



Government of Maharashtra

The Working Plan
for
Wardha Forest Division
(Nagpur Circle)

2006 - 07 to 2015 -16

VOLUME - I
(Part I and II)
(Text)

By

Jarnail Singh, IFS
Deputy Conservator of Forests
Working Plan Division, Nagpur

S D Sontakke, IFS
Conservator of Forests
Working Plan Division, Nagpur

(Near Government Printing Press
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VOLUME - II
(Appendices)

Conservator of Forests
Working Plan Division, Nagpur

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FOREWORD

RAMANUJ CHOUDHARY, IFS
Chief Conservator of Forests,
(Working Plans) Nagpur

INTRODUCTION

This working plan covers the entire reserved, protected, unclassified forest, non forest land and zudupi jungle area of Wardha forest division, i.e. 933.683 sq km of forest area. This replaces the working plan of Dr Nand Kishore, 1992 to 2001-2002 (extended up to 2003-04). As the area of Bor Wildlife Sanctuary transferred to Pench Tiger Reserve for its management; the area of Bor Sanctuary, i.e. 40.359 sq km which was included in the previous plan has not been covered, in the present working plan of Wardha division.

The preliminary working plan was prepared by Shri Jarnail Singh, IFS and was approved by the State Level Committee on dated 29th November, 2002. On the basis of the preliminary working plan approved, the draft plan was prepared by the undersigned. After taking over charge of the division on 28.06.2004, writing the draft working plan for this division was started. By this time the enumeration was already done by SOFR Unit, Chandrapur. Therefore, to save time and to get better more analysis of the tree enumeration data was done by the computer. The software developed for the data analysis was used. Stock map is not prepared during the preparation of working plan, but the satellite imageries were used to clarify the forest patches according to density as received in the Normalized Density Vegetation Index (NDVI) mapping. Analyzed enumeration data and satellite imagery density data helped in forming the different working circles.

In this draft working plan, due care has been taken to incorporate suggestions given in the meeting of State Level Committee during discussion on preliminary working plan report. More than 50% area of the Wardha division constitutes Teak. The harvestable girth for teak has

been determined at the maximum volume production indicated by the intersection of CAI and MAI in the stem analysis exercise for teak at site quality IV. The girth (OB) corresponding to the exploitable girth is 101 cm, hence the exploitable girth is fixed as 105 cm. Preliminary working plan report of Wardha division when discussed in state level committee, suggestions were received during discussion to set up committee to the management of hollow trees distribution data, reasons for the same and decide the working circle. Committee was formed under the chairmanship of Add. Principal Chief Conservator of Forests (Production & Management), MS, Nagpur. Committee visited the forest area of Wardha division and assessed the hollowness problem and found 50% hollowness in teak trees of CWR working circle. Since the area was worked under CWR repeatedly, it leads to the production of hollow timber. Therefore in the present plan although the exploitable girth of teak in site quality IV is fixed as 105 cm as per stem analysis exercise; the hollow trees can be harvested at 75 cm GBH (OB).

Major changes which have been effected in the present working plan are:

- ⊕ Shift from CWR working to SCI working in major areas because the coppicing vigor has drastically reduced due to 3 - 4 coppice rotations in the past.
- ⊕ The plantation area has been drastically reduced because of past poor results of plantations and more emphasis is now laid on natural regeneration which will include root stock management.
- ⊕ In PWPR, Grassland management was not considered but after discussion in the state level committee, looking to grazing pressure on forest land in the division. "Grass & Fodder Resource

Management" working circle over an area 10379.821 ha is incorporated in the draft plan.

- ⊕ Ministry of Environment & Forests, GOI circulated National Working Plan Code in June 2004. In accordance to Nation Working Plan Code, chapters on Forests Protection, JFM, NWFP and Wildlife management have been incorporated.

I express my deep sense of gratitude for the valuable guidance and advice provided by Shri Jwala Prasad IFS, Add. Principal Chief Conservator of Forests (Production & Management), MS, Nagpur. I am highly grateful to Shri Ramanuj Choudhary IFS, Chief Conservator of Forests, Working Plans, Nagpur whose valuable guidance and encouragement could give the final shape to the draft plan. Shri Ramanuj Choudhary has been a source of inspiration in finalisation of this plan. I am highly thankful to Shri S K Sood IFS, Chief Conservator of Forests, (Territorial), Nagpur for his valuable suggestions, guidance, extending help for providing informations and cooperating in all respect to complete the work. The undersigned is thankful to Shri S P Thakare IFS, Deputy Conservator of Forests, Wardha Forest Division and his all staff for rendering all cooperations during the field work and providing necessary information relevant to working plan. I am really thankful to Shri Rathod, Divisional Manager, FDCM Ltd, Nagpur for providing data on FDCM Wardha division which proved helpful in writing chapter on FDCM. The undersigned is extremely thankful to Shri D K Mandal, Sr. Scientist, National Bureau of Soil Survey and Land Use Planning, Nagpur for providing a resource data on Water Balance in Wardha district.

However, I shall be failing in my duty, if I do not make a special mention of a few of them, Shri A N Dhote RFO, Shri B T More Ranger Surveyor deserve a special appreciation for their untiring work in analysis of

data, digitization of maps and guiding others in various related activities. I am also thankful to Shri T U Shewate RFO who deeded Stem Analysis for the draft plan. I am extremely thankful to Shri R T Dhabekar ACF, Gadchiroli Forest Division and Shri S K Thapliyal RFO, CCF (Working Plan), Nagpur who rendered necessary help in analyzing satellite imagery data. Thanks are due to Shri J M Ghodam and Shri H R Nasre Surveyor, Shri N T Ikhankar Clerk for assistance and cooperation. Shri B N Gomase Forest Guard deserve appreciation for doing digitization and extending cooperation. My special appreciation is also due to Shri A C Gondane Clerk in typing, printing, binding and other related works.

Before parting, a word in appreciation to the staff who worked with great enthusiasm and zeal. The following of the staff of this division who worked to complete the plan

- i. Shri P M Chauhan Forest Guard,
- ii. Shri S J Kalbande Forest Guard,
- iii. Smt P P Shrikhande Accountant,
- iv. Shri S K Gajbhiye Driver.

