaneous Regulations shall be followed, with modifications, proposed in the following paragraphs.

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 shall be observed strictly for marking the trees in different areas;

A-Type Areas: Protection Areas:

1. No tree shall be marked for felling.

B- Type Areas: Under stocked Areas:

1. No standing tree shall be marked for felling except dead trees retaining at least 2 trees/ha as snags.

2. All live high stumps shall be marked.
3. In case of Coppice regeneration, 1 or 2 most promising shoot will be retained and rest marked for removal.
4. Areas which do not contain sufficient natural regeneration or rootstock will be artificially regenerated by suitable local species if the site is suitable for afforestation works. In case, the areas selected contain old unsuccessful plantations, such areas shall be treated only after examining the factors responsible for failure and upon taking prior approval from the CCF (T).

C -Type Areas: Groups of young poles:

1. The congested pole crop shall be marked for thinning to maintain spacing equal to $1/3^{\text{rd}}$ of the crop height. Poles of seedling origin shall be preferred for retention over the poles of coppice origin.
2. Dead poles shall be marked for thinning.
3. Multiple poles shall be thinned to regain one promising pole per stump/stool.

D - Type Areas: Well-stocked Areas:

1. All dead trees shall be marked for felling except two trees per hectare which shall be retained as snags.
2. All live high stumps shall be cut back to the ground level.
3. All but one or two promising coppice pole per stool shall be marked for felling.

Sequence of Working: Demarcation of coupe, preparation of treatment map, marking, felling (dead trees), PPO works will be done in the sequence of operations as depicted in Appendix No.XXXIV.

4.6.11: SUBSIDIARY SILVICULTURAL OPERATIONS CLEANING AND THINNING: Not Applicable

4.6.12: REGENERATION:

- **CHOICE OF SPECIES:**

Order of priority among desirable species for retention is prescribed as: Tiwas, Saja, Bija, Karam, Haldu, Shisham, Dhaora, Khair, Siwan, Rohan, Salai, Mowai, Dhaman, Lendia, Semal, Kulu, Bhirra,, etc.

Valuable local species suitable for the site and favoured by the local village communities and JFMCs will be preferred in plantations. Shisham, Khair, Siwan, Sisoo, Siris, Chichwa, Karanj, Ain, Bija, Dhaora, Aonla, Chinch, Neem, Maharukh, semal, Sitaphal, bamboo etc. should be considered among the recommended species. In poorly drained areas and swampy area Arjun, Babul, Jamun and Ain shall be preferred. Seedlings of edible fruit-yielding forest species may constitute up to 20 percent and seedlings of medicinal plants up to 5 percent each. The extent of plantation should not be exceed 50 ha.. An officer not below the rank of Assistant Conservator of Forests should approve the site selection. The broad information of the different species growing in different types of soil conditions is given in **Appendix XLIV** as different species show their preference for edaphic factors.

Mixed species plantations will include fairly good proportion of fodder and firewood yielding species, like, Anjan, Neem, Sissoo, Ficus, babul, Gular, Pakar, Maharukh, Kinh, Siwan, Karanj, Siras, Sitaphal, etc.

- **Method of Regeneration :**

A-type areas of high slope should not be planted. In areas of gentle slope and nalla banks, stake planting may be resorted to.

In B1 areas **tending of Natural Regeneration** and existing rootstock is prescribed to be given preference over plantations. The areas having promising NR and rootstock patches shall be identified and marked on the treatment map. Cultural operations for natural regeneration in the D-type areas and rootstock management in the B1-type areas are prescribed. In view of the poor regeneration status across the Division, areas with promising natural regeneration may not be available, but wherever exists, the prescriptions is that NR should be supported with Aided Natural Regeneration.

Plantations shall be taken in the B2-type areas (but not in natural blanks wherein geology, soil and water regime does not support tree growth) which have good soil depth and are well drained. Choice of species is carefully selected as per site suitability. Improved nursery practices including Root trainers shall be adopted to raise quality seedlings.

It shall be ensured that no seedling is planted within 3 meters distance from an established seedling or existing trees. The standing trees have influence zone of spreading shadow and pits should not be dug either in the shadow or in the influence zone of the standing trees. Influence zone for various sizes of trees is given below:

Table No.4.4: Zone of Influence of trees

Sr.no	Girth class (cm)	Influence zone (meter)
1	<30	2
2	30-60	3
3	60-90	4
4	90-120	5
5	>120	6

No plantation shall be taken up in the C and D areas. In D areas with good natural regeneration NR should be supported with Aided Natural Regeneration. The details are given in Miscellaneous regulations.

Soil and moisture conservation works in the areas put under this working circle will be done as prescribed in the relevant paras under Miscellaneous Regulations and in accordance with specific guidelines issued from time to time in this regard. Given the prevailing drought conditions and the need to conserve water and soil, this Plan has prescribed 2000 Cum of SMC per year which will primarily be carried out in the plantation area but also covering any area of the entire Coupe as per site conditions.

4.6.13: ASSOCIATED REGULATIONS AND MEASURES

- **CLOSURE TO GRAZING AND FIRE PROTECTION**

Protection from fire and grazing is essential for success of natural and artificial regeneration.

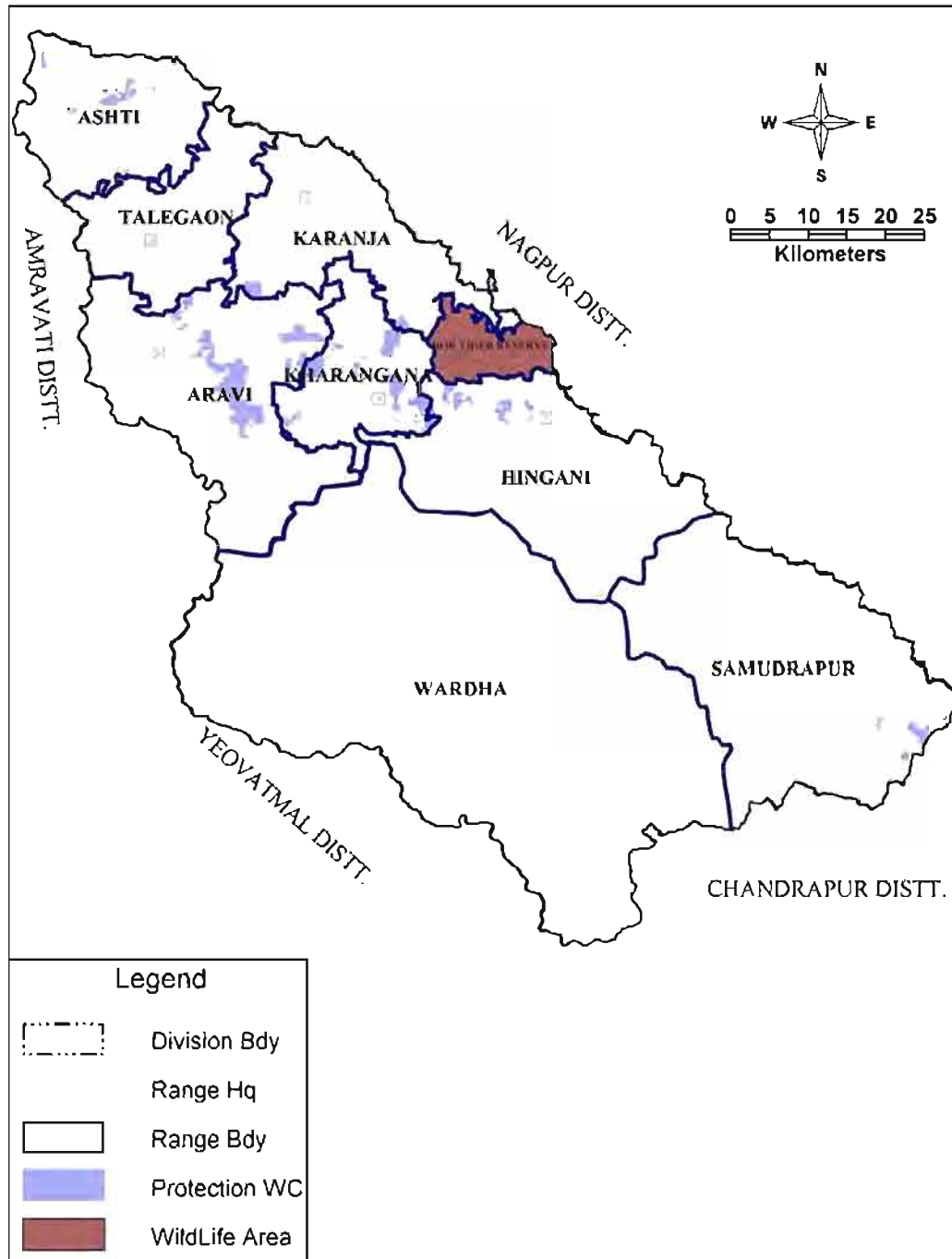
All annual coupes will be provided strict fire protection and will remain closed to grazing till the seedlings reach a minimum height of 10 feet.

- **INSTITUTIONAL FRAME WORK FOR EXECUTING AFFORESTATION WORK**

1. Agency of Implementation: For the success of afforestation works, role of local communities is extremely important. Therefore, afforestation works under this working circle are to be entrusted to JFMCs as per area allotted to JFMCs and forest department should provide technical guidance. Already, Govt. of Maharashtra has identified JFMCs as implementing agency for NREGA works.
2. NREGA Scheme can be effectively used for raising tall seedlings. This would bring in suitable convergence between the Non-plan budget resources and funds from special scheme like NREGA.
3. For protection of such plantations, JFMCs should be asked to select protection labour from among their members as per guidelines of G.R. of July 2012. This model would enable intensive protection and management of small patches.
4. 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.
5. In light of the success of the Bihar Model of roadside plantation under MNREGA implemented in Social Forestry Department, the DCF Wardha should experiment this model under block plantations for small areas. Priority should be given for good sites preferably in Zudpi Jungle in and around cities and towns. Such sites should be chosen at last one in each Range every year.

Whenever possible, teak should be avoided for AR as there is an overabundance of teak in the forest. The teak seedling should not be more than 20%.

MAP OF WARDHA FOREST DIVISION PROTECTION WORKING CIRCLE



CHAPTER-5

PROTECTION WORKING CIRCLE

5.1: NAME OF WORKING CIRCLE CLEARLY MARKED ON GIS BASED MAPS (1:50,000): 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

The catchment areas of the major, medium and minor irrigation projects of Wardha Division are included in this working circle. It extends over to 12320.57 ha. of forest areas, comprising of 8305.56 ha Reserved Forests and 3876.89 ha. as the Protected Forests and Acquired Pvt. Forest 138.12 ha.

Protection and soil conservation treatment in these forests is necessary for site protection, preserving the steep and precipitous slopes and reducing silt load to the major dams or water bodies in the division.

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

- The compartments having more than half of its areas on the steep slope or in the stream buffer.
- The compartments which are close to and in the catchments of the major dams and water bodies in the Wardha district.

Table No.5.1:Range-wise Compartment allocation to Protection Working Circle:

Sr. No.	Range	RF		PF		Acquired Private forest	Total Comptt.	Total area in ha.
		No. of Comptt	Area in ha.	No. of Comptt	Area in ha.			
1	Arvi	14	3942.05	6	1224.54	53.21	20	5219.80
2	Ashti	1	276.81	4	687.044	0	5	963.854
3	Hingni	4	659.51	3	536.74	0	7	1196.25
4	Karanja	3	729.24	2	12.433	0	5	741.673
5	Kharangana	12	2697.95	6	764.249	0	18	3462.199
6	Samudrapur	0	0	5	651.88	84.91	5	736.79
7	Talegaon	0	0	0	0	0	0	0
8	Wardha	0	0	0	0	0	0	0
Grand Total		34	8305.56	26	3876.89	138.12	60	12320.57

5.3: GENERAL CHARACTERISTICS OF VEGETATION

The forests composition varies from pure teak to the mixed crop having high proportion of Teak. The common associates of teak are Ain, Dhaora, Tiwas, Lendia, Tendu, Moha, Bhirra, Mowai, Salai, Rohan, Shisham, Aonla, Achar, Kulu, Semal and Khair. Majority of the area supports stunted tree crop. Teak, Bhirra, Palas and Khair are found in larger proportions.

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. The density of crop generally varies from 0.2 to 0.7, having well stocked patches as well as under stocked and open areas.

On the basis of enumeration results the species composition and their girth distribution in forest areas under this working circle is given in the table.5.2

Table No.5.2: Species and Girth Distribution in the Protection Working Circle (area/ha)

Sr. No	Species	15 - 30	31 - 45	46 - 60	61 - 75	76 - 90	91 - 105	106 - 120	121 - 135	136 - 150	151 up	Total
1	Ain/Saja/Sajad	0.00	0.00	0.93	0.00	0.74	0.19	0.00	0.00	0.00	0.00	1.85
2	Amaltas/Bahawa	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37
3	Apta/Bhosa/Sehra	0.00	0.37	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.56
4	Behada	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
5	Bel	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
6	Bhera/Bhirra	0.19	9.81	7.04	7.41	2.96	1.85	2.41	0.19	0.56	0.00	32.41
7	Bor	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
8	Chilati	0.00	1.30	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.67
9	Dhaora	0.00	0.00	0.00	0.37	0.00	0.37	0.19	0.19	0.00	0.00	1.11
10	Dudhi	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
11	Feter	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
12	Ghatbor	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
13	Hiwar	0.00	0.37	0.56	0.19	0.00	0.19	0.00	0.00	0.00	0.00	1.30
14	Kahu	0.00	0.00	0.00	0.00	0.19	0.19	0.00	0.00	0.00	0.00	0.37
15	Kalumb	0.00	0.00	0.56	0.37	0.00	0.00	0.37	0.00	0.00	0.00	1.30
16	Katbor	0.00	0.19	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37

Sr. No	Species	15 - 30	31 - 45	46 - 60	61 - 75	76 - 90	91 - 105	106 - 120	121 - 135	136 - 150	151 up	Total
17	Katsawar	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
18	Khair	0.00	10.74	5.56	1.85	0.74	0.00	0.00	0.00	0.00	0.00	18.89
19	Kuda	0.00	0.93	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.11
20	Lendia	0.00	2.22	1.48	0.56	0.19	0.37	0.00	0.19	0.00	0.00	5.00
21	Medsing	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
22	Mowai	0.00	0.00	0.00	0.19	0.56	0.19	0.19	0.00	0.00	0.19	1.30
23	Neem	0.00	0.19	0.00	0.19	0.00	0.00	0.19	0.00	0.00	0.00	0.56
24	Palas	0.19	12.41	4.81	2.96	0.56	0.37	0.19	0.00	0.19	0.00	21.67
25	Salai	0.00	0.00	0.00	0.56	0.56	0.19	0.19	0.56	0.00	0.00	2.04
26	Sisam	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.19
27	Teak	0.37	55.19	38.70	19.07	10.00	4.63	1.67	0.56	0.19	0.00	130.37
28	Tendu	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37
	Total	0.74	95.19	60.78	34.70	16.67	8.70	5.37	1.67	0.93	0.19	224.92

Extent of NR is shown in table below:

Table No.5.3: Average Regeneration recorded in the Protection Working Circle (per hectare)

Range	No. of Plots	R1 per ha.	R2 per ha.	R3 per ha.	Total per ha.
Arvi	22	125.00	15.00	0.00	140.00
Ashti	4	10.00	25.00	7.50	43.00
Hingni	6	28.33	28.33	3.33	60.00
Karanja	4	5.00	7.50	2.50	15.00
Kharangana	14	35.71	32.14	0.71	68.57
Samudrapur	4	40.00	15.00	0.00	55.00
AVERAGE		67.41	21.11	1.29	89.85

The status of natural regeneration in this Working Circle is inadequate.

The details of the compartments included in this Working Circle have been provided in the **Appendix XXXIX**.

5.4: FELLING SERIES, CUTTING SECTIONS AND JFM AREAS

Treatment series and annual coupes: The area of this working circle is divided into **6 treatment series with average area of 2053 ha**. Each treatment series is further divided into 20 coupes with average coupe size of 102 ha. Details of treatment series and coupes are given in **Appendix No.XLI**.

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

The details of compartment in this working circle have been provided in the Appendix No. XXXIX

5.6: SPECIAL OBJECTIVES OF MANAGEMENT

1. 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.
2. 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.
3. 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

Stock mapping: Conventional Stock Mapping has been done by the staff of the territorial division. Satellite imageries obtained from FSI have also been used for verification.

Age and density: The crop is mostly young to middle aged with scattered patches of mature and young crop. The density of the crop varies from 0.2 to 0.8 having fair share of open and dense patches. The dense areas make a significant part of the crop.

Enumeration: Enumeration has been carried out by SOFR unit of Amravati as per the procedure laid down in National Working Plan Code, 2014.

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 works 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.

5.6.3: 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: FELLINGCYCLE: Treatment cycle is fixed at 20 years.

5.6.7: DIVISION INTO PERIODS AND ALLOTMENT TO PERIODICBLOCK (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:

The annual coupes shall be demarcated one year in advance.

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: Treatment Map:

Following areas shall be shown on the treatment map:

- **A Type areas:** Areas having more than 25° slopes and 20 meter wide buffer along streams will be measured from the bank or the high flood mark. Similar buffer of the A2-type areas will be marked along water bodies and tanks.
- The A3-type (excessive erosion prone) includes seasonally flooded areas and such pockets marked on the land use maps.

- B type areas are understocked with density less than 0.3.
- The **C-type areas** would include groups of naturally grown poles, having 15 to 45 cm GBH
- The D - type areas would include well-stocked forest patches.

5.6.11.3: Treatment Prescription:

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

(1) A-Type Areas: Protection Areas

- i. **Soil and moisture conservation:** The requirement of site would be the prime consideration while planning for Soil and moisture conservation works.
- ii. **Bush sowing:** Bush sowing of *Khair*, *Neem*, *Maharukh*, *Babool* and other local seeds (except teak) are to be carried out. Any one species should not constitute more than one-third of the total species.
- iii. **Stake planting:** In the 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. Provided that Stake planting shall be done in the plain areas only and not in high slopes.
- 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* and *Tiwas* may be extracted.

(2) B-Type Areas: Under-stocked Areas

Rootstock Management – Tending of rootstock will be carried out as follows:

- 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, 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:** All seedlings and saplings of valuable species *more than 1 meter in height will be nursed as future crop*. Spacing operations, if required, will be carried out to leave nearly 400 saplings per hectare at an average of 5 metre spacing. The natural regeneration operation should give priority to non-Teak species and Teak of origin and 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 will be carried out in October.

(b) Second year operations: The soil working in October will be repeated in the following year.

(c) Third year operations: Singling of coppice shoots, management of damaged and malformed saplings, climber cutting and shrub clearance shall be repeated as third year operations.

iv. No harvesting in B Type area.

(3) C-Type Areas: Groups of pole crop

i. **Thinning:** Groups of pole crop will be thinned by maintaining average spacing of one-third of the crop height in such patches. Poles of vigorously growing non-teak species should be preferred for retention if teak is more than 50 percent of the crop in stocking.

ii. No planting shall be done in these areas.

(4) D-Type Areas: Well-stocked Areas

i. No harvesting of green trees is prescribed. However, dead trees after retaining two dead trees per hectare as snags are permitted for harvesting. Similarly, coppice shoots will be tended to retain one or two promising coppice shoots per stump.

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 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. No plantation is prescribed in these areas.

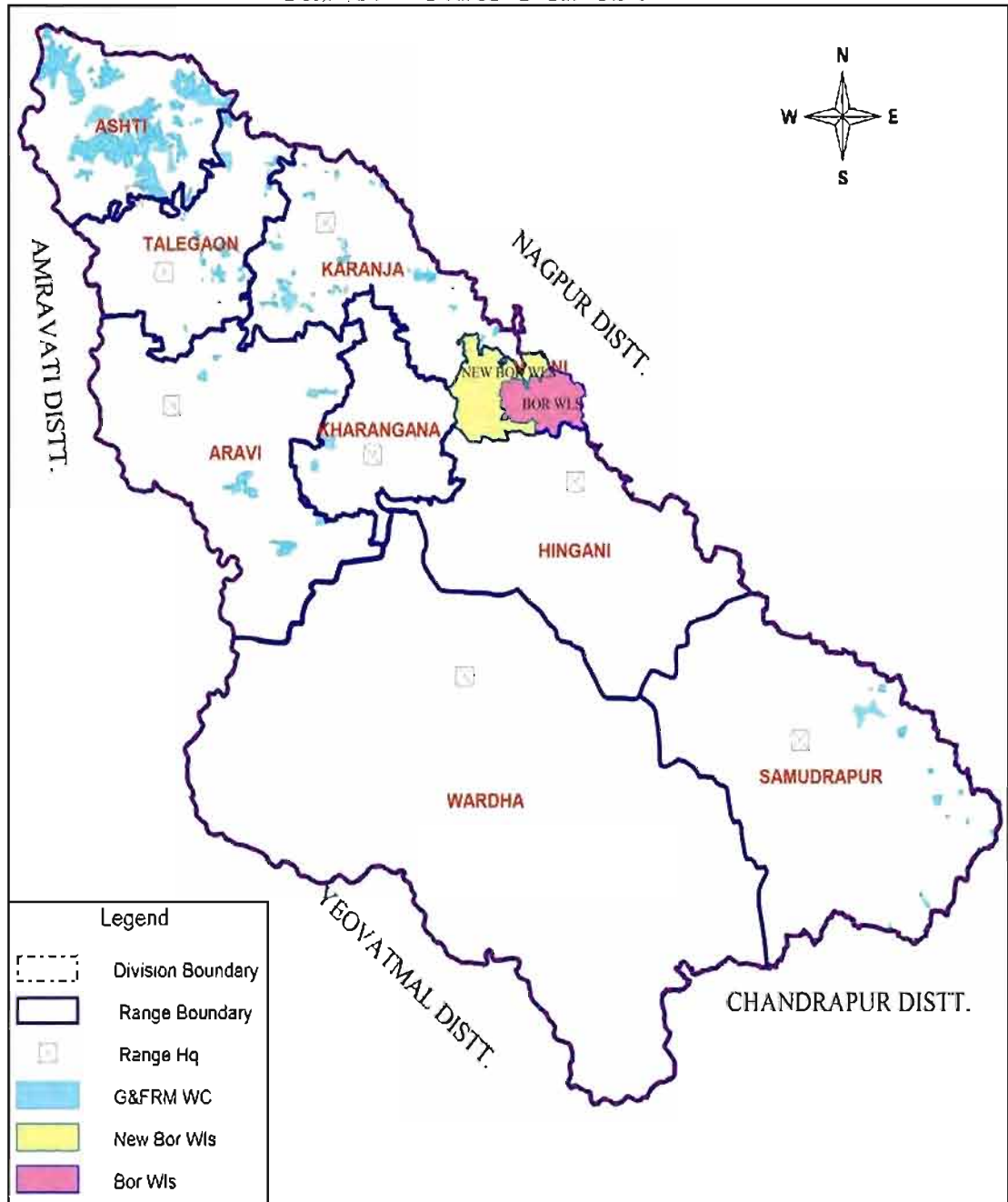
Each water body / reservoir is a unique ecological site having endowed with varied and rich biodiversity as well as natural and scenic beauty. Due to proximity of water there is a great diversity of flora and fauna around these water bodies as well as along the water courses. These forest areas also support a substantial number of NWFP species, which are of great significance for the livelihood needs of the local people. Therefore, these sites are ideally suitable for developing Ecological Centres (**Eco-centres**) for purpose of disseminating information, generating sensitivity and developing understanding of the complex issues and concerns associated with sustainable forestry, wildlife conservation and environment conservation. These Eco-centres will cater to the eco-tourism needs of the people of this region and will, in addition, open up employment opportunities and new means of livelihood for local people. Involvement of local people and NGOs in development and management of these areas as focal points of nature interpretation and eco-tourism is crucial and will pave the way to generate good will about forests and wildlife in the local communities.

5.6.12: REGENERATION: Not applicable

5.6.13: ASSOCIATED REGULATIONS AND MEASURES

Grazing Closure, Fire Protection and Other Regulations: Protection from fire and grazing is essential for success of regeneration efforts. Grazing closure will be enforced in the entire areas.

MAP OF WARDHA FOREST DIVISION
G&FRM WORKING CIRCLE



CHAPTER-6

GRASS & FODDER RESOURCES MANAGEMENT WORKING CIRCLE

6.1: (NAME OF) WORKING CIRCLE (CLEARLY MARKED ON GIS

BASED MAPS (1:50,000): The area of this Working Circle has been clearly marked on the GIS based map of 1:50000 which is appended and a copy of the same is given on a smaller scale on A4 size here.

6.2: GENERAL CONSTITUTION OF WORKING CIRCLE

1. The forests included under this working circle are-
 - i. Areas which were under this Working Circle in the previous plan
 - ii. Areas which are in the vicinity of villages and hence under severe biotic pressure
2. **Area allocation:** Range-wise allocation of area is shown in table below:

**Table No.6.1 Compartments and Area allocation to G & FRM
Working Circle (in ha.)**

Sr. No.	Range	RF		PF		Total Comptt.	Total area in ha.
		No. of Comptt	Area in ha.	No. of Comptt	Area in ha.		
1	Arvi	2	123.861	5	398.473	7	522.334
2	Ashti	6	900.35	25	3243.482	31	4143.832
4	Karanja	0	0	21	356.73	21	356.73
5	Kharangana	1	271.14	1	47.508	2	318.648
6	Samudrapur	1	25.689	9	250.426	10	276.115
7	Talegaon	1	239.57	12	492.669	13	732.239
Grand Total		11	1560.61	73	4789.29	84	6349.90

6.3: GENERAL CHARACTERISTICS OF VEGETATION

The areas allotted to this working circle contain degraded soils and are with heavy biotic pressure. They are therefore open (density ranges from 0.2 to 0.3) containing brushwood and bushes along with the grasses. Trees are stunted, malformed and hacked and are found scattered throughout.

Tree species found are *Teak, Palas, Lendia, Bhirra, Ain, Bor, Dhawda, Movai, Salai, Char, Moha, Sitaphal, Rohan*. Thorny and bushy species like *Bor, Khair, Bharrati, Eruni, Ghot, Chilati, Phetra* are also common; Grass species are *Kusal, Bhurbhushi, Ghonad, Sheda, Marvel*.

Weed infestation has been observed in the tract. *Rantulasi, Lantana* 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. Hence, the availability of palatable grasses has reduced.

6.4: FELLING SERIES, CUTTING SECTIONS AND JFM AREDAS

Treatment series and annual coupe - The working circle has been divided into 13 fodder series with **average area of fodder series 488 ha**. (the term 'Treatment series' has been replaced with 'fodder series'). As all the pastures and grass lands are proposed to be managed on a four years rotation, each such series will have 4 coupes (A, B, C & D) with **average area of coupe 122 ha (Appendix XXXVIII)**.

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

The blocks and compartments allotted to this working circle are shown in **Appendix XXXVI**.

6.6: SPECIAL OBJECTIVES OF MANAGEMENT

- 1) To augment fodder requirement of the villages.
- 2) To supplement the fodder requirement of wild animals.
- 3) Introduction of suitable palatable indigenous varieties of grasses as well as legumes and fodder tree species in selected areas.
- 4) To restore the site through Soil and Moisture conservation works.

6.6.1: ANALYSIS OF THE CROP: Analysis and Valuation of the Crop:

(i) Stock mapping – Conventional Stock Mapping has been done by the territorial staff. Satellite imageries were used for verification of stock maps.

(ii) **Age and Density** - Areas are mostly open and blank and density ranges between 0.1 to 0.3

(iii) **Site Quality:** Mostly, the site quality is IVb.

(iv) **Enumeration** – Enumeration has been done by the SOFR unit of Amravati as per the procedure laid down in National Working Plan Code, 2014.

Table No.6.2: Species and Girth Distribution in the G&FRM Working Circle

Sr No	Species	15 - 30	31 - 45	46 - 60	61 - 75	76 - 90	91 - 105	106 - 120	121 - 135	136 - 150	151 up	Total
1	Ain/Saja/Sajad	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37
2	Apta/Bhosa/Sehra	0.00	1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.48
3	Arjun/Anjan/Kahu	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37
4	Awla	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37
5	Bel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.37
6	Bharati	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37
7	Bhera/Bhirra	0.37	11.48	7.04	2.96	0.37	0.00	0.00	0.00	0.00	0.00	22.22
8	Chicholi	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.37
9	Dhaora	0.00	1.85	1.48	0.74	0.00	0.00	0.00	0.37	0.00	0.00	4.44
10	Dudhi	0.00	0.00	0.74	0.00	0.00	0.37	0.00	0.00	0.00	0.00	1.11
11	Hiwar	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37
12	Kanchan	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37
13	Khair	0.74	15.56	11.48	3.33	1.85	0.37	0.00	0.00	0.00	0.00	33.33
14	Lendia	0.74	4.44	2.22	1.85	0.00	0.00	0.37	0.00	0.00	0.00	9.63
15	Medsing	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.37
16	Mowai	0.00	0.00	0.00	0.00	0.37	0.74	0.00	0.00	0.00	0.00	1.11
17	Neem	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37
18	Palas	1.11	3.33	3.33	1.85	0.37	0.74	0.00	0.00	0.00	0.00	10.74
19	Teak	1.11	0.00	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.22
20	Tendu	0.00	0.74	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.11
	Total	4.07	39.63	29.63	10.74	2.96	2.59	0.74	0.74	0	0	91.11

(v) **Regeneration status** of the tree crop in the forests allocated to this working Circle is given in table 6.3 below:

Table No.6.3: Average seedlings and saplings per ha in GFRM areas

Range	No of Plots	R1 per ha.	R2 per ha.	R3 per ha.	Total per ha.
Ashti	21	19.00	24.29	0.48	43.00
Arvi	1	0.00	0.00	0.00	0.00
Karanja	1	0.00	0.00	0.00	0.00
Samudrapur	2	0.00	0.00	0.00	0.00
Talegaon	2	10.00	185.00	0.00	195.00
Average		15.19	32.59	0.37	48.14

(vi) Analysis and Valuation of Grass and Fodder Resources

Present enumeration primarily values tree crop and this has been given under table 15.4 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

Based on the grass and forest resources of the site as well as the objectives of the management, the silvicultural systems to be followed as under:

1. Regulated and rotational grazing in pasture areas.
 2. Regulating seeding, grass cutting and complete closure to grazing in identified Grass land.
- **Method of Treatment:** The method of treatment to improve grasses shall be two pronged i.e. (a) rotational grazing in pasture areas and (b) augmenting natural grasses in grasslands through closure to grazing.

(a) Rotational Grazing in Pasture Lands

The areas shall be regulated for controlled grazing as per prevailing grazing rules. Pasture lands have been divided into 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 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 stage only. Soil and moisture conservation works may be taken up extensively for improving the site, such as CCTs, Nalla-bunding and gully plugging etc.

(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 removal of such weeds manually/ mechanically 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.

6.6.3: ROTATIONPERIOD: 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 DIAMETERS: Not applicable

6.6.5: REDUCING FACTORS AND REDUCED AREAS: Not applicable

6.6.6: FELLING CYCLE: Treatment cycle is fixed at 4 years.

6.6.7: DIVISION INTO PERIODS AND ALLOTMENT TO PERIODIC BLOCK (PB): Not applicable

6.6.8: CALCULATION OF THE 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 & Carry away' basis to be regulated by the Department through the JFMCs, whenever exists.

6.6.11: SUBSIDIARY SILVICULTURAL OPERATIONS CLEANING AND THINNING

- **Demarcation and Treatment Prescription :**

Demarcation : The coupe due for closure to grazing will be demarcated one year in advance, by cutting 3 metre wide lines and erecting pillars at suitable intervals.

Treatment prescribed: Each year about 200 ha. area suitable for fodder development will be selected from out of the coupes and developed for fodder either by removal of obnoxious weeds and unwanted grasses or through ploughing and seeding of suitable grasses. Depending on the requirement of site, suitable options for fencing can be taken up by DCF.

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, *Hardwickia binata* (Anjan), *Soymida febrifuga* (Rohan), *Accacia nilotica* (Babul), *Accacia leucophloea* (Hiwar), *Zizyphus mauritiana* (Ber), *Ficus glomerata* (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 first 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 protected from fire with the involvement of local people or JFM Committees.

(iii) **Inspections:** The area closed to grazing will be inspected frequently by the Officers in charge to see that the closure is adequately enforced.

SOME OF THE WILDLIFE OF WARDHA

INDIAN FOX



CHAMELEON LIZARD



WOOLLY NECKED STORK



SIRKEER MALKOHA



WHITE BREASTED WATERHEN



BLACK BUCK



Photo credits: Shri Parag Dandge
All Photos from Wardha District

SOME OF THE WILDLIFE OF WARDHA

CLIFF SWALLOW NEST



NILGAI



SPOTTED OWL



INDIAN COURSER



YELLOW WATTLED LAPWING



FAN THROATED LIZARD



Photo credits: Shri Parag Dandge
All Photos from Wardha District

CHAPTER-7

WILDLIFE (OVERLAPPING) WORKING CIRCLE

7.1: WILDLIFE (OVERLAPPING) WORKING CIRCLE: The area covers the whole Division and is therefore not specifically marked on GIS based map.

7.2: GENERAL CONSTITUTION OF WORKING CIRCLE:

Territorial areas of Wardha forest division adjoin the Bor Tiger Reserve and hence have significant wildlife value. These forests are important for corridor management between the P.A.s mentioned above and the adjoining territorial areas. Apart from functioning as crucial corridors, the territorial areas provide space for the spillover population of wildlife from the core zone of protected areas.

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 Wardha 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, 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. Generally the western and northern slopes are better stocked than the drier eastern and southern slopes. The rocks throughout the Wardha Forest Division are Deccan trap, but the soil varies. Geology, soil type and depth plays 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 (MARKED ON GIS BASED MAPS): Entire Forest area of the Division.

7.6: SPECIAL OBJECTIVES OF MANAGEMENT:

- 1) To ensure wildlife (animals & plants found in wild) protection and conservation in the managed forests of this Division.
- 2) To ensure scientific management of wildlife in the managed forests by undertaking measures like habitat management, waterhole development and monitoring population of the wild animals.
- 3) To provide extra space for spill over population from adjoining protected areas.
- 4) To ensure protection of ecologically sensitive and special habitat sites for wildlife conservation, such as riparian zones, mesic sites (natural water seepage sites), perennial water holes, natural grasslands, natural wallows, salt licks, natural resting, breeding and nesting sites (caves snags, overhangs, groves of old Ficus trees, thick Bamboo groves).
- 5) To check wildlife trade and smuggling.
- 6) To promote and encourage ecotourism without disturbing and damaging wildlife.
- 7) To generate awareness among local communities towards the need for biodiversity conservation.
- 8) To protect the wild animals from various diseases.
- 9) To explore the possibility of engineering habitat to reduce man-animal conflict.

7.6.1: ANALYSIS OF THE WILDLIFE IN THE DISTRICT:

The general condition of vegetation has been prescribed in various working circles. The general condition and density of wildlife in the Division is good, however, its distribution is quite uneven. Wildlife population density varies with the habitat depending upon availability of food, water and shelter. The forest of Wardha division has predominance of Teak species. Wildlife commonly found in

the division is as below (detailed list is given in the List of Fauna under Introductions):

A. Carnivores: (i) Tiger (*Panthera tigris*) (ii) Panther (*Panthera pardus*) (iii) Striped Hyena (*Hyaena hyaena*) (iv) Wild dog (*Cuon alpinus*) (v) Jackal (*Canis aureus*) (vi) Indian Fox (*Vulpes bengalensis*) (viii) Leopard Cat (*Felis bengalensis*) (ix) Jungle Cat (*Felis chaus*) (x) Common Mongoose (*Herpestes edwardsi*).

B. Herbivores (i) Bison (*Bos gaurus*) (ii) Nilgai (*Boselaphus tragocamelus*) (iii) Sambhar (*Cervus unicolor*) (iv) Cheetal (*Axis axis*) (v) Barking Deer (*Muntiacus muntjak*) (vi) Wild boar (*Sus scrofa*) (vii) Sloth bear (*Melursus ursinus*) (viii) Four horned antelope (*Tetraceros quadricornis*) (ix) Common Langurs (*Presbytis entellus*), (x) Rhesus Macaque (*Macaca mulatta*), (xi) Bonnet Macaque (*Macaca radiata*).

C. Rodents: (i) Three striped palm squirrel (*Funambulus palmarum*) (ii) Jungle striped squirrel (*Funambulus sublineatus*) (iii) Porcupine (*Hystrix indica*) (iv) Hare (*Lepus ruficaudatus*) and (v) Jungle Rats and Moles.

D. Snakes: Kadu (*Typhlops braminus*), Kawda (*Lycodon aulicus*), Gavtya snake (*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*), Russell's Viper or Ghunus (*Vipera russelli*). Checkered keel back (*Xenochrophis piscator*)

E. Birds: (i) Painted sand grouse (*Pterocles indicus*) (ii) Common sand grouse (*Pterocles exustus*) (iii) Pea fowl (*Pavo cristatus*) (iv) Grey jungle fowl (*Gallus sonnerati*) (v) Red jungle fowl (*Gallus gallus*) (vi) Red spur fowl (*Gallus spadicea*) (vii) Painted partridges (*Francolinus pictus*) (viii) Grey partridges (*Francolinus pondicerianus*) (ix) Jungle bush quail (*Perdica asiatica*) (x) Black breasted quail (*Coturnix coromandelicus*) (xi) Indian Bustard quail (*Turnix suscitator*) (xii) Common or grey quail (*Coturnix spp*), (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*) (xxix) Little Grebe (*Podiceps*

ruficollis (xxx) Cormorant (*Phalacrocorax carbo*) (xxxi) Grey Heron (*Ardea cinera*) (xxxii) Large Egret (*Ardea alba*) (xxxiv) Black ibis (*Pseudibis papillos*) (xxxv) Pariah Kite (*Milvus migrans govinda*) (xxxvi) Shikra (*Accipiter badius*) (xxxvii) India Whitebacked Vulture (*Typs bengalensis*).

7.6.2: SILVICULTURAL SYSTEM: Not Applicable.

7.6.3: ROTATION PERIOD: Not Applicable.

7.6.4: HARVESTABLE DIAMETERS: Not Applicable.

7.6.5: REDUCING FACTORS AND REDUCED 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 THE 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 tribals who never used to kill the animals for fun or pleasure. However, hunting became an important pastime for the Rajas and Maharajas who used to hunt and kill the animals for meat as well as for preparing trophies. In the Reserved Forests, hunting was restricted and licenses were used to be issued for small game, big game, etc. and shooting blocks were set apart, where the animals specified in the license only could be hunted.

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 subsequent amendments in this Act in 1991 and 2002, hunting of any animal included in the Schedules of Wildlife (Protection) Act 1972, (other than vermin), as game or sport, has been completely banned.. Hunting of wild animals however can be allowed for special purposes but only in exceptional circumstances. The maintenance of biological diversity is the new mandate of National Forest Policy, 1988. Restriction of degraded habitats outside the protected areas is one of the strategies for action listed in National Wildlife Action Plan (2002-2016). Therefore, primacies of environmental concerns and biodiversity conservation have been dealt in this chapter.

The wildlife, which used to flourish in the forests of the Division, is threatened due to various factors like population explosion, encroachments, over grazing, regular forest fires, improved network of roads and availability of sophisticated weapons. Due to increase in demand for wildlife products all over the world, poaching problems have increased. 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.

- 1. By Actual Sighting:** In the early morning or evening, near water holes, grazing sites or on the roads, we can see the wild animals.

2. **Pug Marks:** By keen observation of these pug/hoof marks we can identify the category of wild animals, their sex and age.
3. **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.
4. **Antlers Marks (on the stem of tree):** Before falling of antlers, Spotted Deer and Sambars rub their antler
5. **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.
6. **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.
7. **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.
8. **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.
9. **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: 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 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 chocking of breathing organs. The poachers then remove the skin or bones of the dead animal for trafficking.

Setting of nets, snares and traps for catching birds, hares and sometimes small animals like deer has been recorded in the past but of late the poachers have been found using the improvised 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 are degrading very fast and is manifested in the form of reduced population of many animal and bird species. The main factors adversely affecting the wild habitat are:

- Heavy biotic pressures, like over grazing, encroachments on forest lands, large scale human and cattle movement in the forest areas, forest fires etc. are responsible for the general degradation of these habitats.
- Large scale diversion of Forest Land for projects like, irrigation dams and canals are also adversely affecting the wildlife habitat by fragmenting the forest areas and creating barriers for the movement of wild animals on one hand and risk to their lives, specially 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.

Fires: Forest fires are of common occurrence these days. The fires in the interior of the forests, besides destroying the natural habitat of the forest fauna, drive them to take shelter near the human habitation and make them easy targets of poacher's guns or local villager's weapons. Due to fire even the young ones of big and strong animals may perish, besides other animals, reptiles and birds, 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 XLVI. 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 XLVI. The Govt. of Maharashtra, has therefore 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:

7.6.14.1: Standing Order (Wildlife) No. 001.

The PCCF (WL) MS, Nagpur has issued a standing order (Wildlife) No.001. This order prescribes duties and lists measures for the protection and conservation of the wildlife outside PAs. Following are the general prescriptions, majority of which are based on the guidelines under this Standing Order, for the protection of wildlife in the areas outside the Protected Areas. The territorial staff of the Nagpur Division shall scrupulously implement these prescriptions.

1. Duties of Forest Guard, Forester, RFO and ACF include-
 - Keeping information of waterholes, particularly in summer and watch on the same, that is, special vigilance at all the water holes in the Division is prescribed.
 - Keeping a watch on the electric lines passing through forests.
 - Ensuring registration of arms licenses as required under Wildlife (Protection) Act 1972.
 - Cognizance of cases of injury due to wild animals as per Govt. Orders from time to time 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 x 7. Such team should be given need based training. Every Range HQ should contain equipments necessary to handle conflict situations.

2. Nature education programme in the villages adjoining forests and in schools and colleges shall be arranged.
3. Ecologically sensitive habitats shall be identified and protected.
4. Antler trade is now banned; hence, no collection of shed antlers is to be allowed.
5. The involvement of Honorary Wildlife Warden and serious NGOs be encouraged for nature education programme.
6. It will be ensured that cattle grazing in forests near the important wildlife habitats are inoculated against contagious diseases.

7.6.14.2: 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.

7.6.14.3: 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.

7.6.14.4: Habitat Development Works: Due to continuous biotic pressure, the wild life habitat has also deteriorated and today it has reached a critical condition. The most important factors in the habitat are water, food, safe places for resting, breeding, and nesting. Wallows and salt licks are other factors. To meet the minimum requirement of the wild animals the following activities are recommended:

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.

The distribution of waterholes in the areas upto 10 Km from the boundary of protected areas is shown in table below. This exercise was done using GIS software. Grids of 9 Sq. Km were laid on GIS map and the existing waterholes were plotted. The number of Grids with presence and absence of waterholes was counted.

Table No.7.1: Grids with presence and absence of waterholes

Sr. No.	Range	Grids with Water holes			Grids without water holes	Total Grids
		Natural	Artificial	Total		
1	Ashti	6	10	16	7	23
2	Talegaon	10	8	18	3	21
3	Karanja	7	8	15	5	20
4	Arvi	15	5	20	0	20
5	Kharangana	9	4	13	13	26
6	Hingani	2	3	5	9	14
7	Samudrapur	3	4	7	5	12
Total Grid		52	42	94	42	136

From the above table, it is evident that future waterhole development should focus on areas with less waterholes.

D. Food/Prey Base: Whether the prey base is adequate or not shall be ascertained from regular herbivore count. Supplements of cattle kill should be taken into account while computing existing herbivore population. Any downward trend should be looked into seriously and possible reasons for its downslide must be found out and rectifying steps must be taken.

To improve the prey base, care of herbivores should be taken by improving the assured fodder availability in the forest, 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.

F. 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.

7.6.14.5: 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. To protect the wild animals from such contagious diseases, forest department with the help of Veterinary doctors, should take the following preventive measures in such villages:

Vaccination of Village Cattle: All cattle of adjoining villages within 5 KM from the boundary of Protected Areas should be vaccinated every year for important diseases. This activity shall be monitored by the PA manager and also DCF (Territorial).

Regular Health Checkup for Cattle: Forest staff, with the help of veterinary doctor of the area, should organize annual cattle health checkup camps in villages. Required vaccination should be done and if required, proper treatment to sick animal should be given.

Proper Sensitization of Staff: The field staffs of the Division should be trained in day to day wildlife management and protection works. They should work in close cooperation with the Wildlife wing.

Protection from Poaching and Trade: The forest staff shall develop an intelligence system with the help of local people, specially with Joint Forest Management Committee, to gather information about any activities related to poachers and traders of wild life.

- Regular patrolling by the staff shall be carried out in the areas where the population of wildlife is more, specially during summer when these animals become more vulnerable due to shortage of water in the forest areas.

- The forest staff shall also be vigilant in the townsô market where at times birds like Parakeets, Partridges, Quails, Water-Birds, Monitor lizards, Tortoise, Turtles etc. are brought for sale.

Protection of Forest from Over-grazing and Fire: After poaching, uncontrolled grazing and fire are the most important factors, adversely affecting the wildlife. To restrict illegal grazing , by cattle including goat, sheep etc., and during the fire season, to prevent the forest fires, patrolling parties should carry out regular patrolling in the sensitive areas of the forest.

Capacity building: Books related to Wild animals disease, treatment, tranquilization, wildlife management etc. should be supplied to the field staffs to improve their management skills. Short duration training for tranquilization of wild animals, to the forest staff and Veterinary Doctors, shall be imparted.

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 in riparian zone.
- 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

- 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. Special efforts are to be initiated to develop meadows.
- 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 Dy.C.F.Wardha will take special care to motivate and orient the field staff in favour of Wild life through regular meetings, guidance and workshops. Some of the RFOs and Foresters shall be sent to short term training in the Wildlife Institute of India. Besides this help of trained officers and staff of wildlife Divisions may also be taken.

To start the work of habitat improvement some demonstration works and visits to wildlife areas should be carried out to expose the field staff to the technical aspects of Wildlife Management.

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 MTDC for the development of such sites.

- The prominent water-bodies and specific habitat sites in the Division are proposed as sites for creation of Eco-centres with facilities of nature interpretation and eco-tourism and to serve as centres for awareness generation and dissemination of issues and concerns of forestry and wildlife.

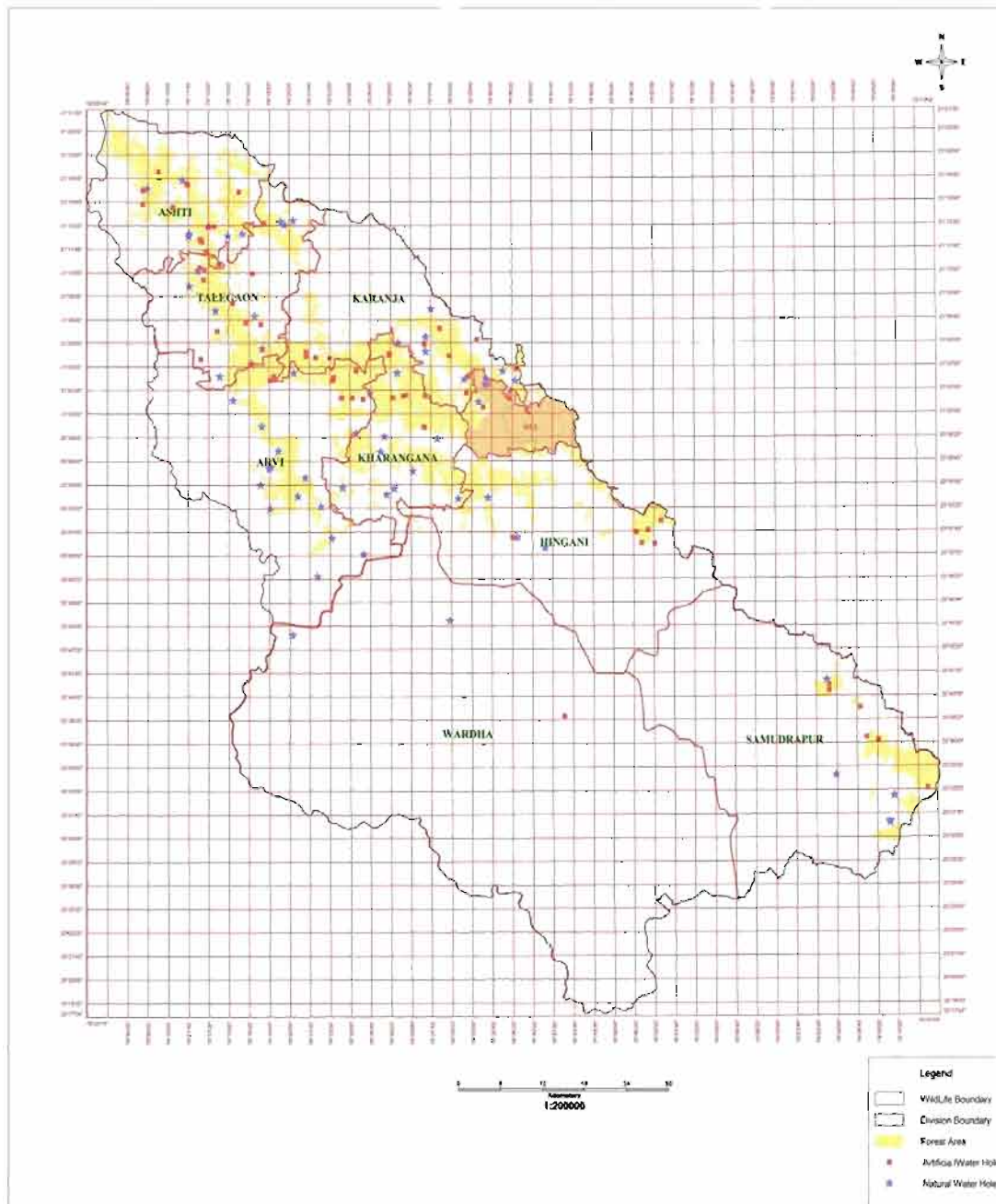
The villages adjoining sensitive sites are proposed to be taken up under eco-development program for their overall development. Eco-development plans shall be prepared with the help of local communities.

It is also prescribed to delineate sacred sites/grooves and worship sites, including, sites for tribal deities with involvement of the local village communities. They are marked on the Division/range maps.

- Archeologically important sites identified as such by the Archaeological Survey of India or the State Department of Culture shall be delineated to serve as focal sites for eco-tourism.
- The Division will maintain record of sacred and cultural sites on a register the "*Register of the Cultural Sites*" and verified and update it annually by an officer not below the Range Forest Officer.
- Awareness generation campaign be taken up to involve local villagers in the wildlife conservation programme. *Village Panchayats* and *JFMCs* shall be involved actively to further the cause of wildlife protection.

Teaching institutions viz. schools, colleges, etc. and NGOs shall be involved through nature camps, wildlife film shows, exhibitions, seminars, competition, etc.

MAP OF NATURAL & ARTIFICIAL WATER HOLE IN WARDHA FOREST DIVISION



CHAPTER-8

NON TIMBER FOREST PRODUCE (OVERLAPPING) WORKING CIRCLE

8.1: NON TIMBER FOREST PRODUCE (OVERLAPPING) WORKING CIRCLE: The area of this Working Circle covers the whole Division and hence not specifically marked on the GIS based map.

8.2: GENERAL CONSTITUTION OF WORKING CIRCLE: This working circle covers the entire forest area of the division. 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. The medicinal plants play a key role in the health support systems in remote villages.