Dated 7th June 2005

S D Sontakke, IFS
Conservator of Forests,
Working Plan Division, Nagpur

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I. Abbreviations used in the Plan

A.C.F.	Assistant Conservator of Forests.
AFF & RSM	Afforestation and root stock management
b.h.	Breast height.
C.A.I.	Current Annual Increment.
CA	Compensatory Afforestation
cm	Centimeter.
Cm³	Cubic centimeter.
Comptt	Compartment.
C.W.R.	Coppice-with-Reserve
CWLW	Chief wild life warden
d.b.h.o.b.	Diameter at breast height over bark.
d.b.h.u.b.	Diameter at breast height under bark.
D.C.F.	Deputy Conservator of Forests.
D.F.O.	Divisional Forest Officer.
Dn.	Division
E.G.S.	Employment Guarantee Scheme
F.D.C.M. Ltd.	Forest Development Corporation of Maharashtra Limited.
F.L.C.S.	Forest Labourers Co-operative Society.
F.R.H.	Forest Rest House.
F.S.	Felling Series.
F.V.	Forest Village.
F.Y.O.	First Year Operations.
G&FRM	Grass & Fodder Resource Management
GIB	Great Indian Bustard
g.b.h.	Girth at breast height.
g.b.h.o.b.	Girth at breast height over bark.
g.b.h.u.b.	Girth at breast height Under bark
ha.	hectare.
IGF	Inspector General of Forests.
IWC	Improvement working circle
JFM	Joint Forest Management
km.	Kilometer.
m.	Meter.
mm.	Millimeter.
M³	Cubic meter.
M.A.I.	Mean Annual Increment.
M.F.P.	Minor Forest Produce.
MIS	Miscellaneous
NGO	Non Government Organization
NWFP	Non-wood Forest Produce
P.B.	Periodic Block.

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

II. Glossary of Local Terms

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

III. Local and Botanical names of Plants occurring in Wardha Forest Division

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

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

Local Name	Botanical Name	Family
Sag/ Sagwan/Teak	Tectona grandis, (L.F.)	Verbenaceae
Saja/Ain	Terminalia tomentosa, W & A	Combretaceae
Salai	Boswellia serrata, (Roxb.ex. Colebr)	Burseraceae
Shisham	Dalbergia latifolia, (Roxb.)	Fabaceae
Shiwan/Siwan	Gmelina arborea, (Roxb.)	Verbenaceae
Siras (Black)	Albizzia lebbek, (L.) Bth.	Mimoseae
Siras (White)	Albizzia procera, (Roxb.) Bth.	Mimoseae
Sissoo	Dalbergia sissoo (Roxb.)	Fabaceae
Sitaphal	Annona squamosa, (L.)	Annonaceae
Subabul	Leucaena leucocephala (L.)	Mimoseae
Surya	Xylia xylocarpa, (Roxb)	Mimoseae
Tendu	Diospyros malanoxylon (Roxb)	Ebenaceae
Tiwas/Tinsa	Ougeinia dalbergioides, (Roxb.)	Fabaceae
Tondri	Casearia tomentosa, (Roxb.)	Samydaceae
Umber	Ficus glomerata, (L.)	Moraceae
Wandra/Bainsa	Salix tetraperma, (Roxb)	Salicaceae
Warang/Baranga	Kydia calycina, (Roxb.)	Malvaceae
White kuda/Satkuda/ Kuda	Holarrhena anthidysentrica (Wall)	Apocynaceae

B. Shrub

Aal	Moringa citrifolia, (Linn.)	Celastraceae
Bharati	Maytenus emarginata, (Wild)	Celastraceae
Bhawarmal	Hamiltonia suaveolens, (Roxb.)	Rubiaceae
Dikamali	Gardenia gummifera (L.F.)	Rubiaceae
Dudhi/Kalakuda	Wrightia tinctoria, (Roxb)	Apocyanaceae
Gautri	Grewia hirsuta (Vahl, symb.)	Tiliaceae
Ghaneri/Ulta	Lantena Camera, (Linn.)	Verbenaceae
Jilbili	Woodfordia fruticosa, (Kurz)	Lythraceae
Kaladhotra	Datura metel, (Linn)	Solanaceae
Katekolati	Barleria prionites, (Linn.)	Acanthaceae

Local Name	Botanical Name	Family
Katumber	<i>Ficus hispida</i> , (Linn)	Moraceae
Kharata	<i>Dodonaea viscosa</i> , (Linn.)	Sapinadaceae
Kharasani/Kharasi	<i>Nyctanthes arbortristis</i> , Jacq.	Astraceae
Muradsheng/ Marophal	<i>Helicteres isora</i> , (L.)	Sterculaceae
Neel	<i>Indigofera tinctoria</i> , (Linn.)	Fabaceae
Nirgudi	<i>Vitex negundo</i> , (L.)	Verbanaceae
Phetra (Safed)	<i>Gardenia turgida</i> , (Roxb)	Rubiaceae
Rui	<i>Calotropis procera</i> , (Aitl) R. Br.	Asclepiadaceae
Sindhi/Chhindi (Palmae)	<i>Phoenix sylvestris</i> , (Linn)	Areacaceae
Wagnakhi	<i>Martynia annua</i> , (Linn)	Martyniaceae

C. Herbs

Divali	<i>Tephrosia hamiltonii</i> , (Drumm)	Fabaceae
Gajargawat	<i>Parthenium hysterophorus</i> (Linn)	Astraceae
Gokru	<i>Tribulus terrestris</i> (Linn)	Zygophyllaceae
Hamata	<i>Stylosanthes hamata</i> (L.)	
Kamarmodi	<i>Tridax procumbens</i> (Linn)	Astraceae
Pivla dhotra	<i>Argemone mexicana</i> (L.)	Papaveraceae
Piviltilwan	<i>Cleome viscosa</i> (Linn)	Cleomaceae
Rantulasi/Bantulasi	<i>Hyptis suaveolens</i> (Linn)	Lamiaceae
Rantur	<i>Atylosia scarabaeoides</i> , (L.)	Fabaceae

D. Bamboo and Grasses

Bans/Bamboo	<i>Dendrocalamus strictus</i> , (Roxb)	Poaceae/ (Gramineae)
Bhurbhusi	<i>Eragrostic tenella</i> , (L.)	Poaceae/(Gramineae)
Dab/Dabat/ Phylpya	<i>Imperata cylindrica</i> , (Beauv)	Poaceae/(Gramineae)
Diwartan	<i>Andropogon pumilus</i> , (Roxb)	Poaceae/(Gramineae)
Durwa/Hariyalli/Doob	<i>Cynodon dactylon</i> , (Prs)	Poaceae/(Gramineae)
Gadasheda	<i>Chrysopogon fulvus</i> , (Spr)	Poaceae/(Gramineae)
Ghonad	<i>Themeda quadrivalvis</i> (L.), O.ktze	Poaceae/(Gramineae)