8.3: GENERAL CHARACTERISTICS OF VEGETATION : The forests of Wardha 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, 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. Generally the western and northern slopes are better stocked than the drier eastern and southern slopes. The rocks throughout the Wardha Forest Division are Deccan trap, but the soil varies. Geology, soil type and depth plays an important role in determining the composition and quality of the crop.

8.4: FELLING SERIES, CUTTING SECTIONS AND JFM AREDAS:
Not Applicable

8.5: BLOCKS, COMPARTMENTS AND JFM AREA (MARKED ON GIS BASED MAPS): Entire Forest Area of the Division.

8.6: 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.

8.6.1: 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, 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. The species and girth-class wise distribution of NTFPs is given in the table below:

NTPF WORKING CIRCLE												
Sr. No.	Species	15-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-150	151-up	Total
1	Palas	0.343	9.446	6.201	3.615	1.504	0.765	0.449	0.132	0.026	0.053	22.53
2	Dhaora	0.000	1.821	1.346	1.266	0.712	0.528	0.343	0.422	0.106	0.106	6.65
3	Khair	0.185	7.995	5.594	1.900	0.844	0.106	0.079	0.026	0.000	0.000	16.73
4	Awla	0.000	0.000	0.026	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.08
5	Bel	0.000	0.712	0.765	0.554	0.396	0.106	0.079	0.026	0.026	0.000	2.66
6	Salai	0.000	0.026	0.026	0.264	0.211	0.158	0.106	0.185	0.079	0.053	1.11
7	Mowai	0.000	0.343	0.422	0.290	0.660	0.475	0.317	0.132	0.053	0.026	2.72
8	Behada	0.000	0.053	0.106	0.053	0.079	0.026	0.053	0.026	0.026	0.026	0.45
9	Tendu	0.053	1.240	0.343	0.053	0.053	0.106	0.079	0.053	0.000	0.026	2.01
10	Biba	0.000	0.000	0.079	0.026	0.026	0.000	0.000	0.000	0.000	0.000	0.13
11	Bor	0.053	0.290	0.158	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.55
12	Char	0.000	0.106	0.185	0.106	0.053	0.000	0.053	0.000	0.000	0.053	0.55
13	Chinch	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.026	0.053	0.08
14	Kahu	0.000	0.000	0.000	0.000	0.026	0.026	0.000	0.000	0.000	0.026	0.08
15	Katsawar	0.000	0.000	0.000	0.026	0.026	0.000	0.000	0.000	0.000	0.000	0.05
16	Moha	0.000	0.000	0.000	0.026	0.026	0.000	0.026	0.000	0.053	0.026	0.16
	Total	0.633	22.032	15.251	8.285	4.617	2.296	1.583	1.003	0.396	0.449	56.54

Besides the above mentioned tree species there are many herbs and shrubs found in the forests and need to be properly documented.

8.6.2: SILVICULTURAL SYSTEM: Not Applicable.

8.6.3: ROTATION PERIOD: Not Applicable.

8.6.4: HARVESTABLE DIAMETERS: NotApplicable.

8.6.5: REDUCING FACTORS AND REDUCED AREAS: Not Applicable.

8.6.6: FELLING CYCLE: Not Applicable.

8.6.7: DIVISION INTO PERIODS AND ALLOTMENT TO PERIODIC BLOCK (PB): NotApplicable.

8.6.8: CALCULATION OF THE YIELD: Not Applicable.

8.6.9: TABLE OF FELLING: Not Applicable.

8.6.10: METHOD OF EXECUTING THE FELLING/CUTTING: Not Applicable

8.6.11: SUBSIDIARY SILVICULTURAL OPERATIONS CLEANING AND THINNING: Not Applicable.

8.6.12: REGENERATION: Not Applicable.

8.6.13: ASSPCOACTED REGULATION & MEASURES:

8.6.13.1: OWNERSHIP OF NTFP:

The statutory provisions have vested ownership rights over the listed NTFPS species in the village communities in the Scheduled Areas without granting such rights over the trees and the land. Till recently, this list did not include Tendu, Apta and Bamboo, the prominent NTFP species in this tract. But after the enactment of 'The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006', even these forest produces have been included in the category of NTFP.

The Seventy-third Amendment of the Constitution of India has brought the NTFPs under the management of the Village Panchayat. NTFPs (MFPs) in the state and its sale procedure can be categorised into two parts:

- A) 33 NTFPs (MFPs) in scheduled areas
- B) Other NTFPs (MFPs) excluding 33 NTFPs in scheduled area and NTFPs in Non Scheduled Areas.

A) 33 Minor Forest Produce in Scheduled Areas :

- 1) 'Govt of India passed the Provisions of the Panchayat Extension to the Scheduled Areas in 1996'. In pursuance to this, Govt of Maharashtra passed Maharashtra Act No XLV of 1997, 'Maharashtra Transfer of Ownership of Minor Forest Produce in the Scheduled Areas and the Maharashtra Minor Forest Produce (Regulation of Trade) (Amendment) Act 1997'.
- 2) As per 1997 amendment, 33 Minor Forest Produce found on Govt land in Scheduled Areas; ownership lies with Gram Sabha.

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

1. 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.
2. 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.
3. Excluding the above mentioned areas, DCF can form NTFP units and put for auction. However, mechanism has to be evolved to regulate excess harvesting.

8.6.13.2: NTFP Collection:

The details of NTFP collection is given in Appendix No. LXVII and LXIX. 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 may be many other forest species which yield various products or leaves, flowers, fruits etc. of such trees are of some use or the other including medicinal uses. However systematic information in this respect is not available at present. But such NTFPs should also ideally find their due place in the JFM micro-plan. Proper grading, value addition and exploring new markets for the traditional NTFPs (such as gum), shall be included under the JFM programme of the Division. The possibility of involvement of NGOs in such an endeavour should be explored.

8.6.13.3: 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 Feb-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.

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 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. Involving JFMCs in this exercise would be beneficial as they are the major stakeholders in collecting, processing and sale of NTFPs. To capture such information with uniformity, suitable printed registers be supplied to all JFMCs through the division office.

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

8.6.13.4: Management of Tendu:

Collection of Tendu Leaves: Tendu is the prominent revenue generating NTFP 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 collection of Tendu leaves commences from the last week of April each year and continues up to first week of June. Quality of leaves is a major criteria 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 governed by the policy of the State Govt in conjunction with various Laws presently in force.
- 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.
- 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.

Tendu Regeneration: In view of importance of Tendu to support the livelihood of forest dwelling communities and its economic value for the region, sustainable management and use of Tendu is prescribed to be given added focus.

- Maintenance and improvement of Tendu in the forest crop composition is prescribed by ensuring regeneration of Tendu and its subsequent protection.
- Singling of shoots and soil working around Tendu seedlings is prescribed in the plantation and rootstock areas to promote growth of Tendu seedlings along with the annual coupes in area-specific working circles.

- 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.

8.6.13.5: Management of Mahua:

A. Mahua Collection: There is substantial number of Mahua trees in the forest crop. The villagers in the tract have local system for allocation of collection rights of Mahua flowers and fruits. For better protection of Mahua trees and to increase its stock, 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. This exercise would inculcate sense of ownership and responsibility in protecting the resource. This also indirectly aids in controlling forest fires. Range Forest Officer shall take lead in promoting such practices and also monitor its implementation. Documentation of such steps is necessary to promote the achievements of JFMCs.

B. Mahua Regeneration: It is prescribed to provide soil working along with other planted seedlings during coupe operations of area-specific working circles. Mahua will be one of the species in mixed plantation. Seedlings of Mahua, raised during the previous season i.e. 18 months old, should only be planted in the mixed plantation schemes.

8.6.13.6: 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. The Kullu (*Sterculia urens*), Dhaora (*Anogeissus latifolia*), Salai (*Boswellia serrata*) and Acacia gum (*Acacia nilotica*) are main sources of gums in the area. These gums are used in medicines, chemicals, cosmetics, food industries and incense. Indian Gum, Arabic or babul gum is from *Acacia nilotica* and is of great commercial importance. The gum is used in 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. 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.

Gum extraction: A study was conducted in Wardha division during the preparation of this plan by adopting "Drill Method" for Gum extraction through Ethephon injection. The findings of the study is given below:

Sr.no	Species	Girth Class	Avg Gum Yield per tree in grams
1.	Dhawda	91-105	68
		106-120	108
		121-135	117
		136-150	576
		>150	599
2	Mowai	91-105	278
		106-120	183
		121-135	608
		136-150	522
		>150	600
3	Salai	91-105	8
		106-120	22
		121-135	16
		136-150	74
		>150	109

Tapping Rules for Drill Method:

- The tapping season will commence from November to end of May each year.
- No tree below 90 cm in girth will be tapped.
- Drills of 2 to 3 cm depth (slightly slanting towards base) are made at a spacing of 20 cm at breast height. A tree of 120 cm will have 6 drill holes.
- 1 ml of Ethephon (39%) will be injected in each hole.
- Within 4 to 5 hours of ethephon injection, Gum oozing commences.
- Gum can be harvested as clumps every 15 days.

8.6.13.7: Management of Hirda, Beheda, Aonla, Char and Other NTFPs.

Collection of Hirda, Beheda, Aonla, Char and other NTFPs: Fruits of Hirda, Beheda, Aonla and Char are marketable items. Similarly, fruits, flowers and leaves of certain shrubs and trees are used for variety of purposes. Current level of collection is quite erratic and, therefore, poor indicator of their potential in the tract.

Collection of species, which are not covered under the monopoly procurement by government agencies, should be allowed by the Joint Forest Management Committees or Village Panchayats for better protection of Hirda, Beheda, Aonla, Char trees and to increase its stock, few of the above trees be numbered and these trees be allotted to members of JFM committee. The members of committees who have been assigned with job of protection & nurture of above trees, they should protect them from fire. Range Forest Officer is supposed to monitor this activity of JFM committee regularly and make proper documentation.

Removal of NTFPs shall be within the sustainable limits of production. Felling of trees and lopping of branches shall not be permitted for NTFPs collection. Destructive removal shall not be permitted, in any case. Digging up of plant roots, branch cutting, debarking on a plant will be considered as destructive removal.

Regeneration of Hirda, Beheda, Aonla and Char: Required tending is prescribed where saplings of *Beheda, Aonla and Char* are found in worked coupes, 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.

8.6.13.8: 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 are preferred. Some villagers also collect Broom grass (Jhadu gavat).

Development of suitable grazing sites to the local cattle is a basic demand of local villagers. Therefore, the degraded areas adjoining to villages should be taken up for fodder plantations with the active involvement of JFMCs. Development of fodder

resources to meet the requirements of local cattle should be a major criteria for performance evaluation of JFMCs.

8.6.13.9: Future Interventions:

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.

CHAPTER-9

JOINT FOREST MANAGEMENT (OVERLAPPING) WORKING CIRCLE

9.1: JOINT FOREST MANAGEMENT (OVERLAPPING) WORKING CIRCLE (1:50,000): The area of this Working Circle covers the whole Division and hence not specifically marked on the GIS based map.

9.2: GENERAL CONSTITUTION OF WORKING CIRCLE:

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

9.3: GENERAL CHARACTERISTICS OF VEGETATION : The forests of Wardha 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, 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. Generally the western and northern slopes are better stocked than the drier eastern and southern slopes. The rocks throughout the Wardha Forest Division are Deccan trap, but the soil varies. Geology, soil type and depth plays an important role in determining the composition and quality of the crop.

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

9.5: BLOCKS, COMPARTMENTS AND JFM AREA (MARKED ON GIS BASED MAPS): Entire Forest Area of the Division.

9.6: SPECIAL OBJECTIVES OF MANAGEMENT: 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.

- To strengthen and empower local institutions for protection and conservation of forest and wildlife resources through people's participation.
- To explore and evolve strategies to generate sustainable employment to local people

9.6.1: ANALYSIS OF THE CROP:

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 45833 ha forest land has been allotted to 185 JFMCs for protection and management.

Table No.9.1: Range wise Area Distribution under JFM Committees

Sr No	Range	No of villages adjoining to forests	JFM Committees formed	Area allotted to the committees (ha)	Plantation undertaken		
					Name of scheme	No of JFMCs	Area Planted
1	Arvi	32	32	6495	State JFM	1	30
					Campa	1	30
					FDA	2	50
					Vidharbh Vikas	5	100
2	Kharangana	22	22	6553.49	State JFM	2	60
					Campa	1	30
					FDA	2	50
					Vidharbh Vikas	3	75
3					State JFM	3	80
					FDA	4	100
					Vidharbh Vikas	5	125

Sr No	Range	No of villages adjoining to forests	JFM Committees formed	Area allotted to the committees (ha)	Plantation undertaken		
					Name of scheme	No of JFMCs	Area Planted
4	Ashti	31	31	6707.92	State JFM	2	60
					Campa	1	30
					Vidharbh Vikas	6	150
5	Karanja	33	33	4957.95	State JFM	1	30
					Campa	1	30
					Vidharbh Vikas	2	50
6	Hingni	23	23	6632.471	State JFM	3	115
					Campa	2	60
					Vidharbh Vikas	2	50
7	Samudrapur	13	13	3861.38	State JFM	2	60
					Vidharbh Vikas	2	50
8	Wardha	2	2	65.08	State JFM	1	20
Total		185	185	45833.7		54	1435

9.6.2: SILVICULTURAL SYSTEM: Not Applicable.

9.6.3: ROTATION PERIOD: Not Applicable.

9.6.4: HARVESTABLE DIAMETERS: Not Applicable.

9.6.5: REDUCING FACTORS AND REDUCED AREAS: Not Applicable.

9.6.6: FELLING CYCLE: Not Applicable.

9.6.7: DIVISION INTO PERIODS AND ALLOTMENT TO PERIODIC BLOCK (PB): Not Applicable.

9.6.8: CALCULATION OF THE YIELD: Not Applicable.

9.6.9: TABLE OF FELLIN: Not Applicable.

9.6.10: METHOD OF EXECUTING THE FELLING/CUTTING:

NotApplicable.

9.6.11: SUBSIDIARY SILVICULTURAL OPERATIONS CLEANING AND THINNING: Not Applicable.

9.6.12: 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.

9.6.13: ASSOCIATED REGULATION & MEASURES:

9.6.13.1: Background of the Joint Forest Management:

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 neighborhood should in no event be permitted at the cost of national interest. Such policy of managing forest only in larger national interests, overlooking the basic needs of local communities did not succeed and forests were degraded as a result of over use.

Forest 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 Deptt. Memorandum of Understanding (MOU) is signed between Forest Deptt. and managing committee clearly specifying the duties and responsibilities of both parties. Entitlement of FPC members to the share in forest produce is subject to the fulfillment of conditions of MoU.

The members of the FPC will help in protection and development of forests and 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:

- i) 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, atleast 50% are women. Representation to SC, ST, VJNT will be as per prevailing Govt. norms.
- ii) 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.
- iii) 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 *Gaothan* would be identified for assignment. Apart from degraded forest areas, even dense forest areas can also be assigned to JFMCs.

- iv) Memorandum of Understanding (MoU) will be signed in prescribed format by DCF (T) and JFMC.
- v) Microplan will be prepared by the JFMC and would be approved by the DCF. All JFM activities should be taken up as per the approved microplan. The microplans are to be dovetailed with the broad prescriptions of the approved Working Plan of the division.
- vi) 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.
- vii) JFMC is authorized to impose penalties on persons involved in forest and wildlife crimes.
- viii) 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.
- ix) The JFMC would be eligible for usufruct sharing from intermediate and final fellings 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.
- x) 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.
- xi) Non forest land available in the village can be included in the JFM programme if the Gram Panchayat agrees to do so.
- xii) 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.

9.6.13.2: Potential Areas for JFM:

The following areas will be suitable for JFM program.

- Areas prescribed under the Afforestation Working Circle.
- Areas under miscellaneous management, especially the Zudpi jungles suitable for afforestation are proposed to be covered under JFM.
- Areas under Grass & Fodder resource management Working Circle are also proposed to be included in JFM.
- Regeneration and protection of NTFP areas and collection, grading, value addition and marketability of various NTFPs in the division are proposed to be given focus for working under JFM program.
- Villages which are adjoining to potential Eco-tourism sites are proposed to be included in JFM programme.
- All potential wildlife areas are to be included in either JFM or EDC programme as per provisions contained in Govt. Resolution.

9.6.13.3: 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 8 JFMCs are covered under FDA Scheme. Therefore, special efforts need to be made to bring more JFMCs under this scheme.

9.6.13.4: 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 are mentioned below:

- (a) 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 “*charaibandi*” and “*ñkurhadbandi*” are eligible for assignment of Village Forests if atleast three criteria are fulfilled.
- (b) The village forests assigned to the village community or the Village Panchayat shall be managed by a committee called as the “*ñVan Vyavasthapan Samiti*” or the Village Forest Management Committee.
- (c) “*ñVan Vyavasthan Samiti*” has to prepare “*ñTen Year Microplan*” by dovetailing with the Working Plan of the landscape and, an “*ñAnnual 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.

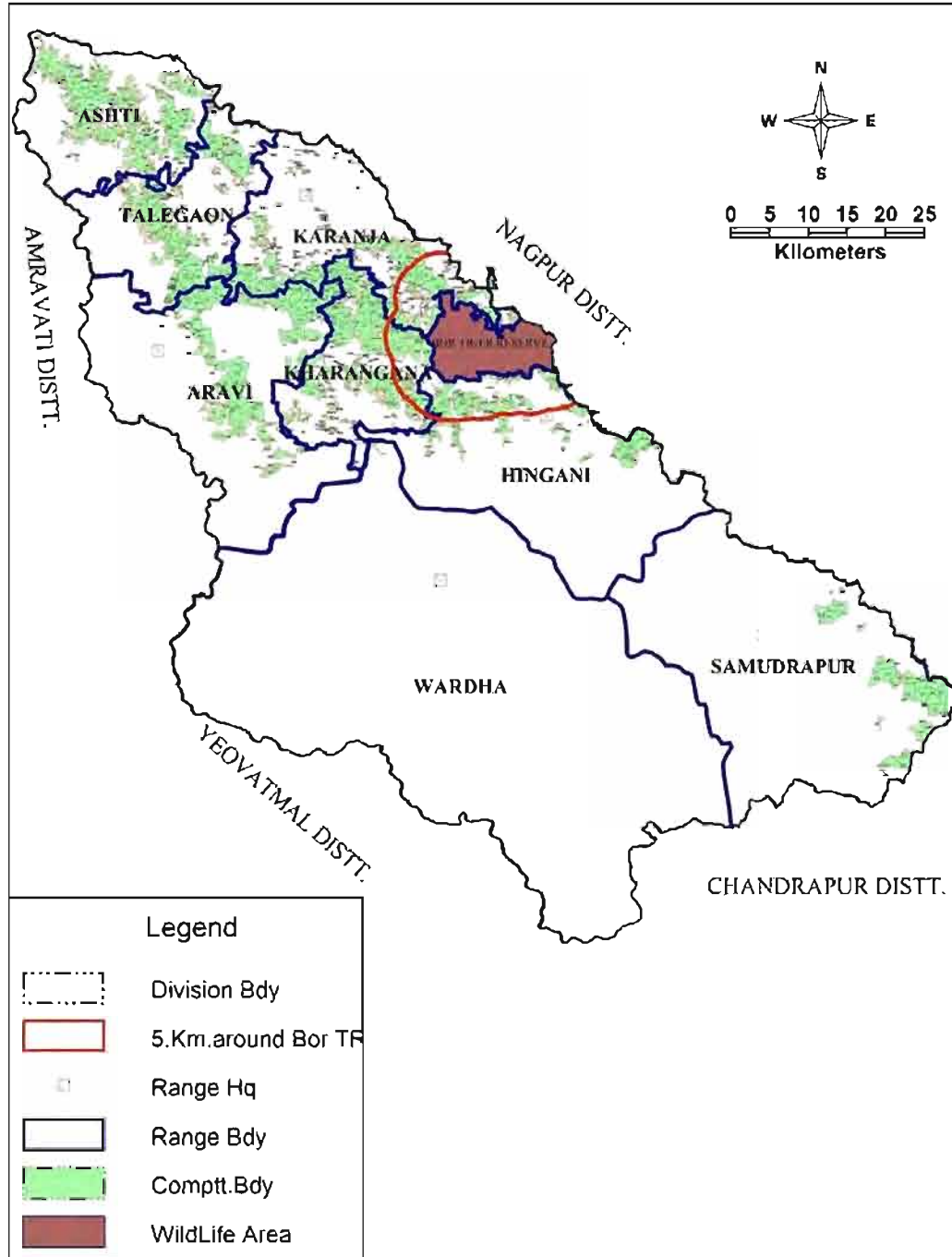
9.6.13.5: General Prescriptions:

- JFM Micro-plans will be prepared for each village through the process of participatory rural approach. Microplans are to be dovetailed with the prescriptions of the approved Working Plan.
- 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 cannot be viewed in isolation. The works depicted in the Microplans should be reflected in the planning process of the Gram Panchayat.
- Wherever required, NGOs be involved for creating awareness programmes.
- 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.
- 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.
- 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.
- 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 grassroots functionaries (FG to RFO) to change attitudes and mindset.
- Dedicated NGOs/Civil society groups can aid the village communities in strengthening JFM institution. Their services can be utilized by the FD in areas of capacity building of JFMCs in microplanning, community motivation, eco-tourism initiatives, evolving models for enhancing livelihoods etc.

- 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.
- 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. JFMCs 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.
- The JFM villages should also be covered with other source of efficient fuel management like Improved Chulhas with help from the Maharashtra Biodiversity Board.
- 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.

MAP OF WARDHA FOREST DIVISION BIODIVERSITY



CHAPTER-10

MANAGEMENT FOR CONSERVATION AND ENHANCEMENT OF BIODIVERSITY

10.1: 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 Wardha.

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.

10.2: General Constitution of Area:- Forest area of whole Wardha division is important from the biodiversity conservation point of view.

10.3: General Characteristics of Vegetation and Biodiversity:-

The forests of Wardha 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 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. The rocks throughout the Wardha Forest Division are Deccan trap, but the soil varies. 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 that for many years though we have noted only 24 species, the same has been increased to 255 species. The same is with the reptilian species, where for the first time the Division has a record of 49 species were recorded. 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.

10.4: Blocks, Compartments and JFM area (marked on GIS based maps):-
Entire forest area in the division.

10.5: Special Objectives of Management:-

1. Document, protect and replenish indigenous vegetation and local ecosystems of the Division.
2. Protect and restore freshwater ecosystems
3. Document and control invasive species
4. Minimize impacts of human interference and other disturbance like fire, grazing, etc. on biodiversity
5. Maintain and record indigenous peoples' ethno-biological knowledge

6. Improve scientific knowledge and access to information about biodiversity
7. Introduce institutional reforms.
8. Sensitize the staff on the issues of Biodiversity for better appreciation and interpretation of the area they work in.

10.6: Analysis of the Crop/Biodiversity:-

10.6.1: The analysis of forest crop of Wardha 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)

Wardha Forest Division have been worked under CWR and CWS systems since 1907 as per the working plan of 1913 to 1934 and after thereafter to 1992-93 to 2001-2002. This has resulted in the overabundance of teak in the forest of Wardha. In view of this the forest are reduced to monoculture in many areas leaving the biodiversity in the area highly impoverished.

To add to this, biotic interference like excessive grazing, illicit felling, overdependence on forest for fuelwood, weed infestation and frequent fires has resulted in the further degradation of the forests. The illegal fellings are 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.

Total Forest area in charge of Wardha Forest Division is 92692.05 ha. As per Wardha FSI report 1997, Inventory of Forest Resources of Wardha district of Maharashtra was brought out by Forest Survey of India. Central Zone, Nagpur in the Year 1997. The salient features of the survey can be summarized as under. The forests of the district can be classified into two strata viz, Teak and Miscellaneous, Teak forest which contains percentage of teak as 57.74% occupies the area of 559.184 KM² whereas Miscellaneous forest is contained in 156.243 Km² of area.

There is a considerable biotic pressure on the forests. 34% of the forests are subjected to injury due to girding and illicit felling and fire incidence was noticed

in 38% of the forest area. About 70% of the forest area is subjected to grazing of different intensities out of which 20.39% of the area is heavily grazed. 78% of the tree forest area is teak forest in which percentage of teak tree is more than 20%. Rest of the area is covered by miscellaneous forest.

10.6.2: Facts - As per this FSI report 'Inventory of Forest Resources of Wardha District' (1997) the findings about the forests of the District shows the condition of the crop and biodiversity status in very poor condition.

Table No.10.1: Crop Composition in Tree Forests of Wardha District

Sr.No.	Forest Type	No.of sample plots	Area (Km ²)	Percentage
1	Teak	68	559.184	78.16
2	Misc.	19	156.243	21.84
Total		87	715.427	100.00

- (i) Dense forest is totally absent in the district and the forest area is gradually converting into open and scrub forests due to heavy biotic pressure. Heavy grazing and soil erosion have been noticed in considerable area.
- (ii) Regeneration is inadequate in 60% of forest area due to biotic interference. Proper steps should be taken to minimize such interference.
- (iii) About 40% of the forest crop is pole crop, big timber is almost absent and only the small sized trees are predominantly occurring in the forests. The crop needs protection so that it could grow well.
- (iv) About one fifth forest area requires to be planted/afforested with suitable species to increase the vegetative cover.

In the light of the above and the observations made in the forest of Wardha it is seen that there is a great need for the restoration of the forests and the replenishment of the biodiversity in the whole Division.