Local Name	Botanical Name	Family
Fuler	<i>Arundinella setosa</i> , (Trin)	Poaceae/(Gramineae)
Katanbahari/Kusara	<i>Aristida funiculata</i> , (Trin. et. Rupr)	Poaceae/(Gramineae)
Katang bamboo	<i>Bamboosa arundinacea</i> , (Willd)	Poaceae/(Gramineae)
Khas	<i>Vetiveria zizaniodes</i> , (Linn) Nesh	Poaceae/(Gramineae)
Kusal	<i>Hetropogon contortus</i> , (Linn)	Dicanthium
Marvel (Small)	<i>Dicanthium annulatum</i> , (Forssk)	Poaceae/(Gramineae)
Marvel (Big)	<i>Dicanthium aristaum</i> (Poir)	Poaceae/(Gramineae)
Mushan	<i>Iseilema laxum</i> (Heck)	Poaceae/(Gramineae)
Paonia	<i>Schima sulcatum</i> (Heck)	Poaceae/(Gramineae)
Phulkia	<i>Apluda mutica</i> , (Linn)	Poaceae/(Gramineae)
Sabai / Sum	<i>Ischaemum angustifolium</i> (Heck)	Poaceae/(Gramineae)
Sheda	<i>Sehima nervosum</i> (Rottl.)	Poaceae/(Gramineae)
Tikhadi	<i>Cymbopogon martini</i> (Roxb.)	Poaceae/(Gramineae)

D. Climber

Aradphari	<i>Olax scandens</i> , (Roxb.)	Olacaceae
Chilati	<i>Mimosa hamata</i> (Willd)	Mimoseae
Dhimarwel/Malkagni	<i>Celastrus paniculatus</i> (Willd)	Celastraceae
Dhudhi/ Bokadwel/	<i>Cryptolepis buchanani</i> , R. & S.	Periplocaceae
Nagwel	<i>Piper betle</i> (L.)	Piperaceae
Eruni	<i>Zizyphus oenoplia</i> , (L.) Mill	Rhamnaceae
Gunj	<i>Abrus precatorius</i> , (L.)	Fabaceae
Gulvel	<i>Tinospora cordifolia</i> , (Willd)	Menispermaceae
Kajkuri	<i>Mucuna pruriens</i> , (L.) D.C.	Fabaceae
Khadyanag/ Langali	<i>Gloriosa superba</i> , (L.)	Liliaceae
Khobarvel	<i>Hemidesmus indicus</i> , (L.) Ait.	Periplocaceae
Kukudranji	<i>Calocopteris floribunda</i> , (Land)	Combretaceae
Mahulbel	<i>Bauhinia vahlii</i> , (Wand. A)	Caesalpiniaceae
Nasbel	<i>Millettia extensa</i> , (Bth.) Baker	Papilionaceae
Papri Lalbel	<i>Vantilago denticulata</i> , (Willd)	Rhamnaceae
Palasvel	<i>Gloriosa superba</i> (Roxb)	Liliaceae

Local Name	Botanical Name	Family
Piwarvel	Combretum ovalifolium (Roxb)	Combretaceae
Ramdaton	Smilax macrophylla,	Smilacaceae
Vasarvel	Cocculus hirsutus, (L.) Diels.	Menispermaceae

F. Parasites

Amarvel	Cuscuta reflexa, (Roxb)	Cuscutaceae
Bandha/ Bandh	Vanda tessellata, (Roxb)	Orchidaceae
Scabra	Stylosanthes scabra	
Tarota	Cassia tora, (Linn)	Caesalpinaceae

**IV. The Common and Zoological names of Animals and Birds commonly found in the
Wardha Forest Division**

Common Name	Zoological Name
A. <u>Animals</u>	
Tiger	Panthera tigris
Panther	Panthera pardus
Hyaena	Hyaena hyaena
Wild dog	Cuon alpinus
Jackal	Canis aureus
Fox	Vulpes bengalensis
Leopard cat	Prionglurus bengalensis
Jungle cat	Felis chaus
Nilgai	Boselaphus tragocamelus
Sambhar	Cervus unicolor
Cheetal	Axis axis
Barking deer	Muntiacus muntjak
Wild boar	Sus cristatus
Sloth bear	Melursus ursinus
Four horned antelope	Teraceros quadricornis
Langur	Prebytis entellus
Palm squirrel	Funambulus palmarum
Porcupine	Sytrix indica
Hare	Lepus ruficaudatus

B. Birds

Painted sand grouse	Pterocles indicus
Common sand grouse	Pterocles exustus
Peacock	Pavo cristatus

Common Name	Zoological Name
Grey jungle fowl	Gallus sonneratil
Grey partridge	Francolinus pondicerianus
Black breasted quail	Cturnix coromandelicus
Indian bustard quail	Turmix suscitator
Pigeon –	
Blue rock pigeon	Columba livia
Crown pigeon	Gaura cristata
Crane	Grus antigone
Saras crane	Anigona antigona
Dove (spotted)	Streptopelia chinensis
Ring dove	Streptopelia risoria
Cotton teal	Nettapus coromandelianus
Whistling teal	Dendrocygna javanica
Vulture	Otogypa calvus
Owl -	
Great horn owl	Gypus bengalensis
Brown fish owl	Bubo bubo
Pied kingfisher	Ceryle rudis
Jungle babbler	Turdoides striatus
Black drongo	Dicrurus adsimilis
Blue jay (Nilkantha), Indian roller	Coracias bengalensis

Part – I

Summary of the Facts on which the Proposals are based

Chapter I

THE TRACT DEALT WITH

1.1. INTRODUCTION

Wardha district lies in the valley of Wardha river and it is enclosed by it on three sides. The district takes its name after the name of river. According to General Cunningham, it is "Wardha" or "Wadtha", the river of banayan trees, as the entire valley was lying beautifully with rows of banayan (Wad) trees. The district is predominantly agricultural except three textile mills, one at Pulgaon and two at Hinganghat. Two oil mills, one at Wardha and one at Hinganghat. 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 of its social service. Many decisions of grave national importance were taken here and deliberations were held during the struggle of national independence when it was visited almost by all leading leaders of independence 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 is established by Trilokya Buddha Mahasangha, 30 km from Wardha where meditation and Buddha's preaching is taught.
- iv) **Girad** : It is 60 km from Wardha. There is a Tomb of Sent Suffi Shekh Farid and it is a pilgrimage place for Hindu and Muslim.