10.6.3: The Species Prone to Exploitation : During the last 10 years, the Forest Division Wardha has booked offence on the killing/trapping of the following

species : Bluebull (Nilgai), Leopard (Chitta), Sloth Bear (Aswal), Hyana (Tadas), Spotted Deer (Cheetal), Barking Deer (Bhedki), Sambhar, Black Buck (Kalvit), Monitor Lizard (Ghorpad), Indian Monitor Lizard (Ghorpad, Sarda), , Hare (Sasa), Indian Black naped hare (Sasa), Monkey (Vanar) ,Red sand boa (Du tonidi sap), Snake (Sap), Peafowl (Mor),Shikra, Ruddy Shelduck, Ibis, Red-wattled lapwing, Laughing dove. However, there is often neglected part the hunting for the quails and partridges in places inhabited by Pardhis which is very essential to be curbed. Hunting of animals in any form needs to be curbed. Unlike tiger and leopards etc which get national and international attention about their presence and threats, the nondescript animals are often neglected by the Department and the public in general. This makes them all the more vulnerable to all forms of overexploitation.

10.6.4: 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 (*Sarcogypscalvus*) and other endangered species like Indian Vulture (*Gyps indicus*) and Steppe Eagle (*Aquila nepalensis*).

10.7: 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 millions 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 Wardha 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 Wardha 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!

10.8: Prescription for the maintenance & Enhancement of Biodiversity.

- (i) Medicinal Plants Conservation Area (MPCA) has been identified in the Wardha Division in Comptt No. 119 Pillapur Beat under Arvi Range. This is an area of 200 ha as an important development for the biodiversity conservation. The DCF should endeavour to involve 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. As the Division already has the list of local medicinal practitioners (LMP) and the species used by them, it shall be the duty of the Division to chalk out the ways and means of sustainable harvest, with or without the consultation with the LMPs, at its own discretion.
- (iii) Sensitization of the staff of Wardha 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 Wardha 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. Pothara Dam is known to be rich in avi-fauna and needs to be studied for further protection. It should be the endeavor 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 JFMô 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 thereto.

Important provisions of the Act:

- (a) Section 2(a) defines the term "Benefit Claimers" as; the conservers of biological resources, their byproducts, 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.
- (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 derogation of, the provisions in any other law, for the time being in force, relating to forests or wildlife.

CHAPTER-11

MANAGEMENT OF FOREST HEALTH AND VITALITY

11.1: 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).

11.2: GENERAL CONSTITUTION OF AREA: Forest area of whole division.

11.3: GENERAL CHARACTERISTICS OF VEGETATION:

The forests of Wardha 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. The rocks throughout the Wardha Forest Division are Deccan trap, but the soil varies. Geology, soil type and

depth plays an important role in determining the composition and quality of the crop.

11.4: SPECIAL OBJECTIVES OF MANAGEMENT:

A) 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:

- (1) Improving the regeneration status of the forest by encouraging seedling origin new regeneration.
- (2) Minimizing the occurrence and impact of forest fire on forest.
- (3) Detecting and containing pests and diseases from defoliators and skeletonisers to all forms of parasites, fungal attacks.
- (4) Ensuring grazing in forest is kept to a minimum.
- (5) Reducing human interference of all forest, from illegal felling, grazing, hunting etc. by enforcing the law & changing moral perception.

B) As the forest of Wardha have been worked for over 90 years under the Coppice with Reserve and Coppice standard system, the presence of teak in most part of forest is more than 80 & the Teak Coppice being third-fourth generation coppice has lost its vigor revitalize the forest the following needs to be done.

- (1) Wherever, regeneration comes up priority for retention and nurturing should be given to seedling- origin regeneration.
- (2) Whenever, NR is done after felling in 'D' areas and afforestation in 'B2' areas, the seedlings under NR and the species under AR should be of miscellaneous species keeping Teak to a maximum of 20 %.
- (3) The choice of species for afforestation in AWC and other plantation should be of miscellaneous and fruit bearing species keeping in barest minimum teak seedlings/stumps.

11.5: ANALYSIS OF THE CROP:

The analysis of forest crop of Wardha 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)

Wardha Forest Division have been worked under CWR and CWS systems since 1907 as per the working plan of 1913 to 1934 and after thereafter to 1992-93 to 2001-2002. This has resulted in the overabundance of teak in the forest of Wardha. Because the teak coppices were given importance and priority, there is no fresh seedling originated trees in the forests. Moreover, as the teak is of third to fourth generation coppice, the general vitality of the crop and its resistance to injuries has been abysmally low. This is evident from the amount of hollowness in the trees in the Wardha forests. Preferential treatment towards teak and other commercially important species over the years has also reduced the forest in many places into almost monocultures which again adversely affect the forest in every area including its growth and production.

To add to this, biotic interference like excessive grazing, illicit felling, overdependence on forest for fuelwood, weed infestation and frequent fires has resulted in the further degradation of the forests. The illegal fellings are 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 forest health.

Total Forest area in charge of Wardha Forest Division is 92692.05 ha. As per Wardha FSI report 1997, Inventory of Forest Resources of Wardha District of Maharashtra was brought out by Forest Survey of India, Central Zone, Nagpur in the year 1997. The salient features of the survey can be summarized as under.

The forests of the district can be classified into two strata viz, Teak and Miscellaneous, Teak forest which contains percentage of teak as 57.74% occupies the area of 559.184 KM² whereas miscellaneous forest is contained in 156.243 Km² of area.

There is a considerable biotic pressure on the forests. 34% of the forests are subjected to injury due to girding and illicit felling and fire incidence was noticed in 38% of the forest area. About 70% of the forest area is subjected to grazing of different intensities out of which 20.39% of the area is heavily grazed.

78% of the tree forest area is teak forest in which percentage of teak tree is more than 20%. Rest of the area is covered by miscellaneous forest.

11.5.1.: Facts - As per this FSI report 'Inventory of Forest Resources of Wardha District' (1997) the findings about the forests of the District shows the condition of the crop and health status in very poor condition. One can only presume that an area where the forests with little regeneration, overabundance of a single species and subjected to various biotic and abiotic pressure would be in poor health and vitality. The details of the findings area summarised below:

Table No.11.1: Crop Composition in tree forests of Wardha District

Sr.No.	Forest Type	No.of sample plots	Area (Km ²)	Percentage
1	Teak	68	559.184	78.16
2	Misc.	19	156.243	21.84
Total		87	715.427	100.00

- (i) Dense forest is totally absent in the district and the forest area is gradually converting into open and scrub forests due to heavy biotic pressure. Heavy grazing and soil erosion have been noticed in considerable area.
- (ii) Regeneration is inadequate in 60% of forest area due to biotic interference. Proper steps should be taken to minimize such interference.
- (iii) About 40% of the forest crop is pole crop, Big timber is almost absent and only the small sized trees are predominantly occurring in the forests. The crop needs protection so that it could grow well.
- (iv) About one fifth forest area requires to be planted/afforested with suitable species to increase the vegetative cover.

In the light of the above and the observations made in the forest of Wardha it is seen that there is a great need for the restoration of the forests and the improvement of the forest health and vitality in the whole Division.

An important indicator of the vitality of the forests is the presence of the regeneration, as the status of regeneration in the forests represents its future crop. The regeneration of the Wardha Division is extremely poor. A details analysis of the same is given in Chapter 4. The average number of seedlings across the Division is recorded to be only about 73 and this even worse in the Improvement Working Circle, Grassland and Forest Range Management Working Circle and Afforestation Working Circle. In order to tackle this situation, special steps need to be taken and among them is the carrying out of Aided Natural Regeneration in the coupes as prescribed in each Working Circle.

11.6: REGULATIONS AND MEASURES: The biotic factors which have resulted in the degradation of the forests are excessive grazing, frequent fires, illicit felling, overdependence on forest for fuelwood and weed infestation. The illegal fellings are 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, that can stand to grazing and fires. These species are often of low utility. The following factors are discussed individually and special steps to combat and reduce the effect of each factor are required.

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 Wardha 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 Wardha which provides for soil working on 400 seedlings/ha in a coupe is being modified. In the forests of Wardha, **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 or 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 regeneration 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. A model estimate of 100 NR Seedlings and 525 ANR seedlings is attached in the Plan as Appendix No.LXXIX A in order to project cost calculation but actual estimate should be as per actual field condition decided after due survey and evaluation.

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.

7) Diseases and Pests: As discussed in Hollowness, etc. the Conservator of Forest, Working Plan, has initiated study on the content of the hollowness and the same is

given in detail in Para 4.7. This is attributed to many factors like silvicultural systems of CWR and CWS, third-fourth generation coppice crop hence no vigour is left on the teak crop and many factors. The hollowness may also be due to Fungal attack. These reasons may be true, but a scientific investigation is necessary which the DCF should undertake in collaboration with the institutions like ICFRE, and Research Wing of the Department etc.

Eutectonagrandis (Skeletenizer) and *Hyblea peura* (Defoliator) are also commonly observed to affect the teak plants of the Division. Considering that most of the area is dominated by teak, it is necessary that the means of controlling these pests be done as mentioned above for hollowness.

General: Field staff should be made aware of the diseases and their remedial steps wherever possible. Any deceases 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.

CHAPTER-12

CONSERVATION AND MAINTENANCE OF SOIL AND WATER RESOURCE

12.1: 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 necessary 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.

12.2: General constitution of area: Soil and moisture is important in the area of whole division.

12.3: General characteristics of Soil and Water resourced in Wardha: Soil

The National Bureau of Soil Survey and Land Use Planning, ICAR and Deptt of Agriculture, GoM etc have published the 'Soil Resource Atlas, Wardha District' in 2005. The characteristics of the Soils of Wardha District are extracted from this Atlas and discussed below:

Soil Types: Soils are varied in nature. Their extent and development depends on the environmental setting in which they have been evolved. The knowledge on the kinds of soils and their extent is very essential for sustainable land use planning. Soil resource inventory provides this kind of information, obtained through a systematic interpretation of satellite imageries, aerial photographs, field survey, laboratory characterization and cartography. During the systematic survey of Wardha District, it was observed that a great variety of soil (soil families association) occur in the region. The soil family association as obtained (Soil Taxonomy) in the district is given below.

Table No. 12.1: Soil Family Association as obtained (Soil Taxonomy)

Sr. No.	Soil Taxonomy	Local Names	Area	
			Ha.	(%) TGA*
1	Lithic UstorthentsRockout crops	Bardi	6289	01.0
2	Lithic HaplusteptsLithic Haplustepts (Loamy)	Madhyam	143800	22.8
3	TypicHaplusteptsVerticHaplustepts	Madhyam	20406	03.4
4	Lithic UstorthentsLithic Ustorthents	Bardi	87049	13.8
5	TypicUstorthentsLithic Haplustepts	Bardi	36707	05.8
6	TypicHaplusteptsVerticHaplustepts	Madhyam	106125	16.8
7	VerticHaplusteptsTypicHaplusterts	Kanhar	118703	18.8
8	TypicHaplustertsVarticHaplusterts	Kanhar	49315	07.8
9	Chromic HaplustertsTypicHaplusterts	Kanhar	55604	08.8
10	Water bodies		4902	01.0
	Total		628900	100.0

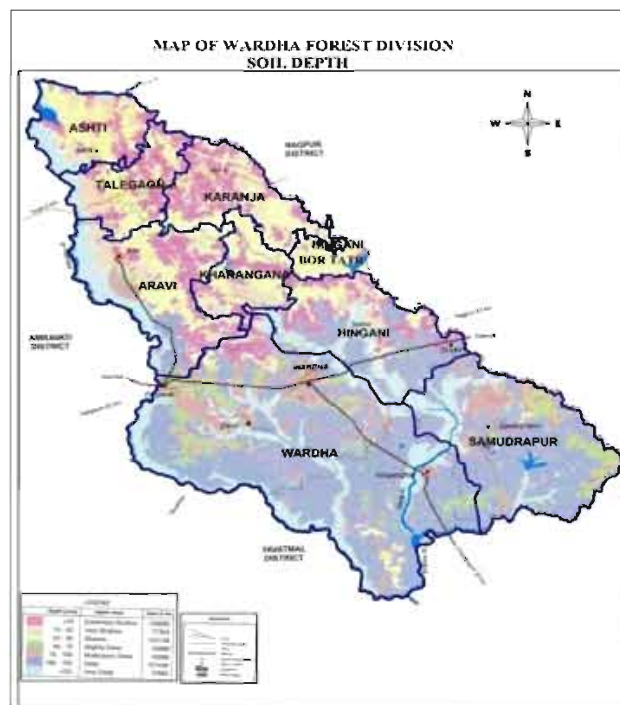
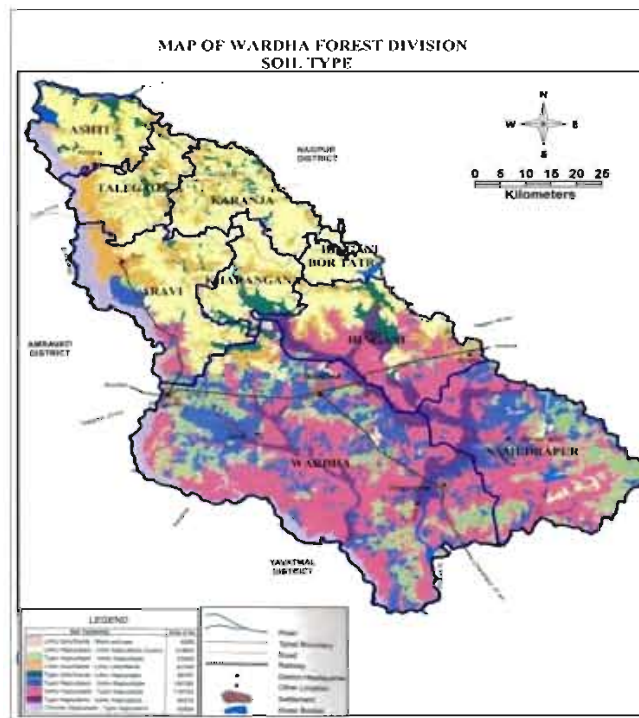
*Total geographical area

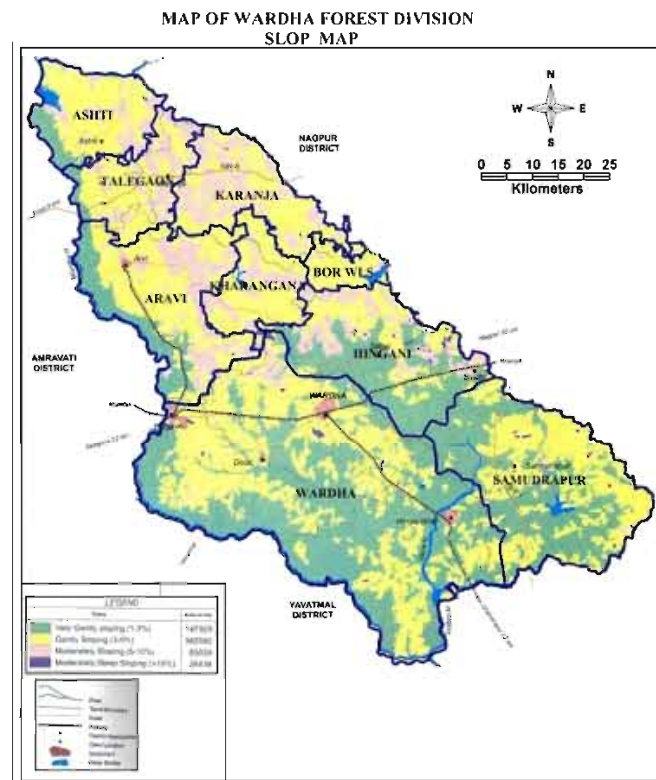
Soil Depth

The soil depth is of vital importance for plant growth as it provides foothold to plant to draw the required water and nutrients from underground sources. As such, the greater soil depth normally results in better forest growth. It takes about 500-1000 years to develop on inch thick soil from the hard basement/rock due to different action & interaction of various soil forming factors and processes. However, a very little time is required to erode this soil if the canopy protection is removed. The depth of soil, therefore, depends on the climate, landform, land use land cover and conditions responsible for management practices. The distribution of soil in different depth classes of the district is given below:

Table No. 12.2: The Soil depth class

Sr. No.	Depth Class	Depth (cm.)	Area	
			Ha.	(%) TGA*
1	Extremely Shallow	<10	126295	20.1
2	Very Shallow	10-25	77343	12.2
3	Shallow	25-50	101136	16.1
4	Slightly deep	50-75	45898	07.2
5	Moderately deep	75-100	45898	07.2
6	Deep	100-150	151448	24.1
7	Very deep	>150	75980	12.1
8	Water bodies	--	4902	01.0
	Total		628900	100.0





Soil Erosion

The soils have been grouped into different erosion classes, their areal extent and expected soil loss is given below:

Table No. 12.3: Different erosion classes

Erosion class	Area		Expected soil loss (tonnes ha ⁻¹ yr ⁻¹)
	Ha	(%) TGA*	
Slight	46508	7.3	5-10
Moderate	473447	75.2	10-15
Severe	104043	16.5	15-20
Water bodies	4902	1.0	--

**Total geographical area*

Slope:

The slope can be defined as an element of the surface inclined to the horizon. A slope possesses a gradient, giving it a direction or orientation in space. The gradient in the terrain is the result of several factors viz. relief, drainage, climate and geology operating in the area.

Table No. 12.4: Class of Slope

Class	Slope (%)	Area	
		(ha)	(%) TGA*
Very gently sloping	1-3	14792	23.5
Gently sloping	3-5	362592	57.6
Moderately sloping	5-10	85039	13.4
Steeply sloping	>15	28438	04.5
Water bodies	--	4902	01.0
Total		628900	100.0

On analysis of the maps as seen above, it is seen that the area falling under forest are highly prone to erosion coming under severe category. The soil depth is very low and is seen to be in most places to be less than 10 centimeters. The slope in the forests areas is comparatively high than any area in the District, which is seen from the slope map above showing areas to be >15% slope. This makes soil and water conservation in the forest area very critical for the filtration of water, the prevention of siltation of dams, the longevity of the live streams, the supply of water, the survival of the dams and every aspect of water regime management.

12.4: Special objectives of management:

- To protect, conserve and improve the forest land forming part of watershed for more efficient water retention and infiltration.
- To protect and enhance the water resource originating from forest lands.
- To check soil erosion and to reduce the effect of sediment yield on the watershed.
- To rehabilitate the deteriorating lands.
- To moderate the floods peaks at downstream areas.
- To increase infiltration of rainwater.
- To improve and increase the production of timbers, fodder and other forest resource.
- To enhance the ground water recharge, wherever applicable.
- Improvement and restoration of soil quality and thus, raising productivity rates.
- Supply and securing of clean and sufficient drinking water for the population
- To minimize the risks of floods, droughts and landslides.

12.5: Associated regulations and measures:

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.

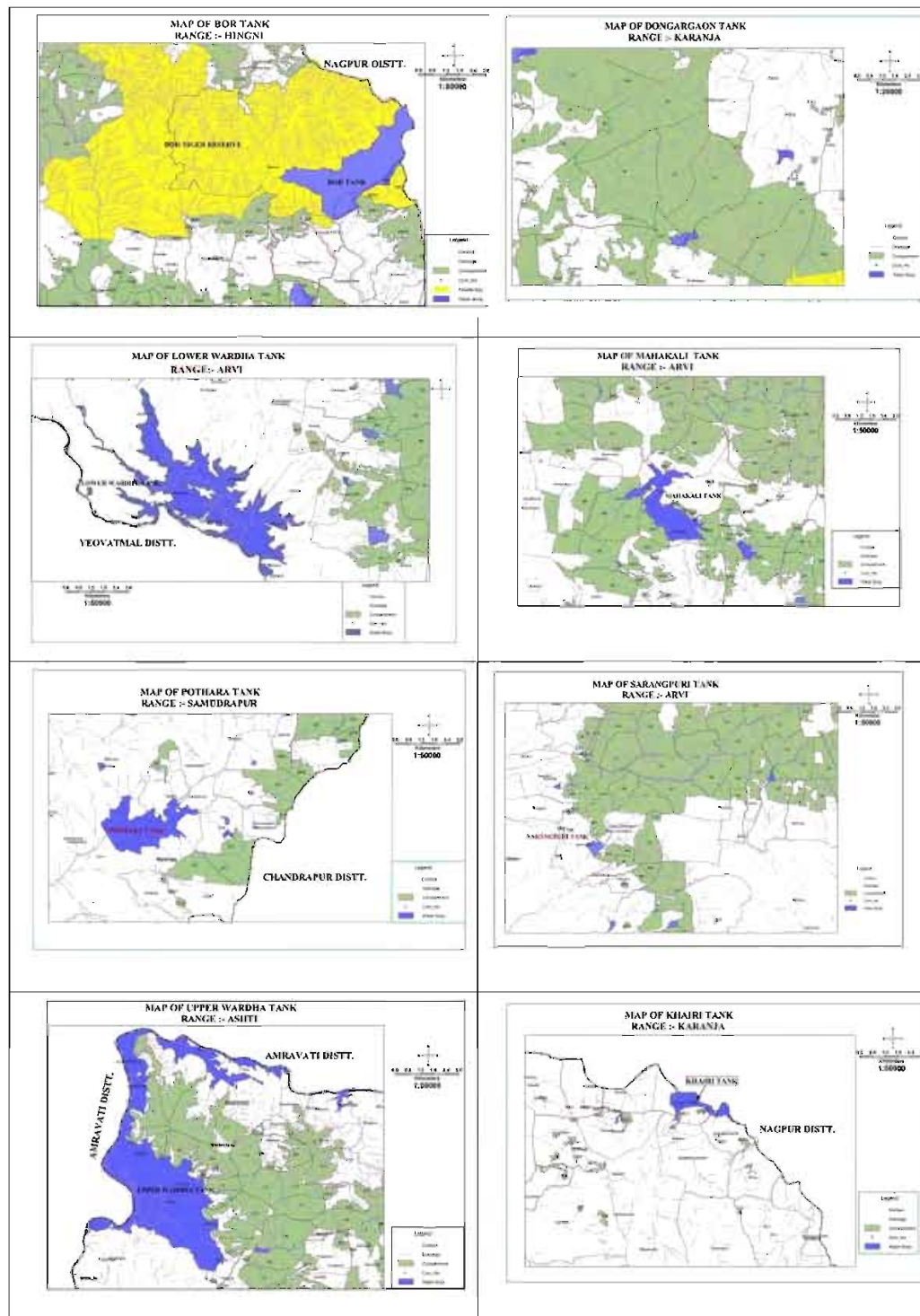
As per the information received from the Division, the following are the major dams that are in or in the vicinity the forest areas of the Wardha Forest Division.

Table No. 12.1: Major dams in or in the Vicinity of the Forest Areas

Sr.No.	Name of Dam	Range
1	Pothara Dam	Samudrapur
2	Bor Dam	Hingani
3	Mahakali Dam	Kharangana
4	Upper Wardha	Ashti
5	Dongargao Tank	Karanja
6	Khairi Dam	Karanja
7	Sarangpuri Tank	Arvi
8	Lower Wardha	Arvi

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 erosion in the slope areas, which should be avoided.

The maps of the above water bodies along with the area adjoining to the forests are shown. This area should be given priority for the treatment of soil and water conservation.



2. Soil Conservation as part of Coupe Work

(i) Nala Bunding 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.

In the Wardha Division there are 8 Projects have been constructed for the irrigation or other purposes. So maintenance of dams is very important. Most of the catchment areas of thesedam covered by forest areas. In order to avoid siltation in the Dam, SMC work should be carried out in the catchment areato control the soil erosion. SMC structures like, Continuous Contour Trench (CCT), Loose Boulder Structure (LBS), Gabian Structure, Water Absorption Trench (WAT), Forest ponds, Wandoha, Cement plug, Earthen Nala Bund ets. can be taken as per site specification.

Table No.12.2: Details of CCT models as given below :

Sr. No	Model No	Slope %	Distance Between CCT	Length of CCT	CCT/ Ha.	Excess water Drain out from CCT (gap)	Length of CCT including Gap (Mtr)	Unit of peac hing Sqmt	Gully plugging (Unit m ³)	Seed Kg.	Agave
1	5	0 to 4	10	-	1000	-	1000	-	20	10	1200
2	6	4 to 8	8	50	1179	3	1250	-	20	11.79	1400
3	7	8 to 15	6	30	1514	3	1666	-	20	15.14	1700
4	8	15 to 33	4	20	2174	3	2500	-	20	21.74	2400

* **Source:** As per Maharashtra Govt. Water conservation Department, No.-2013/F.N.114/Water-7, and Dt.10 October, 2013.

(iii) 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.