1.1.01 The total forest area of Wardha district including Bor Sanctuary extends over 974.041 sq km. This working plan deals with the forest areas of the Wardha district except those included in the Bor Sanctuary. The total forest area included in this working plan is 933.683 sq km, out of

which 499.267 sq km is the Reserved Forest, 317.282 sq km Protected Forest, 105.438 sq km Zudupi Jungle, 2.492 sq. km acquired private Forest and 9.204 sq. km. Non Forest Land. It constitutes 15.43 percent of Geographical area of the District which extends over to 6310 sq km. Dr.Nand Kishore's plan (1992) has expired in 2002.

1.2. NAME AND SITUATION

1.2.01 The 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 scattered patches and almost touch the district boundary, except on the South-West side. The boundaries of the tract dealt with are as shown in Table 1.1.

Table 1.1

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	Yeotmal Division/Yeotmal district
4	West	Amravati Division/Amaravati district

1.3. CONFIGURATION OF THE GROUND

1.3.01 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.

1.3.02 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.

1.3.03 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 from 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.

1.4 GEOLOGY, ROCK AND SOIL

1.4.01 **Geological Formation :** The geological map of Wardha District obtained from the Geological Survey of India, Nagpur is given in **Appendix 1.1**. 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*.

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

1.4.02 **Soil and Mineral:** 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.

1.4.03 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 an 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.

1.4.04 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.

1.4.05 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.

1.5 CLIMATE

1.5.01 The climate of Wardha district is hot and dry. There are three seasons namely cold, hot and monsoon. The cold season starts by the end of November and continues up to middle of February. The cold is mild and the weather is pleasant. The hot 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. The monsoon months are humid and sultry. The heat increases as soon as monsoon ends and the months of October and November are, mostly uneasy till winter sets in. A relation between temperature and rainfall (Ombrothermic diagram) is given in **Appendix 1.2**.

Rainfall

1.5.02 The average annual rainfall of Wardha district is 961.72 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. The variation of rainfall from year to year is,

significantly, large (**Appendix No. 1.3**). The following table shows the average annual rainfall and average number of rainy days (during the year 1993 to 2003) in a year for 8 raingauge stations of Wardha District.

Table 1.2

Sr No	Raingauge stations	Average annual rainfall in mm	Average no of rainy days in a year
1	Wardha	808.40	69
2	Seloo	1072.40	60
3	Samudrapur	1105.10	70
4	Hinganghat	1071.70	67
5	Deoli	936.80	59
6	Arvi	959.50	63
7	Ashti	808.40	69
8	Karanja	931.50	65
	Distt Average	961.72	65

The highest and the lowest rainfall recorded at different stations during 1993 to 2003 were as under:

Table 1.3

Sr No	Raingauge Station	Year	Heaviest rainfall	Year	Lower rainfall
1	Wardha	1999	1094.60	2000	568.80
2	Seloo	1994	1568.0	1996	765.0
3	Samudrapur	1994	1643.60	1996	768.5
4	Hinganghat	1994	1573.50	1993	671.60
5	Deoli	1994	1454.60	1993	661.0
6	Arvi	1994	1528.0	2000	733.70
7	Ashti	1999	1094.6	2000	568.8
8	Karanja	1994	1093.90	1996	716.0

Temperature

1.5.03 The diurnal range of temperature is the maximum during March. In August these changes are minimum. The overall minimum and maximum temperature is 9.9° C and 46.0° C, respectively. In April the maximum temperature goes up to 43.7° C, while in May it goes up to 46° C. The shorter divergence is only during the rainy season (**Appendix No.1.4**). 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. The average maximum and minimum temperature and diurnal range during different months from 1993 to 1998 calculated from the records available at the Wardha Meteorological station, are given below:

Table 1.4

Month	Temperature		Diurnal Range °C
	Maximum °C	Minimum °C	
January	33.3	9.9	23.4
February	35.6	11.2	24.4
March	40.1	14.8	25.3
April	43.1	20.2	22.9
May	46.0	25.3	20.7
June	44.3	24.9	19.4
July	36.8	20.7	16.1
August	35.2	19.8	15.4
September	35.2	19.9	15.3
October	34.9	16.7	18.2
November	33.8	12.4	21.4
December	28.9	10.1	18.8

Drought

1.5.04 Damage due to drought is a rare incident. Severe drought has affected the forest crop, especially to teak to some extent in the year 1939-40, 1940-41 and in 1952-53 in the poorer teak forest of Hingni and Karanja ranges. In the recent past, there have been erratic rains during the

monsoon, every alternate year. This affects the natural regeneration and afforestation works undertaken in the division. Talukawise drought prone villages are shown in **Appendix 1.5**. The water balance talukawise in Wardha District is given in table 1.5 (source-NBSS and Land Use Planning, Nagpur) below which may play, decisive role while taking up new plantations.

Table 1.5

Taluka	P	PE	FC	PPE	APWL	ST	DS	AE	WD	WS
Wardha	902.96	3151.59	200	-2248.63	-1247	350.03	0	850.47	2301.12	52.49
Seloo	965.19	1458.9	200	-493.71	-258.33	1006.7	0	801.01	657.89	164.18
Samudrapur	994.63	1459.2	200	-464.57	-250.73	1080.34	0	798.71	660.49	195.92
Hinganghat	963.95	1469.5	200	-505.55	-268.08	958.85	0	780.34	689.16	183.61
Ashti	771.84	1459.5	200	-687.66	-332.51	709.67	0	730.8	728.7	1.04
Karanja	838.34	1468.5	200	-630.16	-328.81	939.11	0	787	681.5	51.34
Deoli	843.38	1394.95	200	-551.57	-289	1012.54	0	798.96	595.99	44.42
Arvi	863.57	1459.59	200	-596.02	-239.26	950.1	0	790.12	669.47	73.45

Where, **P** - Average Rainfall, **PE** - Potential Evapotranspiration, **FC** - Available Water capacity (mm), **PPE** - (P - PE), **APWL** - Accumulated Profile water loss, **ST** - Soil storage, **DS** - Storage Change, **AE** - Actual Evapotranspiration, **WD** - Water Deficit, **WS** - Water surplus.

Storms, Floods and Frost

1.5.05 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.

Health

1.5.06 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.

1.6 WATER SUPPLY

1.6.01 Wardha river is perennial source of water, whereas, other small rivers 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. The list of existing Forest Department wells, tanks and anicuts is given in **Appendix 1.6 & Appendix 1.7**.

1.7 DISTRIBUTION AND AREA

1.7.01 The total forest area of the division, (including Bor Sanctuary), the Reserved Forests, Protected Forests and Zudupi Jungle extends over to 974.042 sq km.

RESERVED FORESTS

1.7.02 The old Reserved Forests i.e. 508.075 sq km excluding the newly Reserved Forests of Wardha Division have been divided into 26 blocks having numbers 21 to 24, 31, 35, 49 to 53, 54E, 54W, 55 to 67. In 1934, all the blocks were divided on permanent basis into 216 compartments having numbers 39 to 57, 59, 97 to 275 and 314 to 330. Out of 216 compartments 6 compartment numbering 230 to 235 have been transferred to Bor wildlife sanctuary. The missing compartment and block numbers pertain to Nagpur Division; as Wardha was a part of Nagpur Division, at that time, till 1959.

1.7.03 21 compartments in part and 1 compartment in full; thus 22 compartments of Protected Forest have been constituted into new Reserved Forest. This new Reserved Forest comprises of 22 compartments and extends over an area of 18.681 sqkm. In Dr Nand Kishore's plan, these new Reserved Forest compartments have been numbered by adding suffix 'A' to old protected compartment number. These compartments are 8A, 25A, 38A, 40A, 60A, 61A, 80A, 84A, 86A, 93A, 208A, 209A, 176A, 181A, 220A, 222A, 230A, 231A, 234A, 239A, 249A, 269A. Out of 22 compartments 3 compartments numbered 222A, 231A and 234A; have been transferred to Bor Wildlife Sanctuary.

1.7.04 Thus, the Reserved Forest of the division extends over an 526.756 sq km and have been divided into 238 compartments. Out of 238 compartments; 9 compartments such as, 222A, 231A, 234A, 230 to 235 compartments have been transferred to Bor Wildlife Sanctuary. Hence

229 compartments extend over an area 499.267 sq km is with the division for purpose of silvicultural management.

PROTECTED FORESTS

1.7.05 The Protected Forest measuring 324.303 sq km have been divided into 271 compartments having numbers 1 to 65; 67 to 230, 232 to 265 and 267 to 274. Compartment number 231 has been declared as Reserved Forests and compartment number 66 & 266 has been disforested. Out of 271 compartments; 5 compartments in full and 1 compartment in part have been transferred to Bor Wildlife Sanctuary. Thus, 266 compartments of protected forest extend over an area 317.282 sq km remain with the division for silvicultural management. **(Appendix 1.8).**

UNCLASSIFIED FORESTS

1.7.06 Area of unclassified forests 5.849 sq km transferred to Bor Sanctuary. Zudupi jungle extends over 105.438 sq km area, 2.492 sq km area is acquired private forest and 9.204 sq km area is non forest land with Wardha Forest Division.

AREAS TRANSFERRED TO THE WILDLIFE DIVISION

1.7.07 Total forest area, falling in the Bor Wildlife Sanctuary measuring 40.359 Sq.km, was transferred to the Nagpur Wildlife Division. 27.489 Sq km of the Reserved Forest, in 9 full and 4 part compartments, 7.021 Sq. km. of the Protected Forests in 5 full and 1 part compartments and 5.849 Sq km. Unclassified Forests in 5 Compartments falls in the Bor Wildlife Sanctuary. **(Appendix 1.9).**

Taluka wise area distribution is given in Table 1.6.

Table 1.6 TALUKA-WISE AREA STATEMENT OF WARDHA DIVISION (area in sq km)

Taluka	Geographical Area	Reserved Forest (RF)	Protected Forest (PF)	Unclassified Forest (UF)	Acquired Private Forest (APrF)	Non Forest Land (NFL) for CA	Zudupi Jungle (ZJ)	Total	Percentage
Wardha	791	0	0	0	00.849	0	14.618	15.467	1.59
Deoli	655	0	0	0	0	0	7.918	7.918	0.81
Hinganghat	907	0	0	0	0	0	19.754	19.754	2.03
Samudrapur	981	45.509	11.825	0	0	0	24.516	81.850	8.40
Seloo	675	89.101	66.891	0	0.311	0.286	10.828	167.417	17.19
Karanja	808	84.458	37.219	0	0.158	0	11.825	133.660	13.72
Arvi	999	171.303	94.514	0	1.174	1.280	8.177	276.448	28.38
Ashti	494	108.896	106.833	0	0	7.638	7.802	231.169	23.73
Total	6310	499.267	317.282	0	2.492	9.204	105.438	933.683	95.86
Seloo (Bor - Sanctuary)	0	27.489	7.021	5.849	0	0	0	40.359	4.14
G. Total	6310	526.756	324.303	5.849	2.492	9.204	105.438	974.042	100.00

BLOCKS AND COMPARTMENTS

1.7.08 Reserved forest of the division was declared in 1879 into 26 blocks vide notification No 917a dated 26th February, 1879. The 26 blocks further divided into 217 compartments in 1934.

One compartment (58) is disforested in 1947. 6 compartments (232 to 235) have been transferred to Bor Wildlife Sanctuary. Therefore finally 210 compartments are of Reserved Forest.

22 compartments of Protected forest declared as New Reserved Forest vide notification No FLD-2369/52991/F-2 dated 14th April, 1978. Out of this, three compartments 222A, 231A and 234A have been transferred to Bor Wildlife Sanctuary. Thus, 210 compartments are old Reserved Forest and 19 of new Reserved Forest; a total of 229 compartments are with the division. **(Appendix 1.10)**

1.7.09 Protected forest of the division was declared in 1955 in 254 villages vide notification No 3058-2979-XI dated 4.6.1955. Area of the Protected forest was further constituted into 273

compartments. Compartment No 66 have been disforested vide notification No FLD/264-189972/W dated 13.2.1970 and Compartment No 266 has been disforested vide notification No FLD/3371-19955-W dated 29.1.1972. Five compartments (222, 231, 233, 234, 235) have been transferred to Bor Wildlife Sanctuary. Thus, 266 compartments remain with the division.