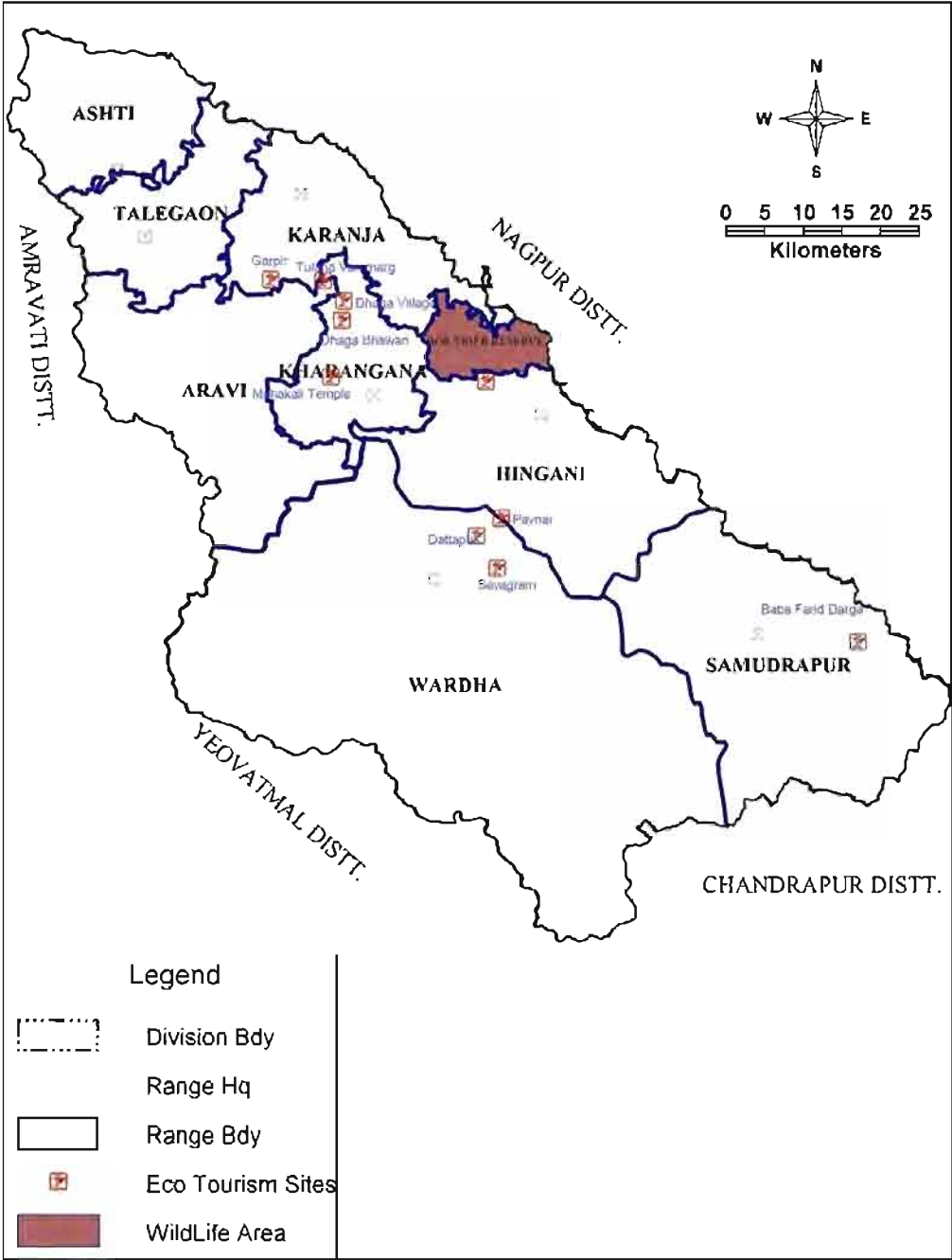
(iv) Other Measures: These include:

(i) 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.

(ii) 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.

12.5.1: 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. Whenever possible, the norms as given in the above CCT models above should be followed.

MAP OF WARDHA FOREST DIVISION
ECO-SITES & ECO-CIRCUITS



CHAPTER-13

MANAGEMENT OF THE SPIRITUAL, CULTURAL ASPECT OF FORESTS AND ECOTOURISM

13.1: 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, the Isopanishad, 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 similies 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/ch/ch11.php>)

SACRED GROVES

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 Wardha 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 bengalensis*) 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.

13.2: 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:

- Minimize physical, social, behavioral, and psychological impacts.
- Build environmental and cultural awareness and respect.
- Provide positive experiences for both visitors and hosts.
- Provide direct financial benefits for conservation.
- Generate financial benefits for both local people and private industry.
- Deliver memorable interpretative experiences to visitors that help raise sensitivity to the sites' environmental and social importance.
- Design, construct and operate low-impact facilities.
- 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 highlights 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 stakeholders, capacity building of stakeholders, Information, Education and communication, selection of eco-tourism centers and operationalization of it, formation of "Maharashtra Eco Tourism Promotion Board" to promote ecotourism. This policy laid down principles of Eco tourism as below,
 - The Ecotourism activity should be concise and small for operationalization.
 - It should be proper in view of environmental, social and cultural aspects.
 - It should be proven and worthy of adoption.
 - Participation of local community.
 - It should neither be degrading nor destructive.
 - As per tourist demand but definitely with some restrictions.

This policy entrusts Forest Department to prepare management plan of eco-tourism centers 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.

13.3: POTENTIAL ECO-TOURISM SITES IN WARDHA FOREST DIVISION.

Wardha 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. 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 No. 13.1: Eco- sites and Eco-Circuits of Wardha Division

Sr.No.	Range	Eco-Tourism Place	Division	Distance in Km.
1	Wardha	Gitai Temple	Wardha	3
2	Wardha	Magan Sangrahalaya	Wardha	2
3	Wardha	H.Q. Rashtrabhasha Prachar Samiti -Hindi Vishw Vidyalaya	Wardha	4
4	Wardha	Grampayogi Vigyan Kendra, Dattapur	Wardha	6
5	Wardha	Bapukuti Sevagram	Wardha	10
6	Wardha	Vinoba Bhave Ashram,Pawnar	Wardha	8
7	Samudrapur	Farid baba Darga, Girad	Wardha	65
8	Hingani	Ganpati Temple,Kelzar	Wardha	25
9	Hingani	Vishwa Shanti Stup,Kelzar	Wardha	25
10	Hingani	Bor Wildlife Sanctuary & Bor Dam, Bordharan	Wardha	35
11	Kharangna	Dhaga Bhawan, Dhaga	Wardha	40
12	Kharangna	Mahakali Temple & Dam, Mahakali	Wardha	30
13	Kharangna	Van Darshan Marg,Tulana	Wardha	45
14	Arvi	Sarangpuri Tank, Sarangpuri	Wardha	54
15	Karanja	Garpit, Forest Rest House	Wardha	45

Other potential sites area Madan Unnai Dharan, Ridhora dam at Hingni Range located inside the forests are also to be explored. Some areas on the fringe of the Bor Tiger Reserve can also be explored for homestay potential.

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.

- À Biodiversity garden, Medicinal Plants gardens, Nakshatra van etc
- À Nature interpretation centers,
- À Adventure Sports,
- À Tent camping,
- À Nature Trail,
- À Observation towers,
- À Camping,
- À Homestay development,
- À Boating,

- À Observation tower,
- À Bird watching,
- À Protection hut.

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 a 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 Donôts 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.

CHAPTER - 14

FINANCIAL FORECAST

There has been a steady increase in the funding to the Working Plan activities of the Forest Division in the past two years. This increase is a good sign and needs to be maintained. Looking into the prescriptions of the Plan, it is seen that the implementation of this Plan will incur an average amount of Rs.2709.30 lakh annually in the first three years and Rs.2584.30 lakh annually for the next seven years that is from the fourth year onwards. The total expenditure will come to Rs.26218.06 lakh. The expected revenue from the implementation of the Plan is Rs.1438.55 lakh annually. The expenditure and revenue of the Division during the last ten years is given below:

Table No.14.1: Statement showing the Revenue, Expenditure & Surplus

Year	Revenue (Rs in lakh)	Expenditure (Rs in lakh)			Total expenditure (col. 3+4+5)	Surplus (+) or Deficit (-) (Rs)
		Conservancy & Works (Rs in lakh)	Establishment (Rs in lakh)	Plan (Rs in lakh)		
2004-05	268.24	82.6	371.18	77.68	531.46	-263.22
2005-06	723.19	63.49	404.40	91.32	559.21	163.98
2006-07	552.23	34.9	378.55	96.34	509.79	42.44
2007-08	837.12	88.78	492.49	100	681.27	155.85
2008-09	155.28	86.83	589.12	162.46	838.41	-683.13
2009-10	169.52	92.08	762.85	166.92	1021.85	-852.33
2010-11	470.97	184.84	860.93	213.86	1259.63	-788.66
2011-12	588.15	166.28	955.89	437.62	1559.79	-971.64
2012-13	385.14	156.19	1071.69	404.51	1632.39	-1247.25
2013-14	561.29	132.31	1320.74	552.81	2005.86	-1444.57
Total	4711.13	1088.30	7207.84	2303.52	10599.66	-5888.53

Hidden among the cost is the Crop damage cost which has 2543 cases damaging 2301.80 ha and a compensation of Rs. 10730061/-. Similarly there were 164 cases of human attacks for which the compensation is a total of Rs.3160631/-

SOURCE OF FUNDS FOR THE IMPLEMENTATION OF THE PLAN:

The sources of funds during the last Plan were Plan Schemes, Non-Plan schemes, CAMPA, District Plan (DPDC), MNREGA, Special Project Jalyukt Shivar, etc. The implementation of the Plan is going to cost the Division an amount of Rs.11833.22 lakh.

PLAN Funds: From the Plan expenditure statement, as provided by the DCF, for the last 3 years average, the annual Plan funding is Rs. 464.00 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.151.59 lakh per year. This needs to be enhanced if the plan is to be implemented in full.

CAMPA: The CAMPA is an important source of funding. In the Wardha Division, the CAMPA fund between 2011-12 to 2013-14 was Rs. 183.71 lakhs. This can be increased for the core forestry operations for the implementation of the Plan.

District Plan: The District Plan funding for the upgradation of Nurseries, the development of Eco-Tourism sites, etc should be explored.

MNREGA: 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.

Special Projects: State specific and District-specific projects like Jalyukt 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.

BENEFIT COST RATIO: The benefit cost ratio for the implementation of this plan taking the figures of the Ten Years average is 1:1.823. Thus the cost of implementing this Working Plan is expected to be more than the benefit.

This is the B.C.Ratio of only those parts of the tangible benefits that would be directly extracted as per the tables placed below.

As discussed under the Chapter 9 in Para 9.6 "Forest Resource Accounting", if the value of the benefits of the Forest including tangible and intangible is taken into account, the amount that is being derived as benefit far outweighs and exceeds the little investment that will be put in. The value of the benefits derived from the Forests is around Rs.6,14,507 lakhs as per the current rate of NPV value for the Wardha Forest. As the NPV rate is taken for the benefits accruable over the period of 20 years the annual benefit comes to Rs.30725.35 lakhs. This figure as per the new NPV rate proposed is Rs.1285568 lakh but the annual period is variable for various forest types and situations. Hence it is difficult to find the annual benefits.

If this figure of current NPV is taken for the B.C.Ratio calculation, the maths works out as under:

11.718:1 say, 12:1 as per current rate of NPV,
i.e. for every rupee that is invested the returns are twelve times.

FINANCIAL FORECAST

Estimated Annual Expenditure (details) for the Working Plan Implementation in Wardha Division.

Selection-Cum Improvement Working Circle

Expected expenditure during the plan period (Rs. In Lakh)

Sr No.	Particulars of work	Avg. Quantum of work	unit	Man days/ unit	Rate /unit (Rupees)	Annual (Rs. In lakh)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Average (Rs.in Lakh)
1	Demarcation and marking	1643	Ba.	4.5	1198	19.68	19.68	19.68	19.68	19.68	19.68	19.68	19.68	19.68	19.68	19.68	19.68
2	Coupe working																0
2a	Timber harvesting	3519	cum	9.5	2529	88.99	88.99	88.99	88.99	88.99	88.99	88.99	88.99	88.99	88.99	88.99	88.99
2b	Firewood extraction	2346	stack	3.5	932	21.86	21.86	21.86	21.86	21.86	21.86	21.86	21.86	21.86	21.86	21.86	21.86
3	Natural Regeneration ANR+Nursing of naturally occurring seedlings and coppice management etc. in "D" area + B1 area NR 100 + Aided NR 525	822	Ha.	10	2662	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88

Sr No.	Particulars of work	Avg. Quantum of work	unit	Man days/unit	Rate /unit (Rupees)	Annual (Rs. in lakh)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Average (Rs.in Lakh)
3a	PPO/PYO (Pre - planting works)	822	Ha.	207.38	61484	505.40	505.40	505.40	505.40	505.40	505.40	505.40	505.40	505.40	505.40	505.40	505.40
3b	FYO (First year operations)	822	Ha.	91.6	27158	223.23	0.00	223.23	223.23	223.23	223.23	223.23	223.23	223.23	223.23	223.23	223.23
3c	SYO (Second year operations)	822	Ha.	57.49	17045	140.10	0.00	0.00	140.10	140.10	140.10	140.10	140.10	140.10	140.10	140.10	140.10
3d	FYO (Third year operations)	822	Ha.	58.88	17457	143.50	0.00	0.00	0.00	143.50	143.50	143.50	143.50	143.50	143.50	143.50	143.50
4	Soil and moisture conservation works				0.00	0.00											0.00
	100 cum/coupe	1500	cum	0.92	245	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
5	Cutback operation	822	Ha.	6	1597	13.13	0.00	13.13	13.13	13.13	13.13	13.13	13.13	13.13	13.13	13.13	13.13
6	Plantation (Teak/Mix) B2	100	Ha.		0.00	0.00	0.00										0.00
6a	PPO/PYO (Pre-planting works)	100	Ha.	51.93	13825	13.83	13.83	13.83	13.83	13.83	13.83	13.83	13.83	13.83	13.83	13.83	13.83
6b	FYO (First year operations)	100	Ha.	158.70	42250.701	42.25	0.00	42.25	42.25	42.25	42.25	42.25	42.25	42.25	42.25	42.25	42.25

Sr No.	Particulars of work	Avg. Quantum of work	unit	Man days/ unit	Rate /unit (Rupees)	Annual (Rs. In lakh)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Average (Rs. In Lakh)
6c	SYO (Second year operations)	100	Ha.	103.00	27421.69	27.42	0.00	0.00	27.42	27.42	27.42	27.42	27.42	27.42	27.42	27.42	27.42
6d	TYO (Third year operations)	100	Ha.	76.00	20233.48	20.23	0.00	0.00	0.00	20.23	20.23	20.23	20.23	20.23	20.23	20.23	20.23
6e	4th YO (Fourth year operations)	100	Ha.	38.50	10249.855	10.24	0.00	0.00	0.00	0.00	10.24	10.24	10.24	10.24	10.24	10.24	8.40
6f	5th YO (Fifth year operations)	100	Ha.	38.50	10249.855	8.40	0.00	0.00	0.00	0.00	0.00	8.40	8.40	8.40	8.40	8.40	8.40
7	Cleaning	822	Ha.	8.00	21.3	17.50	0.00	0.00	0.00	0.00	0.00	17.50	17.50	17.50	17.50	17.50	17.50
	Total			924.40	256558.88	1321.31	675.31	953.92	1121.44	1285.17	1295.41	1321.31	1321.31	1321.31	1321.31	1321.31	1319.47

Note:-

1. The mandays approved for Demarcation & Marking is for 'D' type areas. However, mandays for 'B' type and 'C' type areas be decided by territorial Dy.CF as per crop condition.
2. Mandays for Fire Protection will be sanctioned after preparing "Fire Protection Plan" for the entire division.
3. The fund requirement will vary as per the prevailing wage rate.
4. The above items are only indicative and not exhaustive. DCF can change the quantity shown as per site requirements.
5. ANR area of 822 ha. shall be carried out as per site conditions requirement and staff Capacity.

Estimated Annual Expenditure (details) for the Working Plan Implementation in Wardha Division

Improvement Working Circle

Sr. No.	Particulars of work	Arg. Quantum of work	unit	Man days/ 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 (RS. In Lakh)
1	Demarcation and marking	962	Ha.	1.5	399	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2	Coupe working (Hygenic Felling) D + B area																
2a	Timber harvesting	0	cum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2b	Firewood extraction	4810	stacks	3.5	932	44.82	44.82	44.82	44.82	44.82	44.82	44.82	44.82	44.82	44.82	44.82	44.82
3	Natural Regeneration	200	Ha.	10													
	ANR+Nursing of naturally occurring seedlings and coppice management etc. in understocked patches	200	Ha.	10	2662	5.32	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52
3a	PPO/FYO	200	Ha.	207.38	61484	122.96	122.96	122.96	122.96	122.96	122.96	122.96	122.96	122.96	122.96	122.96	122.96

Sr. No.	Particulars of work	Ave. Quantum of work	unit	Man days/ 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 (RS. in Lakh)
3b	FYO (First year operations)	200	Ha.	91.6	27158	54.31	0.00	54.31	54.31	54.31	54.31	54.31	54.31	54.31	54.31	54.31	54.31
3c	SYO (Second year operations)	200	Ha.	57.49	17045	34.09	0.00	0.00	34.09	34.09	34.09	34.09	34.09	34.09	34.09	34.09	34.09
3d	FYO (Third year operations)	200	Ha.	58.88	17457	34.91	0.00	0.00	0.00	34.91	34.91	34.91	34.91	34.91	34.91	34.91	34.91
4	Soil and moisture conservation works	200															
	100 cum/ coupe	1000	cum	0.92	245	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45
5	Plantation (Mixe including Bamboo depending upon suitability of site)																
	Teak/Mix Plantation																
6a	PPO/FYO	100	Ha.	51.93	13825	13.82	13.82	13.82	13.82	13.82	13.82	13.82	13.82	13.82	13.82	13.82	13.82
6b	FYO (First year operations)	100	Ha.	158.7	42250	42.25	0.00	42.25	42.25	42.25	42.25	42.25	42.25	42.25	42.25	42.25	42.25

Sr. No.	Particulars of work	Area- Quantum of work	unit	Man days/ 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 (RS. In Lakh)
6c	SYO (Second year operations)	100	Ha.	103	27422	27.42	0.00	0.00	27.42	27.42	27.42	27.42	27.42	27.42	27.42	27.42	27.42
6d	TYO (Third year operations)	100	Ha.	76	20367	20.36	0.00	0.00	0.00	20.36	20.36	20.36	20.36	20.36	20.36	20.36	20.36
6e	4th YO (Fourth year operations)	100	Ha.	38.5	10250	10.25	0.00	0.00	0.00	0.00	10.25	10.25	10.25	10.25	10.25	10.25	10.25
6f	5th YO (Fifth year operations)	100	Ha.	38.5	10250	10.25	0.00	0.00	0.00	0.00	0.00	10.25	10.25	10.25	10.25	10.25	10.25
	Total			907.9	251746	427.04	190.4	286.96	348.47	403.74	413.99	424.24	424.24	424.24	424.24	424.24	424.24

Note:-

1. The mandays approved for Demarcation & Marking is for 'D' type areas. However, mandays for 'B' type and 'C' type areas be decided by territorial Dy.CF as per crop condition.
2. Mandays for Fire Protection will be sanctioned after preparing "Fire Protection Plan" for the entire division.
3. The fund requirement will vary as per the prevailing wage rate.
4. The above items are only indicative and not exhaustive. DCF can change the quantity shown as per site requirements.

**Estimated Annual Expenditure (details) for the Working Plan Implementation in Wardha Division
Afforestation Working Circle**

Sr No.	Particulars of work	Arg. Quantum of work	unit	Man days/ 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 (RS. in Lakh)
1	Demarcation and marking	2193	Ha.	1.5	399	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75
2	Coupe Working (Hygenic Felling)																
2a	Timber harvesting	0	Cum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2b	Firewood extraction	4386	sticks	3.5	932	40.87	40.87	40.87	40.87	40.87	40.87	40.87	40.87	40.87	40.87	40.87	40.87
3	Natural Regeneration	219	Ha.	10													
	ANR+Nursing of naturally occurring seedlings and coppice management etc. in understocked patches	219	Ha.	10	2662	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82
3a	PPQ/FYO	219	Ha.	207.38	61484	134.65	134.65	134.65	134.65	134.65	134.65	134.65	134.65	134.65	134.65	134.65	134.65
3b	FYO (First year operations)	219	Ha.	91.60	27158	59.48	0.00	59.48	59.48	59.48	59.48	59.48	59.48	59.48	59.48	59.48	59.48

Sr No.	Particulars of work	Qty. Quantum of work	unit	Man days/ 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 (RS. In Lakh)
3c	SYO (Second year operations)	219	Ha.	57.49	17045	37.32	0.00	0.00	37.32	37.32	37.32	37.32	37.32	37.32	37.32	37.32	37.32
3d	TYO (Third year operations)	219	Ha.	58.88	17457	38.23	0.00	0.00	0.00	38.23	38.23	38.23	38.23	38.23	38.23	38.23	38.23
4	Soil and moisture conservation works																
	2000 cum/coupe SMC in whole coupe including plantation area	2000	cum	0.92	245	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90
	Teak/Mix Plantation																
6a	PPO/FYO	400	Ha.	51.93	13824	55.30	55.30	55.30	55.30	55.30	55.30	55.30	55.30	55.30	55.30	55.30	55.30
6b	FYO (First year operations)	400	Ha.	158.7	42246	168.98	0.00	168.98	168.98	168.98	168.98	168.98	168.98	168.98	168.98	168.98	168.98
6c	SYO (Second year operations)	400	Ha.	103	27419	109.67	0.00	0.00	109.67	109.67	109.67	109.67	109.67	109.67	109.67	109.67	109.67

Sr No.	Particulars of work	Arg. Quantum of work	unit	Man days/ 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 (RS, In Lakh)
6d	TYO (Third year operations)	400	Ha.	76	20331	80.92	0.00	0.00	0.00	80.92	80.92	80.92	80.92	80.92	80.92	80.92	80.92
6e	4th YO (Fourth year operations)	400	Ha.	38.5	10249	40.99	0.00	0.00	0.00	0.00	40.99	40.99	40.99	40.99	40.99	40.99	40.99
6f	5th YO (Fifth year operations)	400	Ha.	38.5	10249	40.99	0.00	0.00	0.00	0.00	0.00	40.99	40.99	40.99	40.99	40.99	40.99
	Total			907.9	251700	821.97	245.39	473.85	620.84	739.99	780.98	821.97	821.97	821.97	821.97	821.97	821.97

Estimated Annual Expenditure (details) for the Working Plan Implementation in Wārdha Division
Grass & Fodder Resource Management Working Circle

Sr No.	Particulars of work	Arg. Quantum of work	unit	Man days/ 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 (RS. In Lakh)
1	Demarcation of coupe	1587	Ha.	0.5	133	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11
2	Deep Ploughing in 10 Ha Area suitable for grass land	40	Ha.	0	2000	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
3	Seed broadcasting in July	40	Ha.	2.5	666	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
4	Enclosure	40	Ha.	0	30000	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
5	Removal of shrub growth & weeds	200	Ha.	5.00	1331	2.66	2.66	2.66	2.66	2.66	2.66	2.66	2.66	2.66	2.66	2.66	2.66
	Total			8	34130	17.83	17.83	17.83	17.83	17.83	17.83	17.83	17.83	17.83	17.83	17.83	17.83

Estimated Annual Expenditure (details) for the Working Plan Implementation in Wardha Division

Protection Working Circle																	
Sr. No.	Particulars of work	Avg. Quantum of work	unit	Man days/ 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 (RS. In Lakh)
1	Demarcation	616	Ha.	1.0	266.2	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63
2	Soil & Moisture conservation work 200 cum/coupe	1400	cum	0.92	245	3.43	3.43	3.43	3.43	3.43	3.43	3.43	3.43	3.43	3.43	3.43	3.43
Total				1.92	511.20	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06

Estimated Annual Expenditure (details) for the Working Plan Implementation in Wardha Division

Boundary Demarcation

Sr No.	Particulars of work	Arg. Quantum of work	unit	Man days/ 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 (RS. In Lakh)
1a	Fixing boundary pillars (Artificial & Natural RF Boundary)	696	pillar	1	266.23	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85
1b	Fixing boundary pillars (Artificial & Natural PF Boundary)	4462	pillar	1	266.23	11.87	11.87	11.87	11.87	11.87	11.87	11.87	11.87	11.87	11.87	11.87	11.87
1c	New Demarcation of Zudpi Jungle, Aquired Pvt. Forest, Non Forest Land for C.A. and undemarcated Protected Forest	6807 Ha./ year	Ha.	10 Pillar/ Ha.	15000 /Ha.	1021.00	1021.00	1021.00	1021.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total			12	15532.46	1034.72	1034.72	1034.72	1034.72	13.72	13.72	13.72	13.72	13.72	13.72	13.72	13.72

Estimated Annual Expenditure (details) for the Working Plan Implementation in Wardha Division

Wild life (Overlapping) Working Circle

Sr No.	Particulars of Work	Total Quantum of work	Unit	Man days /unit	Rate/ unit Rs. in Lakh	Total amount Rs. in Lakh	Year- 1		Year- 2		Year- 3		Year- 4		Year- 5	
							No. of water hole	Amount Rs. in Lakh	No. of water hole	Amount Rs. in Lakh	No. of water hole	Amount Rs. in Lakh	No. of water hole	Amount Rs. in Lakh	No. of water hole	Amount Rs. in Lakh
1	Preparation of Water Hole	42	No. of Water Hole		2.75	115.50	5	13.75	5	13.75	4	11.00	4	11.00	4	11.00

Year- 6		Year- 7		Year- 8		Year- 9		Year- 10	
No. of water hole	Amount Rs. in Lakh	No. of water hole	Amount Rs. in Lakh	No. of water hole	Amount Rs. in Lakh	No. of water hole	Amount Rs. in Lakh	No. of water hole	Amount Rs. in Lakh
4	11.00	4	11.00	4	11.00	4	11.00	4	11.00

Abstract of Yearwise Requirement of Funds for Implementation of Working Plan (Rs. In Lakh)

Sr. NO	Working Circle /Activity	Year -1	Year-2	Year-3	Year -4	Year -5	Year-6	Year -7	Year-8	Year-9	Year -10
1	Selection cum Improvement	675.31	953.92	1121.44	1285.17	1295.41	1321.31	1321.31	1321.31	1321.31	1321.31
2	IWC	190.4	286.96	348.47	403.74	413.99	424.24	424.24	424.24	424.24	424.24
3	Afforestation	245.39	473.85	620.84	739.99	780.98	821.97	821.97	821.97	821.97	821.97
4	Grass & F.R.M.	17.83	17.83	17.83	17.83	17.83	17.83	17.83	17.83	17.83	17.83
5	Protection	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06
6	Boundary Demarcation	1034.72	1034.72	1034.72	13.72	13.72	13.72	13.72	13.72	13.72	13.72
7	Wildlife (Overlapping) W.C. (Water hole Management)	13.75	13.75	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
	Grand Total	2182.46	2786.09	3159.36	2476.51	2537.99	2615.13	2615.13	2615.13	2615.13	2615.13

Note:-

The requirement for funds will vary according to prevailing wage rate.