Table 1.7 RANGE-WISE AREA STATEMENT OF WARDHA DIVISION (area in sq km)

Range	RF		PF		UF		ZJ		APrF		NFL		Total
	Com	Area	Com	Area	Com	Area	Village	Area	Village	Area	Village	Area	Area
Wardha	18	45.509	16	11.825	0	0	317	66.806	1	0.849	0	0	124.989
Hingni	46	89.101	47	66.891	0	0	62	10.828	2	0.311	2	0.286	167.417
Karanja	38	84.458	59	37.219	0	0	40	11.825	1	0.158	0	0	133.660
Arvi	80	171.303	63	94.514	0	0	33	8.177	3	1.174	6	1.28	276.448
Ashti	47	108.896	81	106.833	0	0	45	7.802	0	0	17	7.638	231.169
Total	229	499.267	266	317.282	0	0	497	105.438	7	2.492	25	9.204	933.683
Bor- WL	13 (9F, 4P)	27.489	6 (5F, 1P)	7.021	5	5.849	0	0	0	0	0	0	40.359
Grand Total	238	526.756	271	324.303	5	5.849	497	105.438	7	2.492	25	9.204	974.042

1.7.10 In Dr Nand Kishore's working plan, village maps of 16"= 1 mile scale have been transferred on toposheets of scale 4" = 1 mile with the help of pantograph showing Protected Forest boundaries. Isolated patches of protected forests have been shown on separate sheets. **The present plan has endeavoured to prepare digital maps of the entire forests area in the GIS (Geographical Information System) environment**, which integrates maps in different scales to bring uniformity. This digitisation includes Reserved Forest boundaries, cadastral map (village maps) of the protected forests area (of the 249 revenue villages) & digitisation of Zudupi jungles (497 villages). In addition to these, areas contours, drainage, major and minor roads and other important features are included in digital database. **(Appendix 1.11)**

ADMINISTRATIVE UNITS

1.7.11 For administrative convenience the ranges, rounds and beats were reorganised in 1982 and the entire division has been divided into 5 Ranges, 24 Rounds and 142 Beats. Range-wise distribution of forests is given in the Table 1.7. **(Appendix 1.12)**

DISFORESTATION PRIOR TO 1980

1.7.12 The disforestation made in Wardha Division of **3825.73** ha in Reserved Forest (**Appendix 1.13a**) and area of seven Forest villages **1223.48 ha** is disforested and transferred to Revenue department (**Appendix 1.13b**) Thus total area disforested in Reserved Forest is **5049.21 ha** and total area disforested in Protected Forest is **2168.17 ha. (Appendix1.13c)**

AREAS DIVERTED FOR NON- FORESTRY PURPOSES UNDER FOREST CONSERVATION ACT, 1980

1.7.13 Forest areas as given in the Table 1.8 are under non-forestry use and the provisions of Forest Conservation Act, 1980 are applicable in such cases. The total area of such forestland is 1010.670 ha under 45 projects,. In lieu of this, 920.43 ha of non-forest and 9179.79 ha Zudapi jungle have been made available to the division from project authorities and revenue department. Out of 10100.22 ha land; part land shall be made available for Compensatory Afforestation against the projects of other districts than Wardha (**Appendix No. 1.14**). Abstract of this is as follows:

Table 1.8

Projects of Wardha district				
No of Projects	Forest Land (ha)	Compensatory land (ha)		
		ZJ	NFL	Total
45	1010.67	9179.790	920.43	10100.22

1.8 STATE OF BOUNDARIES

1.8.01 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.

1.8.02 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 ex-proprietary 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 are given in **Appendix 1.15**.

1.9 LEGAL POSITION

1.9.01 **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 From 1* of the Division.

1.9.02 **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.

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

1.9.04 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.

1.9.05 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.

1.9.06 A number of alterations and adjustments affecting the area of the Reserve and Protected Forests have subsequently taken place. The details of these are recorded in Form No 1. The details of these notifications are given in **Appendix 1.16**.

1.9.07 10543.78 ha of Zudupi jungle owned by Revenue department handed over to Forest department., the proposal for notification 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 1.9.

Table 1.9 Zudupi Jungle distribution

Zudupi Jungle (Taluka wise)		
Taluka	No of village	Total area (ha)
Arvi	33	817.66
Ashti	45	780.2
Deoli	54	791.78
Hinganghat	86	1975.45
Karanja	40	1182.48
Samudrapur	111	2451.59
Seloo	62	1082.77
Wardha	66	1461.85
Total	497	10543.78

Zudupi Jungle (Range wise)		
Range	No of village	Total area (ha)
Wardha	317	6680.67
Hingni	62	1082.77
Karanja	40	1182.48
Arvi	33	817.66
Ashti	45	780.2
Total	497	10543.78

1.10 RIGHTS AND CONCESSIONS

RESERVED FORESTS

1.10.01 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.

- o 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 .

1.10.02 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

1.10.03 Before abolition of the proprietary rights all lands belonged to the proprietors. A village administration paper called "Wazib-ul-arz," 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.

1.10.04 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.

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

- o 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.

GRAZING

1.10.06 As per the 2003 cattle census, the total cattle population of Wardha District is 6.93 lakhs. Out of this, 58% cows and bulls; 10% buffaloes, 25% sheep, goats and horses and other cattle were 7%. The cattle density is 116 per sq km. From 1992 to 1997, there has been 9 percent increase in cattle population. Taluka-wise Live stock population in Wardha Distt. is given in Table 1.10 .

Table 1.10 Taluka Wise Live-Stock Population in Wardha District(as per 2003 census)

Taluka	Cows & Bulls	Buffaloes	Sheeps	Goats	Horses	Others	Total
Ashti	24453	4191	1573	11623	43	2311	44194
Samudrapur	105855	10409	451	41774	11	13627	172127
Wardha	48486	10664	543	17894	31	6723	84341
Arvi	41514	12635	223	18451	11	5412	78246
Karanja	41612	10286	142	9808	5	4746	66609
Deoli	46454	7679	335	22288	17	4352	81125
Hinganghat	53510	7054	719	28488	28	5237	95036
Seloo	39740	5452	41	19666	18	6284	71201
Total	401634	68370	4027	169992	164	48692	692879
Percent	57.97	9.87	0.58	24.53	0.02	7.03	100.00

1.10.07 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 gazing 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."

1.10.08 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 information of grazing units village wise and grazing capacity is mentioned in the **Appendix 1.17**.

1.10.09 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 further that all animals in excess of those specified in 5;
 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.

OCCUPATIONAL NISTAR

1.10.10 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.

1.10.11 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

1.10.12 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

1.10.13 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.

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

1.10.15 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.

1.10.16 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.

1.10.17 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.

1.10.18 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 partaks 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.

Chapter II

THE FLORA AND FAUNA

IIA FLORA

2.1 TREES

2.1.01 The forest of Wardha division comprises of dry teak forest, and southern dry mixed deciduous forest in type and composition which supports high proportion of teak. The crop mainly ranges from middle aged to mature and is of uneven aged in character and composition. They are rich in floral diversity. Majority of the area have been worked 3 to 4 times under coppice system, hence vigor of coppice production is reduced. Although crop is middle aged to mature; occasional young and over matured trees are found. The dominant site qualities are IVA, but the areas of site quality III and IVB are also found mixed in the crop. The density varies from 0.4 to 0.8.

2.1.02 Teak is predominant species and found in well drained areas having good loamy soil. It constitute over 50% of the crop and formed pure patches of teak at places. It is mainly found in Arvi, Hingni and Karanja ranges. The common associates of teak are Bherra, Dhawada, Lendia, Ain, Tendu, Mowai, Kalamb. Fruit bearing species such as Tendu, Moha, Achar, Aola, Chinch and Bel are commonly interspersed with miscellaneous trees.

2.1.03 Natural regeneration of teak and other prominent associates is found all places, but is far from adequate and its establishment varies from place to place due to fire and grazing damage. In many areas, mainly of Protected Forest adjoining to villages are having scrub and scanty forest and mostly thorny species like Babul, Chillati, Khair; are found. The grass lands in the division are not properly managed during previous plan because of which weeds, shrubs and thorny bushes invaded the grass land areas.

2.1.04 NWFP species formed a major component of the vegetation. (Tendu, Kullu, Salai, Dhawada, Char, Aola and medicinal plants)

Enumeration results shows species girth wise distribution per ha in overall area shown in the following Table.

Table 2.1 Species and girth distribution per ha. in the Over - all areas

Species	16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-above	Total	Basal Area
Ain*	1.274	1.316	1.037	0.594	0.451	0.247	0.140	0.069	0.096	5.224	0.15
Aonla	0.037	0.050	0.046	0.034	0.026	0.013	0.006	0.002	0.001	0.215	0.01
Behada	0.131	0.124	0.111	0.048	0.050	0.039	0.015	0.025	0.034	0.577	0.02
Bija*	0.015	0.021	0.016	0.008	0.007	0.012	0.006	0.004	0.002	0.090	0
Bhirra	5.540	5.890	4.430	2.810	1.281	0.694	0.310	0.106	0.093	21.155	0.48
Biba	0.108	0.078	0.050	0.025	0.003	0.003	0.001	0.000	0.001	0.268	0
Bel	0.767	0.774	0.861	0.667	0.347	0.157	0.075	0.006	0.013	3.666	0.1
Char	0.135	0.204	0.128	0.090	0.061	0.025	0.035	0.011	0.009	0.697	0.02
Chichwa	0.063	0.018	0.013	0.007	0.006	0.013	0.005	0.005	0.011	0.141	0.01
Dhaman	0.104	0.083	0.038	0.018	0.002	0.001	0.002	0.000	0.000	0.248	0
Dhawada	2.382	2.813	1.757	1.122	0.784	0.448	0.243	0.122	0.071	9.744	0.25
Garadi	0.066	0.120	0.074	0.031	0.011	0.000	0.000	0.000	0.000	0.302	0.01
Haldu*	0.004	0.003	0.008	0.001	0.000	0.002	0.001	0.000	0.002	0.021	0
Hirda	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0
kalam*	0.257	0.246	0.304	0.229	0.153	0.116	0.081	0.031	0.095	1.513	0.06
Kasai	0.015	0.018	0.012	0.002	0.000	0.000	0.000	0.000	0.000	0.046	0
Khair*	4.371	6.761	3.147	1.170	0.409	0.135	0.045	0.012	0.022	16.073	0.25
Kullu	0.032	0.022	0.007	0.001	0.000	0.001	0.000	0.000	0.001	0.064	0
Lendia*	3.280	3.012	1.350	0.645	0.277	0.097	0.032	0.010	0.003	8.706	0.13
Moha	0.045	0.033	0.015	0.024	0.011	0.020	0.010	0.026	0.082	0.265	0.02
Mokha	0.004	0.005	0.003	0.002	0.004	0.001	0.001	0.001	0.000	0.020	0
Mowai	0.405	0.498	0.499	0.572	0.476	0.298	0.157	0.117	0.091	3.114	0.13
Palas	9.610	8.833	5.097	2.194	0.801	0.310	0.142	0.053	0.066	27.106	0.44
Rohan	0.071	0.083	0.072	0.064	0.030	0.017	0.017	0.013	0.009	0.376	0.01
Salai*	0.136	0.117	0.196	0.586	0.316	0.278	0.205	0.136	0.097	2.066	0.12
Semal*	0.002	0.000	0.002	0.005	0.002	0.002	0.004	0.002	0.004	0.023	0
Shisam*	0.010	0.012	0.017	0.011	0.001	0.004	0.000	0.003	0.001	0.060	0
Shiwan	0.000	0.002	0.002	0.002	0.002	0.001	0.000	0.002	0.000	0.010	0
Surya	0.000	0.000	0.000	0.000	0.000	0.009	0.003	0.000	0.000	0.012	0
Teak*	37.057	40.483	31.278	17.615	8.221	3.762	1.567	0.691	0.480	141.153	3.03
Tendu	4.459	1.859	0.738	0.321	0.164	0.107	0.092	0.021	0.043	7.802	0.1
Tiwas*	0.018	0.028	0.010	0.004	0.002	0.001	0.002	0.000	0.000	0.065	0
Other	9.843	6.617	2.538	0.964	0.518	0.253	0.175	0.089	0.255	21.252	0.33
Total	80.243	80.121	53.853	29.867	14.416	7.064	3.373	1.558	1.581	272.077	5.67