Revenue Forecast of Wardha Forest Division

Sr. No.	Working Circle	Approximate Expected yield (Annual)								Avg. Unit Price in Rupees (As per Schedule of Rates)							
		Timber		Beat		Poles		Bamboo		Timber		Beat		Pole		Bamboo	
		Teak	Non Teak	Teak	Non Teak	Teak	Non Teak	Long Bamboo	Bamboo Bundle	Teak	Non Teak	Teak	Non Teak	Teak	Non Teak	Long Bamboo	Bamboo Bundle
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	SCI	2815.00	704.00	1408.00	938.00	5000.00	1000.00	0.00	0.00	30000.00	5000.00	3000.00	1200.00	200.00	50.00	0.00	0.00
2	IWC	0.00	0.00	2886.00	1924.00	1800.00	200.00	0.00	0.00	40000.00	5000.00	3000.00	1200.00	200.00	50.00	0.00	0.00
3	AFF WC	0.00	0.00	2632.00	1754.00	0.00	0.00	0.00	0.00	40000.00	5000.00	3000.00	1200.00	0.00	0.00	0.00	0.00
Grand Total		2815.00	704.00	6926.00	4616.00	6800.00	1200.00	0.00	0.00	120000.00	15000.00	9000.00	3600.00	400.00	100.00	0.00	0.00

Sr. No.	Working Circle	Approximate Annual Revenue (Rs. in Lakh)								Grand Total
		Timber		Beat		Pole		Bamboo		
		Teak	Non Teak	Teak	Non Teak	Teak	Non Teak	Bamboo	Bamboo Bundic	
19	20	21	22	23	24	25	26	27	28	29
1	SCI	1126.00	35.20	42.24	11.25	10.00	0.50	0.00	0.00	1225.19
2	IWC	0.00	0.00	86.58	23.08	3.60	0.10	0.00	0.00	113.36
3	AFF WC	0.00	0.00	78.96	21.04	0.00	0.00	0.00	0.00	100.00
Grand Total		1126.00	35.20	207.78	55.37	13.60	0.60	0.00	0.00	1438.55

Note:-

The expected Annual Revenue would vary as per the prevailing market prices.

CHAPTER-15

MISCELLANEOUS REGULATION

15.1: BOUNDARY DEMARCATION:

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. Areas which are undemarcated should be attended on priority.

Objectives:

1. To maintain territorial integrity of forestlands in the division by delineating their boundaries by permanent pillar marks to act as legal boundary marks.
2. To ensure effective protection of the forest resources of the entire division against adverse influences.

Approach to the Forest Demarcation:

1. Well-defined forest boundary is a prerequisite for effective forest protection and its sustainable management. However, in some PF the forest boundary has not been demarcated as given by DCF in Appendix XX and this need to be carried out in the first 3 years of the implementation of the Plan. 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. Forest boundaries adjoining private land shall receive the highest priority to ensure protection of these areas.
2. 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 the area. Hence, examination of record, collection of authentic maps and demarcation of the area is essential for the entire Zudupi Jungle within three years. Entire area under Zudpi jungle should be demarcated on priority within a period of **3 years** from the start of this plan. The Zudpi jungle areas which are situated in the boundary of Municipal Corporation or Nagar Parishad are vulnerable for non-forestry activities and

hence, depending on the vulnerability, suitable method of demarcation should be adopted.

3. Fixing Boundary of the Erstwhile Forest villages

15.2: 1/5 BOUNDARY DEMARCATION: It is prescribed to work the entire boundary of Reserve Forest & Protected Forest in 5 years period. Details of the compartment boundary for the purpose are given in **Appendix No. XVIII.**

15.3: ROUTINE BOUNDARY MAINTENANCE:

1. The Beat Guard after his personal inspection of the entire compartment must submit the 'Compartment Inspection Certificates' every month. The certificate must record forest encroachments, illicit cutting and condition of forest boundaries including pillar numbers and inter-pillar visibility conditions. Separate certificate should be submitted for each compartment.
2. The Round Officer should submit similar certificates for his inspections. Half of his certification should involve checking of the work done during the previous month by the Beat Guards in his jurisdictions, and the other half should involve checking of the compartments not reported by the Beat Guards during the months. He should also submit monthly report regarding the action taken on the forest offences recorded and the progress of forest enquiries entrusted to him.
3. The Range Forest Officer can allow the delay not exceeding 15 days for reasons recorded in writing. Default on this account for consecutive 2 months should be viewed as dereliction of duty and should attract disciplinary action.
4. The Range Forest Officer should check accuracy of the 'Compartment Inspection Certificates' according to the prescribed norms covering each round. He should personally check at least 2 (two) vulnerable compartments other than those covered by the Beat Guards and the Foresters during the previous month.
5. The Range Forest Officer, Mobile Squad will co-ordinate cross-checking of 'Compartment Inspection Certificates'.
6. These guidelines shall be applied along with other directives issued for the forest protection from time to time. Other field officers will carry out their

field inspections according to these guidelines as modified from time to time. As per Maharashtra Forest Manual 2012, duties of Forest Guard, Round Forest officers, Range Forest Officer as well as ACFs shall be applied along with directives issued for the forest protection.

15.4: 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, Chief Conservator of Forests is empowered to give sanction to the design of the pillars. However, May 2001 instructions referred to as above have given uniform specification for this purpose. Accordingly 1.40-meter long cement concrete pillars at roughly 50 meters interval on the external forest boundaries will be erected. Wherever the external boundary is shared with other government land, the interval should be increased to 100-150 meters and intermediate pillars may be 0.90 meter long. Both types of pillars should be embedded to 0.40-meter depth in the cement-concrete base. The prescribed tapering cross-section of the 1.40-meter pillar is 0.10 x 0.15 meter at the top and 0.15 x 0.23 meter at the base. The 0.90 - meter pillars are parallel pipe with 0.15-meter width and thickness. As per review of forest staff work is very poor for cement concrete pillars. Most of the cement concrete pillars get broken for removal of steel bar by local people. Hence Protection for pillars becomes essential.

15.5: 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. Interspaces between the large stones should be filled in with small stones, and the outer stones will be wedged with stone chips. A cairn will be 1.20 meter high, and have 1.20 meter top diameter and 1.80 meter base diameter, as described in the Central Province and Berar Forest Manual. A slab stone (0.20 x 0.20 x 0.90 meter) or a timber stake projecting 1/2 (half) meter in the centre will be fixed firmly on the top of the cairn, and marked with cairn serial number. Each boundary marks (cairns) must be visible from its neighbouring ones on both sides. Distance between two

consecutive boundary marks should not exceed 250 meters. The cairn stone or post should be colour washed white for the open forests and red for the closed forests. The cairn tops should have direction of boundary lines shown by the same colour lines radiating from the centre. Such Cairns can be made of earthen mass, where stone boulders are not available.

15.6: RECORDING LOCATIONS OF THE BOUNDARY PILLARS OR CAIRNS:

The location of the boundary pillars and Cairns along with their numbers should be shown on the maps. The numbering will follow the convention communicated by the Chief Conservator of Forests in charge of the land matters. The numbers shown on the topo-sheets will be maintained unless warranted by the compelling reasons. Such reasons must be reduced in writing and entered as a note on the master set of the maps. This master set will be made available to the Working Plan Division for updating the working maps and the digital database with GPS reading. Also register for maintenance of boundary pillars be updated at range and division level.

15.7: CLEARANCE FOR THE BOUNDARY LINE:

Boundary line clearance on the artificial boundaries will follow the standard width as described in the directives on the subject. 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.

15.8: 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.

15.9: 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. He must submit details for work done in each compartment in his *Annual Colour-Wash Report*. The Round officer will carry out sample checking of the report in the manner decided by the Range Forest Officer. Only material cost should be admissible for the purpose.

15.10: REVIEW AND MONITORING OF BOUNDARY DEMARCATION WORKS:

Continuous review and monitoring of boundary demarcation works is absolutely necessary to ensure time bound implementation. Dy.CF Wardha shall get the annual work plan for boundary demarcation prepared from RFOs well in advance and make suitable budgetary provisions. He shall review the implementation of works every month and report the progress to CF, Working Plan on a quarterly basis. CCF (T), Wardha shall review the progress every quarter and instruct for course corrections.

15.11: MANAGEMENT OF PRIVATE ACQUIRED FORESTS:

In Wardha district, 249.12 ha of private acquired forest spread over 23 survey numbers of 7 villages is incharge of Forest Department. Boundaries of these areas are to be demarcated on priority within 3 years. Management prescriptions have been given to this area as per its present status.

15.12: MANAGEMENT OF AREA OF NON FOREST LAND TAKEN OVER FOR COMPANSATORY AFFORESTATION :

In Wardha Forest Division a total of 1327.89 ha. Non Forest Land has been taken over by the Forest Department for Compensatory Afforestation. Boundaries of this area are to be demarcated and secured on priority within 3 years. This area is included in Afforestation Working Circle for the Management purpose.

15.13: DEMARCATION, PREPARATION OF TREATMENT MAP AND MARKING OF COUPE:

Demarcation of Coupe:

1. The annual coupes for harvesting will be demarcated one year in advance, and each coupe, if so required, may 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. 19.1 :

Form No. 15.1

I, ----- R.F.O.
-----certify that I
have personally inspected the demarcation of the coupe No. -----
- in 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.

Date:

Signature of the RFO

3. Demarcation Of Coupes: Annual coupes have been prescribed to be demarcated by cutting and clearing bushy undergrowth on 3 (three) meter wide line and by erecting pillars or posts up to 2 meter height in middle of the cut line at suitable intervals, so as one pillar shall be visible from the other one, except where the coupe boundary runs along streams, fire line or road. The pillars shall bear the coupe number, name of the felling series and the working circle on the side away from the coupe.
4. Selected trees, above 45 cm gbh, at suitable intervals standing on the periphery of the coupe will be given two coal tar bands and a geru band in between after scrapping the loose dead bark. The lower coal tar band will be

at B.H. and the other coal tar band will be 15 cm above it. Just below the lower coal tar band *Tree serial number* in Arabic will be given on the side away from the area of the coupe. The bands and serial numbers of such trees will be maintained in the marking register in, the following, Form No. 19.2.

Form No. 15.2: List of trees on the coupe boundary

Sr.No.	Name of species	GBH (OB)	Remarks
1			
2			
3			

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 Working Circle 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 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.
9. Assessment of Natural Regeneration: At the time of survey and demarcation the staff should also assess the number of Natural Regeneration in the coupe. The actual number obtained by total count or sampling, will decide the number of ANR seedlings that would be required at the time of NR operation as part of the post-harvest works in the coming year. The details in para 15.21 (iii) to (v) should be followed.

15.14: TREATMENT MAP:

1. Immediately, after completion of demarcation of the coupe, Forester will prepare the Treatment map of the coupe under the close supervision of RFO by clearly showing the various Treatment-type areas as prescribed in the chapter 9. The concerned ACF will verify the treatment map and make corrections, if necessary, before submission to the DCF Wardha for approval.

The treatment map will bear the date of preparation by the Range Forest Officer and verification by the Assistant Conservator of Forests.

2. Preparation of treatment map shall 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 RFO, incorporating all the prescribed activities under various treatment-type areas marked on the map, entailing quantum of work involved, estimated amount required and period of operation for each activity. The Work Plan is proposed to be verified by the ACF concerned and submitted for approval to the competent authority.

15.15: MARKING OF TREES FOR HARVESTING.

1. After approval of treatment map, marking of trees for harvesting shall be carried out as per 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 coupes to ascertain proper marking as per prescriptions of working plan as well as to guard against the excessive marking. To ensure this close supervision, a marking certificate in following format is prescribed.

Form 15.3

I, **XXXXXXXXXXXX** RFO, **XXXXXXXXXX**

personally inspected the marking of the coupe No. **XXXX**.. in compartment No **XXXXXX** of felling series **XXXXXX** in **XXXXXX**. Working circle **XXXXXX**.. on dt **XXXX**.. and found that marking of trees for felling has been done as prescribed in the working plan.

Date :

Signature of the RFO

These certificates shall be regularly and frequently checked and verified by ACF as well as 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. The blaze size should be strictly adhered to so as to aid in identification of marked trees at the time of felling.
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, Dhaora and other timber yielding trees 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:

For Tree no. 195

XX (Hammer mark)

1

9

5

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. Remarks column shall

invariably mention about the deformities if any, such as Dead, Top broken, Hollow, severe insect damage etc.

Form No. 15.4: Format for Marking of Trees for Harvesting

Tree Digit No.	Serial No. Coal tar	Name of species	GBH (OB)	Remarks

8. Abstract of trees marked for felling will be made in 15 cm girth classes. Timber, poles and firewood trees will be shown, separately.
9. Malformed trees alone will be recorded as fuel trees, except that of teak. A tree will be classified as fuel tree only when it is incapable of yielding any useful sawn timber or pole.

15.16: FOREST PROTECTION

Status of forest offence cases: The Range Forest Officer, the Assistant Conservator of Forests and the Deputy Conservator of Forests will take review of forest offence cases at least once, every month. Shifting of boundary marks along the forest boundary shall be viewed seriously, and the adjoining landholders or encroachers would be charged in the court for omission or commission causing obliteration of the forest boundary. Charges regarding all cases of forest encroachments must be submitted before the Judicial Magistrates within 3 months. Similar time-bound action is recommended in all cases of timber theft. All cases of violation of the Forest (Conservation) Act, 1980 shall be dealt with timely and firmly.

Routine monitoring: The Deputy Conservator of Forests shall personally carry out routine checking of the Range Offence Register and the Round Enquiry Reports in at least 4 Ranges every year. Similarly, the Chief Conservator of Forests shall check these records in at least one Range every year, and circulate the inspection report to all the Ranges.

Regular training: The Deputy Conservator of Forests and the Assistant Conservator of Forests will periodically convene staff meeting to review and

impart training for the boundary management and for effective disposal of offence cases.

Awards and Rewards: Staff who has performed exemplarily in forest protection should be nominated for State and National awards.

JFM activities: JFM activities open up communication channel, discourage forest offences and provide village bodies an opportunity for direct involvement in forest protection. Therefore, JFM activities should be encouraged, and taken advantage of as a workable strategy for effective forest protection.

15.17: FIRE PROTECTION

Fire adversely affects natural regeneration, forest growth, ground flora, soil organisms and site productivity. Effective fire control as prescribed in the plan is essential for the forest development. The division officials and local people should be sensitised about the need of effective fire control. All fire incidences must be meticulously recorded and investigated to assess the damage caused.

Classification of fire control

Class-I (Complete Fire Protection): The Class-I fire control areas include all felling coupes, thinning coupes (six years), plantations (five years), the A-type areas (permanent), forest depots (permanent), forest nurseries (permanent), Special Wild life habitat areas (permanent) and any other areas of special importance decided as such by the Chief Conservator of Forests (Territorial) Wardha.

Class-II (General Fire Protection): The Class-II fire control areas include the remaining areas of the Selection-Cum-Improvement Working Circle as well as any other areas, which deserve this protection in the opinion of the Chief Conservator of Forests (Territorial) Wardha.

Class-III (General vigilance): The remaining forest areas (that is, areas not included in the above two classes) and G and FRM areas are identified as the Class-III fire control areas. Any special measure for the fire protection is not undertaken, but deliberate setting of fire and burning the forest is prohibited.

Fire Control Measures:

1. A fire protection scheme for the entire division shall be prepared before February each year, identifying the watch points (including watch towers), strategic locations, strength of fire watchers at each location, deployment of vehicles, use of wireless sets, supervising of the forest staff and the co-ordination protocol.
2. Each location is proposed to have 5 to 10 persons (24*7) including regular staff and fire watchers. The fire prevention should be treated as a high priority item. The scheme should be implemented sincerely during the fire season.
3. Areas deliberately burnt for silvicultural reasons under the sanction of the Chief Conservator of Forests (Territorial) Wardha will be excluded from the fire protection scheme. Fire in such areas need not be reported unless spreads beyond such area.
4. All the Class-I and Class-II areas will have external fire lines and internal fire lines dividing the forest area into convenient blocks. The Class III areas will also have cut and cleared Guide-lines.
5. Fire Watchers and local forest staff will constantly patrol the Class-I and Class-II fire control areas. The directives require that fire in the Class-I areas be reported to the Deputy Conservator of Forests, immediately, along with details of the area burnt and the damage inflicted on the forest crop.
6. The group of fire watchers shall immediately rush to the site and extinguish fire as soon the fire spot is located by upcoming smoke in their area of operation. Modern firefighting tools should be used for extinguishing the fire. The supervising officials should mobilise reinforcement in case of large fire. Utmost care will be taken to quench the smouldering material. Providing a thick layer of soil over such material is generally effective.
7. The fire lines will be kept clear of all growth and combustible material during the fire season. Leaf litter and other dry material on the fire lines

will be collected periodically along the edge and burnt before the fire season starts.

8. The cutting of fire lines should be completed in December. Fire tracing (burning) should be completed in February, and thereafter should require permission of the Deputy Conservator of Forests and physical presence of a gazetted officer.
9. The division office shall maintain a "Register of fire lines," and enter the period of cutting and burning of fire lines. The register will be kept up to date and checked every year, in March.
10. Standard widths of fire lines are prescribed in the Table 19.2. The supervising officer will decide the width unit for carrying out the fire line work on the shared boundary.
11. Establishment of 24*7 Control Room at Range and Division Office by pooling of resources is necessary to swiftly deploy the teams for dousing fires.
12. Fireline cutting and burning works are to be done with the close cooperation of JFMCs. This approach will instil a sense of direct responsibility on the JFMCs to protect forests from fire. This would act as a performance assessment tool for the department to assess the JFMCs. The funds for fireline cutting and burning shall be allotted by DCF to the JFMCs and the concerned RFO would get the works executed from them. This approach will bring a sense of ownership to the JFMCs.

Table No. 15. 2: Standard width of various types of fire lines

Sr. No.	Characteristics of the area	Width of fire line
1	External Reserved & Protected Forests boundary	12 meter
2	Naturally or artificially regenerated areas (For 5 years)	6 meter
3	Remaining coupe boundary	3 meter
4	Both sides of roads and cart tracks passing through the forests	6 meter
5	Timber, bamboo and firewood depots	40 meter

13. Negligence in the fire protection by the staff should be taken as dereliction of duties. The supervisory officers have been proposed to, extensively, verify the fire control measures.
14. 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. The staff should be trained in the application of other modern fire-fighting tools also.
15. 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.
16. 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.
17. Fire-fighting Squad: The critical condition of the forests of Wardha 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. This is in line with what is given in

pts. 1,2,5,6 above but with a thrust on fire protection only. The squads shall ensure that no fire incident occurs anywhere in the Division particularly in areas of NR.

15.18: ILLICIT CUTTING

Illicit felling in the forest area is growing at alarming rate. Since the subject is dealt separately according to a series of directives for the purpose, recommendations of this plan are of a little consequence. However, faster communication including vehicle facilities, adequate defence capabilities, frequent training and establishment of forest stations at strategic places are recommended to control illicit felling and wildlife offences. Establishing intelligence network for the purpose is strongly recommended. The Secret Service Fund scheme instituted by the Govt. of Maharashtra should be used to control illicit tree fellings.

In addition to addressing supply-side management by augmenting wood production on forest and other community land, the demand-side management should take up efficient wood utilisation and energy efficient alternatives like smokeless chulhas, biogas, LPG connections, solar cookers, etc.

15.19: FOREST ENCROACHMENT

The causes of forest encroachment should be examined thoroughly and addressed in a comprehensive manner. All the necessary support should be provided, and encroachment should be evicted as early as feasible. The boundary management and standard administrative guidelines will help contain encroachment.

The forest areas under encroachment from 1978 onwards are 268.120 Ha. The efforts undertaken by the division lead to eviction of encroachment in 2.71 ha. The Balance area under encroachment after 1978 onwards is 266.41 ha. **(Appendix LVII).** Renewed and concerted efforts on the part of division staff for eviction of encroachment are proposed on priority basis.

Small isolated patches of the forestland are often neglected and become vulnerable to encroachment. Special care shall be taken to ensure protection of such patches from encroachment.

15.20: SOIL AND MOISTURE CONSERVATION:

The areas adjoining the human habitations, especially, the Protected Forests have become devoid of vegetation by way of illicit cutting, heavy grazing and repeated fires. The compaction of soil reduces percolation of water and the water holding capacity of the soil. Due to these factors, NR of teak and its associates die back before being established as part of future crop.

The soil and moisture conservation is crucial to maintain and improve the site conditions as well as water regime of a given tract. Moreover, extensive silvicultural works have been prescribed in this working plan to regenerate the forests primarily assisting and tending the existing NR and the available rootstock. To ensure the success of these operations in improving the forests, soil and moisture conservation works are of utmost importance.

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, bamboo cleaning and shrub clearance should be used for brushwood check dams to arrest the soil loss.

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 to wildlife.

Nala Bunding 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, 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 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.

15.21: GUIDELINES FOR REGENERATION

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, the causes of failure shall be examined and only after eliminating such causal factors, the area be taken up for raising new plantations with the prior approval of CCF (T), Wardha. B2 type areas in the various working circles i.e. the under-stocked areas with scanty natural regeneration are prescribed to be considered but such areas should specifically be put to above tests before taking up plantation there. In the rest of the under-stocked areas, attempts will be made to encourage natural regeneration.

Broad criteria for regeneration in general have been developed in the foregoing paragraphs.

JFMCs should be involved in all types of afforestation activities.

Tending of Natural Regeneration: Wherever Natural Regeneration exists, it will be given preference to artificial regeneration. It is necessary to encourage natural regeneration considering the existence of sufficient rootstock in majority

of areas and successful experience in its management in the past. Natural regeneration is proposed to be achieved in two ways:

- i) Identifying seedlings and saplings (those having attained a height of 60 cm and occurring roughly at a spacing of 5 m, that is, about 400 seedlings per ha) of valuable species. Growth of these seedlings/ saplings shall be encouraged by way of weeding, singling, soil working and mulching in the same way as in case of plantations.
- ii) The areas devoid of seedlings/saplings of seed origin but containing sufficient rootstock shall be tended (stool dressing, singling, removal of congestion etc.) in favour of valuable species. While doing so, the species, which are less in number in stocking (as indicated by enumeration results) shall however be given preference.
- iii) 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 Wardha which provides for soil working on 400 seedlings/ha in a coupe is being modified. In the forests of Wardha, **Aided Natural Regeneration is a must.**
- iv) 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 or associates of Teak in Teak areas and any miscellaneous species in non-teak areas. 625 seedlings are prescribed to be nurtured through this process in such areas. As the number of natural regeneration seedlings/saplings 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.
- v) 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. A model estimate of 100 NR Seedlings and 525 ANR seedlings is attached in the Plan as Appendix No.LXXIX A in order to project cost calculation but actual estimate should be as per actual field condition decided after due survey and evaluation.

Artificial Plantations: Only the areas neither having sufficient seedlings/saplings of seed origin nor sufficient root stock but are found to be suitable for plantation of suitable species shall be covered under the plantation programme. As far as possible, tall seedlings are to be used in plantations.

Choice of species in artificial regeneration: Naturally occurring local species will be preferred for the plantations.

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 is proposed to compile a comprehensive record 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. In no case, provisions of Forest Conservation Act, 1980 be violated.

15.22: HARVESTING AND DISPOSAL:

Agency for harvesting: The Deputy Conservator of Forests, Wardha shall decide the agency for harvesting in accordance with the applicable policies and regulations. Present policy prohibits the sale of standing trees. Estimation of bamboo yield should be based on actual enumeration carried out a year prior to the beginning of bamboo harvesting.

Disposal at timber depots: Harvested timber and firewood are proposed to be transported to the established forest depots for sale by auction or allocation according to the prevailing policies and guidelines. Bamboos are also sold at these depots. 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 convenient places.

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 special low 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, preferably the round or beat headquarters, so that villagers may not be required to traverse large distance to procure the nistar materials.

15.23: IRREGULAR HARVESTING:

Restriction on irregular harvesting: Irregular harvesting of timber, firewood and other NWFPs is prohibited, except in the following cases:

Harvesting for the fire lines and the transmission line: The Deputy Conservator of Forests may permit felling of trees 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. Creation of new fire lines shall require prior permission of the Chief Conservator of Forests.

Felling for the haulage roads: The Deputy Conservator of Forests may permit felling of trees for the purpose of haulage roads that are temporary in nature, and should be aligned properly to ensure minimum possible felling of trees.

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 approved by the Government of India under the provisions of the Forest Conservation Act, 1980 and as per latest guidelines issued by GOI. from time to time for specific projects. The Deputy Conservator of Forests 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 as per departmental procedures.

Harvesting of dead, fallen and uprooted trees in the 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. If more than 2 (two) such trees per hectare is estimated, proper marking will be carried out. Two dead and fallen trees are required for retention from wildlife conservation. Wood removal will be carried out from the compartment after approval of the Deputy Conservator of Forests. The details of material obtained from each compartment and revenue realised from it will be entered in the respective Compartment History Form. Harvesting of dead and fallen firewood is governed by the nistar rights and privileges as admitted in the *nistar patrak* or directed by the government from time to time. The nistar holders are proposed to be allowed to collect such material directly from the forests on rated passes or in the manner determined by the DCF Wardha through the written directives.

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.

15.24: MAINTENANCE OF THE FOREST LAND RECORDS:

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 affect will be recorded annually in the Form No 1- Register during the month of June.

Forest notification: Zudpi Jungl, Aquaried Pvt. forests and non-forest areas transferred for the compensatory afforestation shall be immediately, proposed for notification as the Protected Forests, and the reservation process shall be initiated with the section 4 notification under the provisions of Indian Forest Act 1927.

15.25: 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 Wardha Forest Division to mark completion of the process.

Along with the reconciliation, the details of land grants (*patta*) issued on the forestland will also be made available to the Wardha Division. The Collector and the Deputy Conservator of Forests shall send the details of all grants or occupancy rights issued since 1980 to the Nodal Officer at Wardha.

15.26: Management of Preservation Plots/Research Plots:

The Preservation Plots / Research Plots which are in existence are to be maintained as per the objectives of the ongoing studies and should not be interfered with during regular coupe working.

CHAPTER-16

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.16.1: list of papers, articles, reports and documents

Sr. No.	Department	Subject
1	FSI (Forest Survey of India)	
	i) SFR 2005	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 2009	
	iii)SFR 2015	2) The Plantation Tree outside forest for the State of Maharashtra (SFR 2015)
	iv) Carbon Statistics of India	Carbon & Forest Eco-system Methodology for the assessment of Forest Carbon, accounting of Forest Carbon Stock.
	v) Inventory of Forest Resources of Wardha Dist.	Wardha Inventory
2	Indian Institute of Forest Management, Bhopal (IIFM)	Net Present Value.
3	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 Wardha District.
4	Control Ground Water Board (CGWB)	Water level data with the long term trend (2001 to 2010) Ground Water Recharge, Ground Water Development.

5	Bahar Foundation	1) Check list of Birds in Wardha District. 2) IUCN Listed Threatened Birds in Wardha District.
6	Preliminary survey of Reptile Fauna of Vidhabha Region, Maharashtra,(Central India) Presented By: Parag Dandge & Ashish Tiple. The 8 th Indian Symposium of Odonatology & Biodiversity 2014 Nagpur.	List of Reptiles found in Wardha Forest Division.
7	iucnredlist.org	IUCN Status of animals.
8	Maharashtra AAR 2014-15	Scheme under the 12 th Five Year Plan
9	Social Forestry Wardha	Information regarding Tree Cover outside forest area.
10	Supreme Court Orders	Honôble Supreme Court order in write petition (202 of 1995) dated 12/09/2000 in interlocutory application No. 424
11	National Bureau of Soil Survey & Land use Planning (NBLSS)	1) Soil erosion classes & their areal extent & expected Soil Loss. (Soil Resources Atlas Wardha District.) 2) Slope, Soil erosion, soil texture maps.
12	J.B. Collage of Science, Wardha	Plant species diversity. (List of Algae, Fungi, Bryophytes, Pteridophytes)
13	Twelfth Five year plan document under Environment, Forestry & Wildlife 209	Five year Plan Target & Goals.
14	Geological Survey of India (GSI)	Rock Formation in Wardha District.
15	DFO, Silvicultural Scientist, Nagpur	Information regarding preservation plot in Wardha Division.
16	Survey of Forest Resources (SOFR), Amravati	Tree Enumeration Data of Wardha Division.

17	Maharashtra Remote Sensing Application Centre (MRSAC)	Village Boundary & Survey No. Data of Wardha District.
18	Proceeding of the workshop of Medicinal practitioners in Wardha Division	List of local practitioners or Vaidya & list of Medicinal Plants in Wardha Division.
19	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
20	Designing Rural Technology Delivery Systems for Mitigating Agricultural Distress: A study of Wardha District By MS Swaminathan Research Foundation and O/o Principal Scientific Adviser to the Government of India, New Delhi	Area of wastelands, crop pattern etc. and soil and moisture conservation related information

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 Wardha 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 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. IN this Plan, information were taken from different sources for Birds, reptiles etc and it is seen that the actual recorded birds in the District rose from 24 in the previous Plan to 255 in the current Plan. As with the Reptiles, earlier recorded species were none but from information available now, it appeared that there are records of the presence of 20 snakes and one tortoise species in the District.

In highlighting the above, it is clear that a Biodiversity Assessment study is very much required for the documentation of the richness of our forests. This is also a prescription for the Biodiversity WC.

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. This is evident from the list of the medicinal plants that have been listed by the Vaidyas of Wardha following the Workshop that was held in the Division. 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.

16.1: 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.

16.1.1: 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 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.

16.1.2: 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 Wardha Forest Division one Preservation Plot was established in the year 2001-12 with the following details:

Table No.16.2: Details of Preservation Plot

Sr. No.	Range	Name of preservation plot	Comptt. No.	Year	Area in Ha.	GPS Reading
1	Kharangana	Kharangana	216	2001-2002	10.00	N-21° 01' 09.0" E-78° 30' 09.6"

In the above preservation plot, 5 plots having size 100x100 meter has been laid down and girth of species have been taken up in each plot in the period 2001-02 to 2014-15. Information regarding species wise girth of the same is submitted herewith.

In this preservation plot 9 sub plots have also been laid down having size 10x10 meter and entry of species in the sub plots have been taken up. The information of the same is also enclosed here with.

16.1.3: Recommendation for the Wardha Division:

The following are the forest types found in Wardha District.

Table No.16.3: Forest Types of Wardha Forest Division

Type	Notation	Type description
Sub-group I. Climax types	5 A	Southern Tropical Dry Deciduous Forests.
	5A/ci	Dry teak bearing forests
	5A/cia	Very dry teak forests
	5A/cib	Dry teak forests
	5A/c ₃	Southern dry mixed deciduous forests
II. General Edaphic types	5/E-2	Boswellia forests
	5/E-5	Butea forests
III. Degradation stages	5/D S 1	Dry deciduous scrub.
IV. 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 5A Southern Tropical Dry Deciduous Forests, there is a need to have such plots also

in the rest of the Forest types found in Wardha Division namely, 5/E-2-Boswellia forests, 5/E-5-Butea forests, 5/D S1-Dry deciduous scrub and 5/ISI-Dry tropical Riverain forest. The work for the identification, plot size, demarcation and data collection should be done with the help and collaboration with the Silviculturist, Pune and his subordinate office at Nagpur.

- 1) The DCF Wardha should survey the area of the Division and identify the area under the above forest types namely, 5/E-2-Boswellia forests, 5/E-5-Butea forests, 5/D S1-Dry deciduous scrub and 5/ISI-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

16.2: SAMPLE PLOTS

For the preparation of this Working Plan a total of 379 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 Division. A total of 50 number of representative plots were chosen taking 10 from each Working Circle and the details are shown below:

Selection of Plots: As the forests of Wardha is of one single forest type of Sub-group 5-A Southern Tropical Dry Deciduous Forests, with a sprinkling of other types, the major variation in the forest is not in the type of the forest but in the attributes (like density, composition, age distribution etc) within the type. As the Working Circles were identified based on these attributes, each Working Circle stands as a representative of the density and composition of the forest, hence the choice of 10 sample plots from each Working Circle. Secondly, the ten sample plots chosen are the most representative for each of the Working Circle in terms of species distribution, age, density and other factors. The list of the Sample plots are given below:

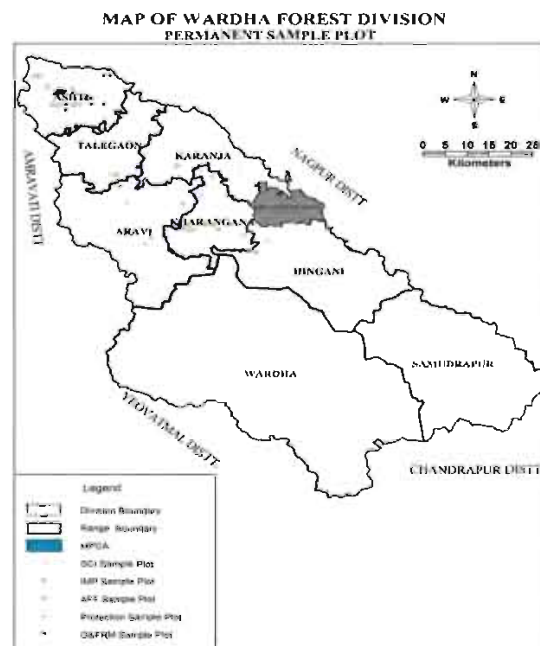
Table No.16.4: List of sample plots

Sample Plot of SCI Working Circle					
S.No	Range	Beat	Comptt. No	Latitude	Longitude
1	Talegaon	Khanwadi	60 PF	21 04 22.0	78 15 37.0
2	Karanja	Rahati	52 RF	21 03 57.0	78 34 22.0
3	Karanja	Joga	55 RF	21 04 47.0	78 32 42.0
4	Kharangana	Dhaga (North)	200 RF	21 03 57.0	78 28 57.0
5	Kharangana	Bangdapur (South)	216 RF	21 01 27.0	78 30 37.0
6	Kharangana	Masod (North)	209 RF	21 01 27.0	78 27 17.0
7	Hingni	Ridhora	260 RF	20 54 47.0	78 36 27.0
8	Hingni	Kelzar	254 PF	20 51 27.0	78 45 37.0
9	Samudrapur	Tadgaon (E)	325 RF	20 34 47.0	79 12 42.0
10	Hingni	Sondi (S)	226/1 PF	20 57 11.1	78 39 45.8

Sample Plot Of Improvement Working Circle					
S.No	Range	Beat	Comptt. No	Latitude	Longitude
1	Arvi	Arvi	141 RF	21 02 42.5	78 16 52.5
2	Arvi	Hiwara	134 PF	21 03 32.05	78 20 12.05
3	Talegaon	Panjara Bangla	136 RF	21 04 22.0	78 16 27.0
4	Talegaon	Panjara Bangla	137 RF	21 03 32.0	78 16 27.0
5	Kharangana	Kachnur	192/3 PF	20 56 27.0	78 26 27.0
6	Kharangana	Mahakali	190 PF	20 57 17.0	78 28 07.0
7	Kharangana	Dahegaon (Gondi)	200/1 PF	21 56 27.0	78 29 47.0
8	Hingni	Akoli	219 PF	20 53 07.0	78 34 47.0
9	Hingni	Akoli	217/1 PF	20 53 32.0	78 33 57.0
10	Hingni	Bori	245 PF	20 56 20.7	78 44 11.9
Sample Plot Of Protection Working Circle					
S.No	Range	Beat	Comptt. No	Latitude	Longitude
1	Arvi	Bedhona	156 RF	21 00 10.4	78 17 40.8
2	Arvi	Kinhala	162 RF	20 55 12.05	78 21 02.05
3	Arvi	Taroda	161 RF	20 54 22.05	78 20 12.05
4	Arvi	Brahamanwada South	172 RF	21 00 12.05	78 25 12.05
5	Ashti	Porgavan	118 RF	21 16 52.0	78 10 37.0
6	Karanja	Nandora	169 RF	21 03 07.0	78 30 12.0
7	Kharangana	Mahakali	198/1 PF	20 57 17.0	78 28 57.0
8	Kharangana	Madna	266 RF	20 55 37.0	78 33 07.0
9	Kharangana	Saheli	199 PF	20 57 17.0	78 31 27.0
10	Samudrapur	Dasoda	271 PF	20 31 27.0	79 11 02.0
Sample Plot Of Afforestation Working Circle					
S.No	Range	Beat	Comptt. No	Latitude	Longitude
1	Ashti	Pilapur West	11 PF	21 16 52.0	78 07 17.0
2	Ashti	Malkapur	27/2 PF	21 14 22.05	78 11 27.05
3	Ashti	Borkhedi	45 PF	21 14 22.05	78 10 37.05
4	Ashti	Khanapur	7/2 PF	21 18 32.0	78 05 37.0
5	Ashti	Khanapur	8/1 PF	21 18 32.0	78 06 27.0
6	Ashti	Sujatpur	16 PF	21 14 22.0	78 08 57.0
7	Ashti	Arvi (Chhoti)	15/1 PF	21 14 22.3	78 08 06.5
8	Karanja	Lingapur	129 PF	21 05 37.0	78 24 22.0
9	Kharangana	Kachnur	165 RF	20 56 27.0	78 25 37.0
10	Samudrapur	Girad	314 RF	20 40 37.0	79 03 32.06

G & FRM Working Circle					
S.No	Range	Beat	Comptt. No	Latitude	Longitude
1	Ashti	Sujatpur	18 PF	21 13 33.4	78 09 46.2
2	Ashti	Pilapur East	119 RF	21 16 02.0	78 08 57.0
3	Ashti	Porgavan	28 PF	21 16 02.0	78 10 37.0
4	Ashti	Dhadi	39/2 PF	21 15 12.0	78 13 07.0
5	Ashti	Kinhi	37 PF	21 14 22.0	78 14 47.0
6	Ashti	Sujatpur	18/1 PF	21 14 22.3	78 09 47.8
7	Ashti	Panchala	26 PF	21 15 12.0	78 12 17.0
8	Ashti	Pandhurna	38/A PF	21 14 22.0	78 13 07.0
9	Ashti	Tarasawanga	29 PF	21 18 32.0	78 14 47.0
10	Ashti	Tarasawanga	30 PF	21 18 32.0	78 15 37.0

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.



16.3: REGENERATION PLOTS:

Selection of Plots: The sample Plots have been surveyed as per the New 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.
- 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.

16.4: NTFP PLOTS:

As stated elsewhere in the Plan, the forest of Wardha have been worked for over hundred years under selective preference to Teak through the Coppice with Reserves and Coppice with Standards. The presence of teak is overwhelming as also mentioned by the FSI report on 'The Inventory of Forest Resource of

Wardha District 1995. As such, the richness in non-timber species in general and NTFP species in particular is not very encouraging. Due to the overabundance of teak and the impact of fire over the years, the ground vegetation is also very poor in most areas. Under these circumstances, the yield of NTFP is negligible.

Yet, the northern side of the Division has some remnants of the original vegetation and in these areas, a Medicinal Plant Conservation Area has been established as per the following details:

Table No.16.5: Details of Medicinal Plant Conservation Area.

Name of MPCA	Division	Range	Comptt. No.	Total Area(Ha.)	MPCA Area (Ha.)
Pilapur	Wardha	Ashti	119 RF	343.18	200.00

Some of the medicinal plant species found in this plot are: *Cassia fistula*, *Phyllanthusemblica*, *Aegle marmelos*, *Terminalia arjuna*, *Acacia nilotica*, *Semecarpusanacardium*, *Tamarindusindica*, *Anogeissuslatifolia*, *Terminalia chebula*, *Eugenia jambolana*, *Acasica catechu*, *Sterculiaurens*, *Madhucaindica*, *Azadirachtaindica*, *Stereospermumsaveolens*, *Gmelinaarborea*, *Holarrhenaanthidysentrica*, *Moringacitrifolia*, *Wrightiatinctoria*, *Vitexnegundo*, *Tribulusterrestris*, *Tridaxprocumbens*, *Argemonemexicana*, *Cleome viscosa*, *Hypitissuaveolins*, *Cymbopogon martin*, *Celastruspaniculatus*, *Abrusprecatorius*, *Tinosporacordifolia*, *Mucunapruriens*, *Gloriosasuperba*.

From the information available from the DCF Wardha, the process of documentation is going on and until such documentation and assessment of the medicinal plants it would not be wise to carry out any kind of experimentation, lest we should cause more harm than good.

It may be worthwhile to mention the FAO website document (<http://www.fao.org/docrep/ARTICLE/WFC/XII/0100-A1.HTM>) dealing with medicinal plants that mention specifically about the harvest of medicinal plants thus:

The vital traditions of sustainability have been ingrained into societies through their emphasis in rituals and their mention in ancient scriptures. For example in Charaksamhita, one of the most important Ayurvedic texts of India, it has been mentioned that the branches and leaves of medicinal plants should be collected in rainy and spring seasons, roots in summer or late winter when the leaves have fallen down or fully matured, barks, tubers and latex in autumn, heartwood in early winter and flowers and fruits according to their season (Sharma, 1994). Further regarding the harvesting of madana(Randiadumetorum) fruits, it has been mentioned-

“These should be collected during the period of transition between spring and summer in pusya, aswini or mrgasivas constellation and maitramuhurta. Those which are unripe, undamaged, non-green, of pale colour, free from organisms, undecomposed, uneaten by animals, not too small (immature) should be taken.”

(Carak Samhita: Kalpasthanam, I.13)

In fact the sustainable harvesting practices do not require any sophisticated or special efforts. Only awareness and certain precautions are required. A few examples may bring out the point-

When the roots of Satawar (Asparagus racemosus) are dug out, the big and small roots are separated. The bigger roots are washed with water, dried and stored. The smaller roots are separated along with the disc and stored in sand in a cool place without washing. These very roots are used as planting material for the next season.

During harvesting of Safed musli (Chlorophytumborivilianum) one or two roots along with the disc are left in the soil. They lie dormant and sprout in the next rainy season, thus naturally propagating itself.

The roots of Nagarmotha (Cyperusrotundus) are dug out in Oct.-Jan. But if only the black roots are taken out and the unripe red roots are allowed to remain in the soil, they sprout again in the next rainy season to produce another plant, thus ensuring sustainability.

In agreement with the above opinion, it is felt that no unnecessary harvesting experimentation may be required but stress should be on creation of awareness and the revival of the conservation traditions that is most required.

Data to be collected: The completion of the documentation and assessment of the medicinal plants in the MPCA area is the first and foremost priority.

Only after the completion of the above, the following experiment may be carried out in the area inside the MPCA:

- Permanent plots of suitable sizes may be laid for development of safe harvesting protocol and the optimum limit of the harvest should be standardized for assured regeneration of the species. The following harvesting regimes may be experimented to work out safe harvesting limit:
 - 50 % harvest of the marketable parts(by leaving 50 % of the whole number)
 - 25 % harvest of the marketable parts(by leaving 75 % of the whole number)
- The plots should be laid in triplicate.
- The plots so treated shall be visited after a gap of one year to enumerate the number of new recruits and the effect of above removal shall be calculated using standard mathematical formulae.
- The above experiment shall be done through the Management Committee of the MPCA.

16.5: OTHER RESEARCH AND EXPERIMENTAL PLOT

There are no seed orchards, clonal seed orchards established in the Division till date. As mentioned earlier in the Plan the Wardha Division has an overabundance of Teak of coppice origin because of its long history of working under Coppice with Reserve and Coppice with Standards. The area of the whole Division however, may be surveyed for the possible establishment of Seed Orchards.

Improved nurseries are already being established throughout the state. It may be mentioned that as of the time of writing of this Plan the polybags are being replaced with root trainers in almost all nurseries. Also, mist chambers, polyhouse, shade nets, compost sheds, vermicompost and other facilities are either established or being established. In the Division, there is a need to institutionalize the creation and maintenance of such nurseries as incidences have happened when relapses to the old technique for the sake of convenience or lack of maintenance.

In order to generate superior quality seeds/ seedlings and planting stock, the Division should also ensure the use of certified source and from known source from the forest Department.

CHAPTER -17

SUMMARY OF PRESCRIPTION

17.1: Introduction:

Wardha Forest Division is situated between 20° 18' to 21°21' North latitude and between 78° 30' to 79° 15' East longitude. The boundary of the Wardha Division is conterminous with the boundary of the Wardha district. The forest areas of Wardha Division occur in compact blocks and some scattered patches. The forest type belongs to the Sub group Southern Tropical Dry Deciduous Forest .The boundaries of the tract dealt with are as shown below.

Sr. No.	Direction	Name of Forest Division / District
1	North and North-East	Nagpur Division/Nagpur District
2	East and South-East	Chandrapur Division/Chandrapur district
3	South and South-West	Yavatmal Division/Yavatmal district
4	West	Amravati Division/Amaravati district

Forests of Wardha division are under scientific management since 1895 when the first working plan of Dobb's was implemented. This Plan replaces the working plan written by Jarnail Singh and S.D. Sontakke.

For Administrative convenience the Ranges, Rounds and Beats were reorganized in year 2006 and the entire division has been divided into 8 Ranges, 39 Rounds and 187 Beats.

17.2: Distribution of the forest area for proposed working plan:-

Sr.No.	Ranges	RF	PF	Zudpi Jungle	Pvt. aquired Forest	Non Forest land taken over for C.A.	Total Area (in ha)
1	Wardha	0	82.04	5971.84	0	0	6053.88
2	Samudrapur	4550.89	1182.52	2962.04	84.91	0	7780.36
3	Hingani	3124.34	4626.48	1560.39	37.01	40.89	9383.17
4	Kharangna	7935.34	6622.20	254.79	0	136.78	14949.11

Sr.No.	Ranges	RF	PF	Zudpi Jungle	Pvt. aquired Forest	Non Forest land taken over for C.A.	Total Area (in ha)
5	Arvi	8999.17	4301.56	988.63	53.21	377.58	14720.15
6	Ashti	5146.73	7581.36	828.70	0	772.64	14329.43
7	Talegoan	6565.76	3738.00	994.94	64.16	0	11362.86
8	Karanja	7723.88	3594.09	1779.35	15.77	0	13113.09
	Total	44046.11	31728.25	15340.68	249.12	1327.89	92692.05

17.3: Distribution of Area to Various Working Circles: The allocation of forest areas under various working circles of the proposed working plan is as under.

Area allocation to different Working Circles

Sr. No.	Name of Working Circle	Area allocated (Ha)
1	Selection-Cum-Improvement	32852.96
2	Improvement Working Circle	19239.01
3	Afforestation	21929.61
4	Protection	12320.57
5	Grass and Fodder Management	6349.90
6	Wildlife (Overlapping)	Entire area
7	NTPF (Overlapping)	Entire area
8	JFM (Overlapping)	Entire area
	Total	92692.05

17.4: The Working Circle wise summary of prescription:

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 Smythies 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:

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
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:

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 óDô type areas Root stock management in óBô 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. Protection Working Circle:**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:

Soil & Moisture conservation works to prevent soil erosion siltation.

5. Grass & Fodder Resources Management 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, areaclosure through enclosures is prescribed.
4. JFMCs to be actively involved.

6. Joint Forest Management (Overlapping) Working Circle:

Prescription:

1. JFM micro plans are to be dovetailed with broad prescriptions of approved working plan.

2. Maintenance of forest boundary, removal of encroachments, control over illicit cutting, illegal grazing, fire and wildlife offences shall receive priority apart from regularly undertaken works such as SMC & Plantations.

3. Transparency in programme has to be ensured through transparent payment mechanisms.

4. Villages which have not received funds should also be accorded importance.

7. Wildlife (Overlapping) Working Circle:

Prescription:

1. Standing Order of PCCF (WL) to be scrupulously implemented.
2. Habitat improvement works like waterhole development, meadow development to be taken up in suitable areas.
3. 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.

8. 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.

9. Miscellaneous Regulation:

1. Boundary demarcation of all un demarcated areas (Entire Zudpi jungle 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. Updation of area registers
6. Where claims are finally rejected, removal of such encroachments.

CHAPTER-18

TREE COVER OUTSIDE FOREST AREA

18.1: 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 Wardha.

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 State of Forest Report 2015, is 1,232.17 sq.kms. This area adds 2.38% to the tree cover of the State. However no specific figure for the Wardha District is available. 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.

The total geographical area of the Wardha District is 6309.00 sq. km. of which 1090.99sq. km. is forest. The total forest cover works out to be just about 13% of the total geographical area. This is way below the targeted 33% forest cover as per the National Forest Policy.

As noted in the Para2.7 in Part I, 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. It is interesting to note that the Department has also carried out the assessment of the success and survival of these plantations in 2005 and the results are very encouraging.

As per its assessment of the above period 1982-2005, out of the planted area of 1298 ha there were 2596 beneficiaries. The number of seedlings planted was 25.33 lakhs. Out of these, the findings are that 6.49 lakhs trees were found have survived/ are standing. These trees are adding valuable tree cover to the District.

Between 2005 to 2015, the Social Forestry Wardha Division carried out Block Plantation for a total of 2710 beneficiaries and planted 1180.3 ha. Area. The total number of seedlings planted were 18.78 lakhs of which the total number of seedling surviving at the time of handing over the scheme was 744397. During the period the Road-side Plantation of a length planted of 664.06 km. with 257145 planted seedling was carried out of which the total of 244447 seedlings survived at the time of handling over the scheme. Hence, the total No. of plants at the time of handling over the scheme is 9,88,844 (744397 + 244447). The assessment of the survival as on date is required to be carried out. The above information has been extracted from the booklet prepared by the Wardha Social Forestry Division where year-wise, scheme-wise and species planted are given. The same is too bulky to be appended,

The Trees Outside Forests need to be assessed by the Social Forestry Division of the District. With the present data already available with the Division, a precise number of trees and forest cover present in the areas outside forests can be arrived at. 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.

18.2: 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 and as for Wardha we have only about 13% of the total geographical area under forest cover. 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 Wardha 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.

18.3: 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:

Agrisilvicultural systems are a combination of crops and trees, such as alley cropping or homegardens.

Silvopastoral 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 **agrosilvopastoral** systems and are illustrated by homegardens involving animals as well as scattered trees on croplands used for grazing after harvests. (Extract from <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).

18.4: Availability of Land for agro-forestry:

As per the assessment of the M S Swaminathan Research Foundation, Chennai in 'Designing Rural Technology Delivery Systems for Mitigating Agricultural Distress: A study of Wardha District', the following is the land-use pattern of the District of Wardha.

Table No. 1 Change in Land-use Pattern in Wardha District, 1961-62 to 2004-05

Three years average centred around the year	Net shown area		Current Fallows		Other Fallows		Culturable Waste Land		Barren unculturable land		Permanent Pasture		Forest area	
	In '00 ha.	%	In '00 ha.	%	In '00 ha.	%	In '00 ha.	%	In '00 ha.	%	In '00 ha.	%	In '00 ha.	%
1961-62	4024.00	63.91	87.73	1.39	132.40	2.10	274.40	4.36	74.00	1.18	519.33	8.25	648.80	10.30
1971-72	4262.00	67.61	67.33	1.07	74.00	1.17	182.33	2.89	68.33	1.08	510.33	8.10	669.33	10.62

Three years average centred around the year	Net shown area		Current Fallows		Other Fallows		Culturable Waste Land		Barren unculturable land		Permanent Pasture		Forest area	
	In '00 ha.	%	In '00 ha.	%	In '00 ha.	%	In '00 ha.	%	In '00 ha.	%	In '00 ha.	%	In '00 ha.	%
1981-82	4171.33	66.12	121.33	1.92	174.33	2.76	142.00	2.25	68.00	1.08	463.00	7.34	671.00	10.64
1991-92	3855.33	61.11	201.33	3.19	246.00	3.90	203.00	3.22	186.00	2.95	459.33	7.28	758.00	12.01
2001-02	3655.00	57.93	624.33	9.90	232.67	3.69	148.33	2.35	107.00	1.70	388.00	6.15	620.33	9.83
2004-05	3650.33	57.86	630.33	9.99	220.00	3.49	155.00	2.46	105.33	1.67	382.00	6.05	624.67	9.90

Note : The percentages are with respect to the geographical area of the district

Source : Data pertaining to 1960-61 till 1997-98 are from EPWRF, 2004 Data pertaining to 1998-99 onward are from Government website, http://nic.in/lus/dt_lus.aspx cited on 17.06.2008

The above table does not add up to the 6309.00 sq. km area of the District and the area shown under forest is also not correct. However, it gives a picture of what area is under fallow (both current and other fallows), area under culturable wasteland and area under Barren uncultivable wasteland which is very much needed figure for assessing the possible expansion and scope of forestry and agroforestry.

Not only is agroforestry possible in the area sown but the area under current fallow and other fallows which is about 850 sq. kms is a potential area for agroforestry under its different types namely, Agrisilvicultural , Silvopastoral and Agrosylvopastoral.

The culturable wasteland and barren unculturable wastelands of about 260 sq. kms is another opportunity that is open for the creation of forest crops that would benefit the local people and ease the pressure on the forests. As envisaged by the National Forest Policy, it is important that the wastelands in any part of the country and in this District should not remain but be transformed into productive lands by way of forestry and agroforestry.

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.

18.5: Roadside/ Canal-side Plantations:

This is an important component of the work of Social Forestry Department and as noted above, during the last ten years the SFD Wardha has taken up Road-side Plantation of a length planted of 664.06 km. with 257145 planted seedling was carried out of which the total of 244447 seedlings survived at the time of handling over the scheme.

With the adoption of the Bihar Model of Roadside Plantation, it is seen that the burden on the SFD staff in taking up such plantation has reduced and that the success of the plantations is also excellent. This rate of plantation could be increased covering more sites and taking up more such plantations in the future.

18.6: Other 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 houndary + crops
- b. Block plantation: Trees + Crops
- c. Energy plantation: Trees + crops during initial year
- d. Alley cropping: Shrubs + crops
- e. Agrihorticulture: Fruit trees + crops
- f. Agrihortisilviculture: Trees + fruit trees + crops
- g. Hortipasture: Fruit trees + pasture/animals
- h. Shelterbelts: Trees +/- crops
- i. Windbreaks: Trees +/- crops
- j. Homesteads: Multiple combination of trees, fruit trees etc.

18.7: Suggestive Steps for the Increase of Area Forestry/Agroforestry

- (a) As per the table above, the identification of the fallow lands, culturable and unculturable wasteland Range/Taluka-wise in agricultural land which is available for taking up afforestation should be done at the District level.

The area under community land should be given priority for plantations.

(b) Drawing up appropriate time specific action plan is essential, which will require the involvement of the Social Forestry Department and the Agriculture Department alongwith the Forest Department

(c) Farmers must be encouraged and motivated by way providing them technical assistance and cooperation by forest department and SFD for taking up planting trees

(d) 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.

(e) 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.

(f) 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.

(g) People's support in forest conservation is to be recognized by the state forest departments. Appropriate extension programmes are to be undertaken to motivate and make them conscious 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.

- (h) 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 buy back arrangements.
- (i) 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.
- (j) The possibility of a Public-Private Partnership in regenerating the culturable wasteland and barren unculturable wastelands of about 260 sq. kms. should be explored. This can also be explored for raising the improved planting material for supply to the farmers.

CHAPTER-19

CONTROL AND RECORDS

19.1: Control and Records:

The following records will be maintained in the Wardha Forest Division Office:

- i. Control Forms.
- ii. Compartment History.
- iii. Plantation Registers.
- iv. Nursery Registers
- v. Divisional Note Book
- vi. Boundary Registers

Control Forms: All control forms and Compartment histories shall be maintained as per the formats prescribed in **Appendix - LXXV and LXXVI** of Volume-II.

The records of all harvesting, subsidiary cultural operations, regeneration works and soil and moisture conservation works carried out as per this working plan prescriptions, will be maintained in the control forms. The prescribed proforma of the control forms have been given in the Volume II of Appendix- **LXXV and LXXVI**.

Two sets of control forms will be prepared. One set will be kept in the division office and the other set will be submitted to the Conservator of Forests Working Plan Nagpur. The Forms will be sent annually by the Deputy Conservator of Forests Wardha Division to the Conservator of Forests Working Plan Nagpur not later than October, 1st. every year taking the necessary entries. All entries showing the deviations from the prescriptions will be underlined in red. The Conservator of Forests, Working Plan, Nagpur will scrutinise it and process further.

19.2: Compartment History:

Compartment histories i.e. the records of various forestry activities and observations made in the past year will be maintained in Forms prescribed in **Appendix- LXXVI.**

Each Compartment must have a separate file for its records. Compartment history must be maintained in the office of Wardha Forest Division 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.Wardha 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 sent to CF, Working Plan for scrutiny.

19.3: Plantation and Nursery Registers: Plantation registers will be maintained for all the areas regenerated artificially as per established departmental procedures.

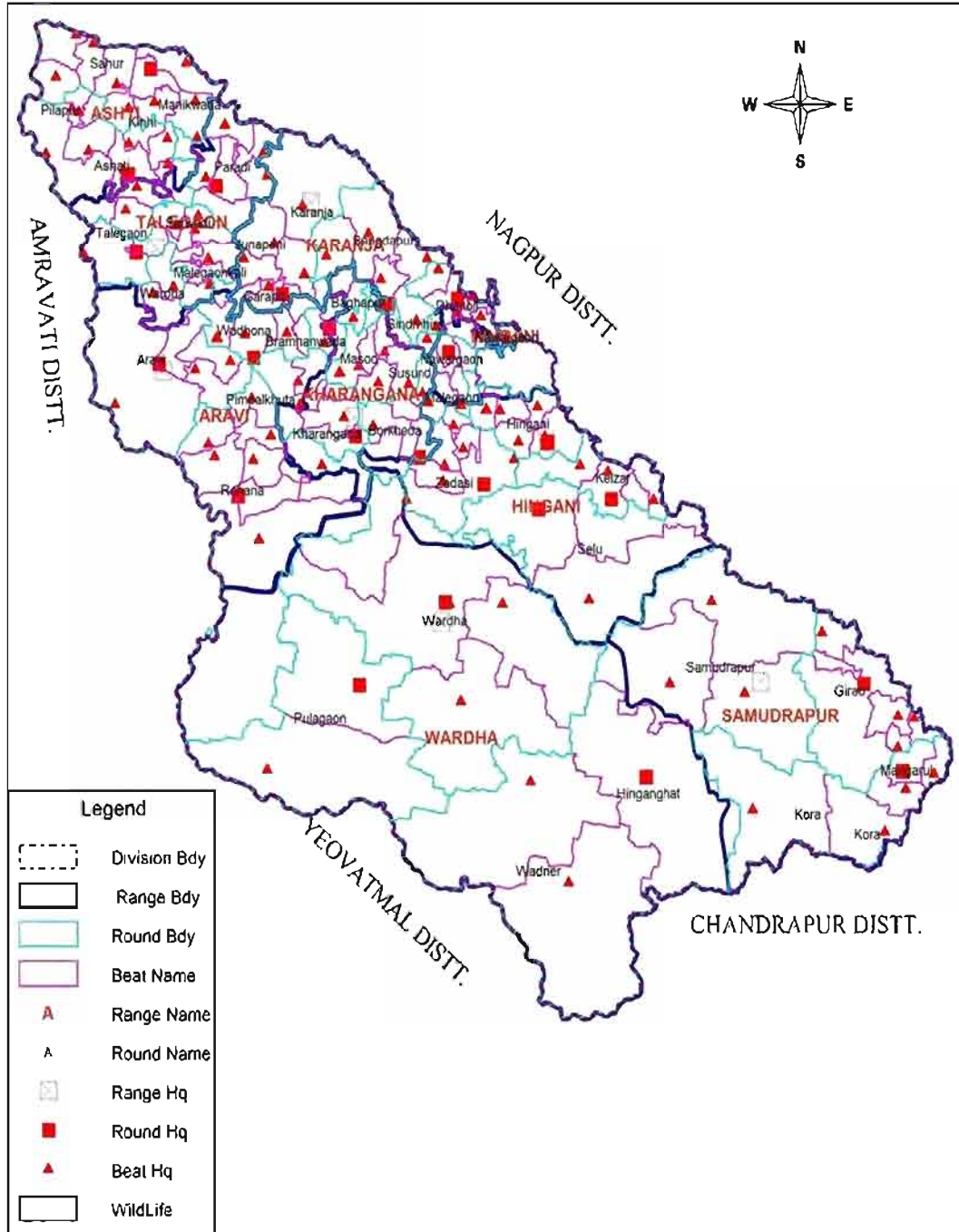
19.4: Divisional Note Book: At divisional level all important matters will be recorded by the DCF every year with his explicit opinions about the working plan operations. A brief note about the plantation will also be recorded by the DCF under appropriate heads.

19.5 Fire Records: They should be maintained as per the latest orders from State Government from time to time.

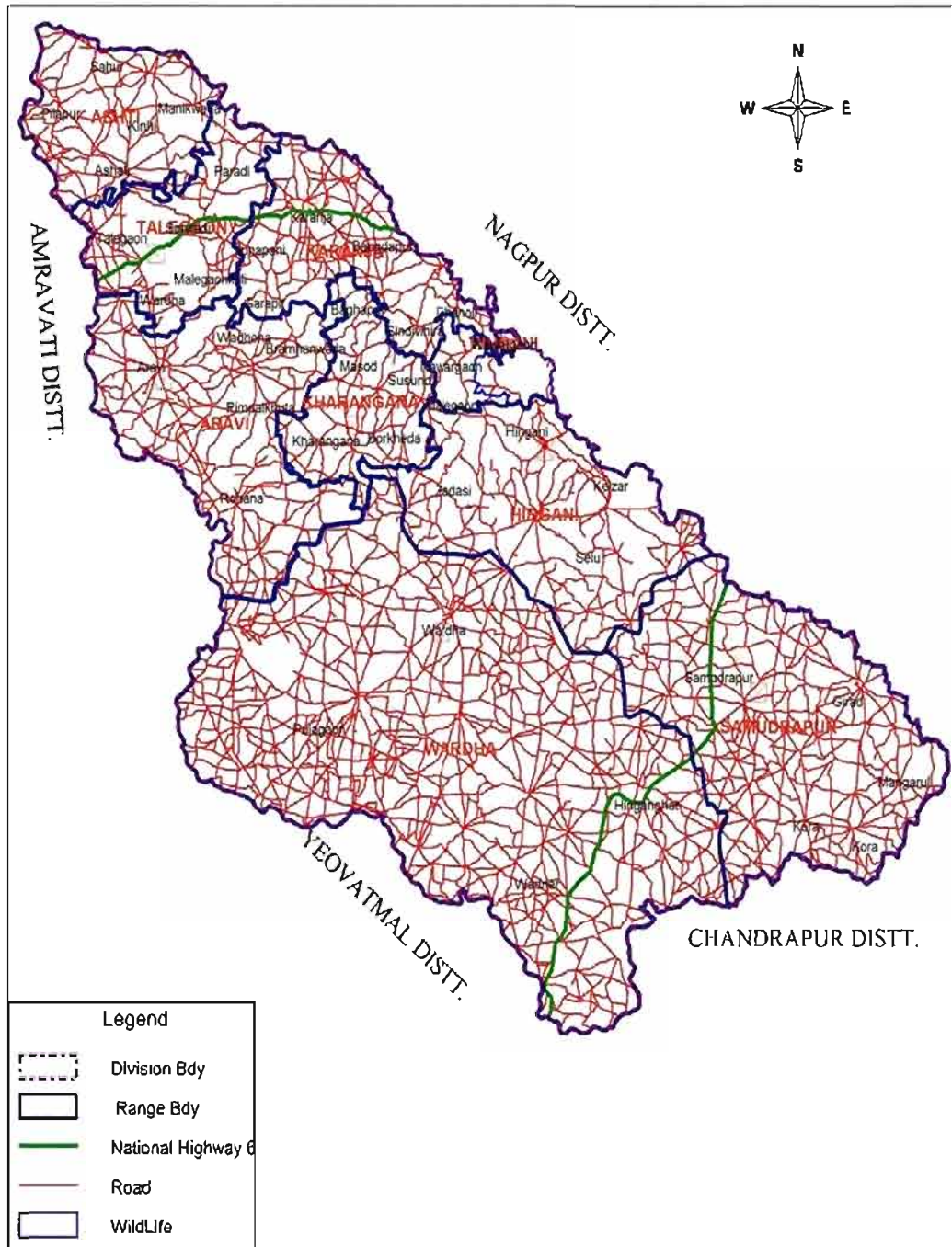
19.6 Other Records: List of amendments to the working plan and list of area changes will be maintained in prescribed forms.

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MAP OF WARDHA FOREST DIVISION RANGE ,ROUND & BEAT



ROAD MAP OF WARDHA FOREST DIVISION



**Compliance of Suggestions/Modifications Suggested by the Standing
Consultative Committee in the meeting held
on 16th March 2016 for the
DWPR of Wardha Forest Division.**

Sr.No.	Suggestions/Modifications	Compliance
1	Dr. V. K. Sinha, APCCF (Conservation) Suggested that, the Figures regarding TOF should be checked as per FSI State Forest Report 2015.	Complied. (Chapter-2, Para No. 2.7 of Part-I & Chapter-18, Para No. 18.1 of Part-II Vol.-I) (Page No 15 & 377)
2	Shri. S. C. Gairola, APCCF & Nodal Officer asked that, what was the reason For showing 9 SCI coupes as unworkable. On this issue Shri.D.W.Pagar, Dy.C.F. Wardha & Shri. T. S. K. Reddy, CCF (T) Nagpur explained that, it was as per treatment map.	On this issue Shri. D. W. Pagar, Dy.C.F. Wardha & Shri. T.S.K. Reddy, CCF (T) Nagpur have explained in the meeting that it was as per treatment map.
3	Dr. V. K. Sinha, APCCF (Conservation) asked that, whether treatment maps of such coupes are available? On this Shri. D. W. Pagar, DCF, Wardha explained that, all such treatment Maps available. The Committee agreed.	On this Shri. D.W.Pagar, DCF, Wardha explained that, all such treatment maps are available. The Committee agreed.
4	Dr. V. K. Sinha, APCCF (Conservation) asked that, what was the reason for works not done in coupe no II,IV,VIII,IX of Afforestation Working Circle. PCCF (HoFF) M.S.Nagpur instructed that, CCF (T) Nagpur should verify the reason of work not done in the coupes from coupe control form of such coupes.	As per CCF (T), Nagpur letter No.Desk/13/As/1689 dt. 4.7.2016 Coupe No. II & IV not worked due to area unsuitable for plantation & work not carried out in coupe No. VIII & IX due to fund.
5	Shri. S. C. Gairola, APCCF & Nodal Officer asked that, why the felling was carried out in the coupe No I to III in Protection Working Circle. Shri. D. W. Pagar, DCF, Wardha has explained that falling has been carried out in such coupes but it has been stopped later	Shri. D.W. Pagar, Dy.C.F. Wardha has explained that felling has been carried out in such coupes but it has been stopped later on. The Committee accepted.

	on. The Committee accepted.	
6	Dr. V. K. Sinha, APCCF (Conservation) has suggested that, In the chapter of " Past system of management " Working Circle wise prescription should be given on page No.79.	It is complied in Vol-I, Part-I Chapter No. 11 Para No. 11.2.8 Page No.147
7	Shri. V. K. Sinha, APCCF (Conservation) suggested that In the chapter of "Past System of management "word "Per hectare" should be inserted in the para of results of SCI Working Circle.	It is complied in Vol-I, Part-I, Chapter No. 11 Para No. 11.2.9 Page No.149
8	Dr. V. K. Sinha, APCCF (Conservation) suggested that, as the plantation has been carried out in the G & FRM Working Circle. DCF, Wardha & Working Plan Officer should verify whether Plantation activity was prescribed in the Working Plan or not?	Plantation activity was not prescribed in G&FRM Working Circle as per earlier Working Plan. (Page No.-195 to 198 of earlier W.P.)
8	Dr. V. K. Sinha, APCCF (Conservation) and Shri. S. C. Gairola, APCCF & Nodal Officer asked that, whether deviation proposal has been submitted for other plantations carried out in the Working Plan area? Whether mid-term review has been carried out during the period of Wardha Working Plan? Shri. Pagar DCF, Wardha told that this information is not available & it will be checked. Shri. W. I. Yatbon, CF Working Plan explained that, The condition of mid-term review has not been mentioned in the Central Govt. approval letter of Wardha division Working Plan. In this regards PCCF (HoFF) M.S. Nagpur has instructed that, CCF (T) Nagpur should review after 5 Years for finding scope of modification where ever	Intimated to CCF (T) Nagpur for complied the same vide this office letter no. CF /WP /RS/55/16-17,Dt.06.05.2016 but Compliance yet to be received. 1) No deviation proposal received. 2) No mid-term review was carried out for Wardha Forest Division.

	necessary after such mid-term review.	
9	Shri. V. K. Sinha, APCCF (Conservation) suggested that, in the chapter "Statistic & Growth" CAI & MAI curve has double peak in the Teak site quality III, which should be corrected.	Complied. (Vol-I, Part-I Chapter No.6 of Maintenance & Enhancement of forest Resources Productivity. Page No.64.)
10	Shri. A.S.K.Sinha, PCCF (P&M) & Shri.V.K.Sinha, APCCF (Conservation) suggested that, figure of Reserve Forest in DWPR should be checked by CF Working Plan & CCF (T) Nagpur.	Complied with.
11	Shri. S. C. Gairola, APCCF & Nodal Officer suggested that, As per GOI instruction Zudpi Jungle area is transfer to the Forest Department for the scientific management. Hence, it should not be put in the Miscellaneous Regulation. Therefore all Zudpi Jungle area should be put in the Afforestation Working Circle for scientific management. In this discussion CCF (T) Nagpur & DCF, Wardha has clarified that, these zudpi jungle areas are scattered & in small patches and some patches encroachments are existing, and Compensatory Afforestation has also been raised already in some zudpi jungle area and some more zudpi jungle areas are proposed for Compensatory Afforestation in future. Hence it is necessary to demarcate such zudpi jungle area as prescribed in proposed plan. The committee did not agreed with this explanation and PCCF (HoFF) M.S.Nagpur suggested that, All zudpi Jungle and Non Forest land should be merged in Afforestation Working Circle & area of private	Complied. All Zudpi Jungle, Non Forest land has been merged in Afforestation Working Circle & area of private acquired forest has been merged in IWC, AWC and P&CAM WC as per its present status. (Vol-I, Part-II, Chapter 3, 4, 5, Page No.197, 212, 222)

	acquired forest should be merged in any Working Circle as per its present status.	
12	Shri. S.C.Gairola, APCCF & Nodal Officer and Dr. V. K. Sinha, APCCF (Conservation) pointed out that, Harvestable girth applied to Wardha Forest Division on the basis of stem analysis of Bhandara forest Division is not justified. In this connection CCF (T) Nagpur explained that, Forest of Wardha & Bhandara do not differ much therefore harvestable girth can be decided on the basis of stem analysis of Bhandara Forest Division. After detailed discussion on this issue, The PCCF (HoFF) M.S.Nagpur has suggested that, harvestable girth as per existing Working Plan of Wardha Forest Division should be kept as it is in the proposed Working Plan. The PCCF (HoFF) M.S.Nagpur has also suggested that in future separate stem analysis should be carried out for each Working Plan of Maharashtra State & The Committee agreed.	Harvestable girth as per existing Working Plan of Wardha Forest Division has been kept as it is in the proposed Working Plan. Vol-I, Part-II, Chapter-2, Para No. 2.6.4 Page No. 181) and related changes made in Vol.-I, Part-I, Chapter No.-6 of Maintenance and Enhancement of Forest Resources Productivity.(Page No. 264)
13	Dr.V.K.Sinha, APCCF (Conservation) suggested to remove word "Malformed" from the para "Treatment" of Afforestation Working Circle.	Complied. Para No. 4.6.2, 4.6.8, 4.6.10.1 (Chapter No.-4 of Vol.-I, Part-II Page No. 216, 217)
14	Shri. S. C. Gairola, APCCF & Nodal Officer suggested to remove word "Catchment from Protection & Catchment Working Circle.	Removed word "Catchment" from earlier Protection & Catchment Working Circle. (Chapter No. 1, Para No. 1.3.2 & Chapter- 5 of Vol-I, Part-II Page No.172, 222)
15	Dr. V. K. Sinha, APCCF (Conservation) pointed out that, taking of plantation in high slope area in the protection & catchment working	Complied. Chapter No. 5 Para No. 5.6.11.3 (1) iv & 5.6.2 of Vol.-I, Part-II, Page No.227, 225)

	circle is not justified, hence 2 dead trees/ha. Should be retained.	
16	PCCF (HoFF) M.S.Nagpur & Dr.V.K.Sinha, APCCF (Conservation) suggested to remove word "Woody Growth" from para of treatment of G&FRM Working circle.	Removed word "Woody Growth" from para method of treatment of Grass and Fodder Resources Management Working circle.(Para No. 6.6.2 (a), Vol.-I, Part-II, Page No.233)
17	PCCF (HoFF) M.S.Nagpur suggested to remove word "mouse deer" from chapter Wildlife (OL) WC.	Complied. Word "Mouse deer" which was shown in DWPR in Chapter No. VII of Wildlife Conservation. Para No. 7.2 has been deleted. (Chapter No.3, Para No. 3.6.2 of Vol-I, Part-I, Page No. 28)
18	Shri. S. C. Gairola, APCCF & Nodal Officer suggested that, Benefit Projection of Financial Forecast should be calculated with N.P.V to show the cost benefit ratio.	Complied. (Chapter No.14 Vol.-I, Part-II, Page No. 313)
19	Shri. Naik, Representative of F.S.I., Nagpur suggested the correction of some figures on the TOF and a wording to be replace with "Tree Cover" instead of "Forest area".	Complied. (Chapter No. 18 of Part-II of Vol.-I Page No.377)
20	PCCF (HoFF) M.S.Nagpur suggested that, Standing Orders regarding Wildlife should be attached in the appendix.	Complied. (Appendix No. LXXII on Page No. 444 of Vol-II)
21	Dr. Dilip Singh, APCCF (Biodiversity) M.S.Nagpur suggested that, Biodiversity management committee should be formed at Panchayat level & Nagar Palika level.	It is reflected in Working Plan in Part-II, Para 10.8 (ix), Page No. 282.
22	Dr. S. H. Patil, APCCF (Campa) suggested that, information regarding Grazing settlement, and Grazing units should be given in the Working Plan.	Complied. (Appendix No. LIX, Page No. 416 of Vol-II)

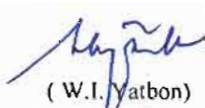
State level committee Meeting held on 16 March 2016

Ref: Govt.G.R. Revenue and Forest Department MDM 2015/CR-95/F-2, Dt.29.04.2015.

With reference to the above mentioned Govt. Resolution, the Draft Working Plan of Wardha Forest Division was discussed and approved by the Committee under the Chairmanship of The Principal Chief Conservator of Forests (HOFF), Maharashtra State, Nagpur.


(D.B. Naik)
Assistant Director
Forest Survey of India, Nagpur


(D.W. Pagar)
Deputy Conservator of Forests,
Wardha Forest Division,

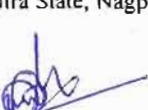

(W.I. Yatbon)
Conservator of Forests,
Working Plan, Nagpur


(T.S.K. Reddy)
Chief Conservator of Forests,
(Territorial), Nagpur


(Pravin Shrivastava)
Addl. Principal Chief Conservator
of Forests,
(Information Technology & Policy)
Maharashtra State, Nagpur

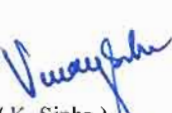

(S.H. Patil)
Addl. Principal Chief Conservator
of Forests, (CAMPA)
Maharashtra State, Nagpur

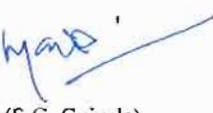

(Dilip Singh)
Addl. Principal Chief Conservator
of Forests & Member Secretary
Biodiversity Board, Maharashtra
State, Nagpur


(Anurag Chaudhary)
Addl. Principal Chief Conservator
of Forests,
(Working Plan-East), Nagpur

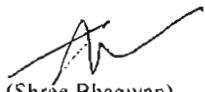

(K.N. Khaware)
Addl. Principal Chief Conservator
of Forests
(Protection),
Maharashtra State, Nagpur

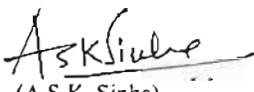

(B.S.K. Reddy)
Addl. Principal Chief Conservator
of Forests,
(Budget, Planning & Development)
Maharashtra State, Nagpur


(V.K. Sinha)
Addl. Principal Chief Conservator
of Forests (Conservation)
Maharashtra State, Nagpur


(S.C. Gairola)
Addl. Principal Chief Conservator of
Forests & Nodal Officer,
Maharashtra State, Nagpur

(Charanjeet Singh)
Scientist 'C',
O/o, Addl. Chief Conservator
of Forests, (Central) Regional
Office, Nagpur


(Shree Bhagwan)
Principal Chief Conservator
of Forests, (Wildlife)
Maharashtra State, Nagpur


(A.S.K. Sinha)
Principal Chief Conservator
of Forests
(Production & Management)
Maharashtra State, Nagpur


(A.K. Nigam)
Principal Chief Conservator of Forests
(HOFF), Maharashtra State, Nagpur