The species distribution per ha of few species in the previous plan (Dr Nand Kishore's plan) is given in the Table 2.2 below:

Table 2.2

Species	16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-above	Total
Ain	2.37	2.135	1.47	0.91	0.5	0.255	0.135	0.055	0.105	7.935
Bija	0.01	0.025	0.015	0.03	0.005	0.005	0	0	0	0.09
Haldu	0	0	0	0	0	0	0	0	0	0
kalam	0.14	0.24	0.28	0.22	0.14	0.11	0.07	0.04	0.05	1.27
Khair	6.76	6.48	3.685	1.145	0.335	0.08	0.025	0.01	0.01	18.53
Lendia	2.55	1.86	0.88	0.33	0.105	0.03	0.005	0.005	0.005	5.77
Salai	0.73	0.87	0.94	1.11	0.845	0.55	0.35	0.15	0.16	5.705
Semal	0.005	0.020	0.025	0.015	0.005	0.000	0.005	0.000	0.010	0.085
Shisam	0.015	0.010	0.020	0.010	0.000	0.000	0.000	0.000	0.000	0.055
Teak	45.350	53.775	34.790	17.900	8.045	3.060	1.305	0.395	0.360	164.980
Tiwas	0.000	0.010	0.015	0.015	0.005	0.000	0.000	0.000	0.000	0.045

Comparative statement between the species (*) in Table 2.1 and Table 2.2 is given in Table 2.3

Table 2.3

Species	No of species per ha as per table 2.1	No of species per ha as per table 2.2	increase / decrease	Percentage
Ain	5.224	7.935	decrease	34.17
Bija	0.09	0.09	--	--
Haldu	0.021	0	increase	--
kalam	1.513	1.27	increase	16.06
Khair	16.073	18.53	decrease	13.26
Lendia	8.706	5.77	increase	33.72
Salai	2.066	5.705	decrease	63.79
Semal	0.023	0.085	decrease	72.94
Shisam	0.06	0.055	increase	8.33
Teak	141.153	164.980	decrease	14.44
Tiwas	0.065	0.045	increase	30.77

2.1.05 Comparative statement shows that the species Haldu, Kalam, Shisam and Tiwas increase in number whereas the species Ain, Khair, Salai, Semal and Teak are reduced in number during the plan period. Regeneration of Hirda absent in the division. It is mainly fruit and medicinal species which needs strict protection and conservation measures. The decrease in percentage of Salai and Semal can be compensated through seed sowings as well as through planting of cuttings in case of Salai. Protection measures be taken to avoid illicit cutting for fuelwood.

2.2 COMPOSITION AND CONDITION OF THE CROP

2.2.01 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 is Deccan trap, but the soil varies. Geology, soil type and depth plays an important role in determining the composition and quality of the crop.

2.2.02 The biotic factors which have resulted in the degradation of the forests are excessive grazing, unregulated felling and frequent fires. The 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 forests of Wardha Division has been classified, as follows, as per Champion and Seth's classification:

Table 2.4 Forest types found in the Wardha Division (Champion and Seth's classification)

<u>Type</u>	<u>Notation</u>	<u>Type description</u>
Sub-group	5 A	Southern Tropical Dry Deciduous Forests.
I. Climax types	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	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

2.2.03 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's 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.

2.204 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.

2.3 DRY TEAK BEARING FORESTS

A) VERY DRY TEAK FORESTS

2.3.01 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 8m. Characteristic species with the 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 arbor-tristis*, *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

2.3.02 These are found in southern parts of Ashti and Arvi ranges, western part of Karanja, Hingni ranges and Bor Sanctuary. The percentage of teak in these forest varies from 40% to 80%. The average quality of the crop is IVa and IVb. Occasional 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. Bamboos are practically absent except in few compartments of Karanja, Hingni ranges and Bor Sanctuary. The crop is mainly of the quality IVb. The floristic is, as follows:

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

C) SOUTHERN DRY MIXED DECIDUOUS FOREST

2.3.03 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 Girad area. The quality of the crop is mainly IVb. Some quality IVa patches are also found in Bor Sanctuary. The floristic is as below:

- I/II. *Chloroxylon swietenia*, *Terminalia alata*, *Tectona grandis*, *Anogeissus latifolia*, *Boswellia serrata*, *Lagerstroemia parviflora*, *Diospyros melaoxylon*, *Lanea coromandelica*, *Soymida febrifuga*, *Ougenia oogenesis*, *Schrebera swietenoides*, *Madhuca longifolia*, *Dalbergia latifolia*, *Buchnanian lanzan*, *Aegle marmelos*, *Mitragyna parviflora*.
- III. *Ziziphus spp.*, *Nyctanthes arbortristis*, *Helicteres isora*, *Vitex negundo*, *Grewia spp.*, *Woodfordia fruticosa*, *Holarrhena pubescens*, *Lantana camara*.

IV. *Cassia tora*, *Hyptis suaveolens*.

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

V. *Butea superba*, *Bauhinia vahlii*.

D) DRY DECIDUOUS SCRUB

2.3.04 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 arbortristis*.

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

E) BOSWELLIA FORESTS

2.3.05 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 arbortristis*.

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

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

F) BUTEA FOREST

2.3.06 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 birs 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* in almost pure patches, *Diospyros melanoxylon*, *Acacia leucophloea*.

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

G) DRY TROPICAL REVERAIN FOREST

2.3.07 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*, *Syzigium cumini*, *Ficus racemosa*.
- I. *Pongamia pinnata*, *Diospyros tomentosa*, *Butea monosperma*.
- II. *Helicteres isora*, *Ficus hispida*, *Vitex negundo*.
- IVa. *Parthenium hysteropnorus*.
- IVb. Very little grass.
- V. Very little climbers.

2.3.08 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 (*Gardenia turgida*) and bor (*Ziziphus mauritiana*). They form as a part of Dry Deciduous Scrub, having khair and bor are in abundance.

2.4 STATUS OF NATURAL REGENERATION

2.4.01 Data on regeneration status collected along with enumeration of the crop in 0.04 ha sub-plots in the enumeration plots. The seedlings are enumerated in the following three categories, as given in the Table. 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 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.

Table 2.5 Seedlings and saplings per ha in overall area

Range	Seedlings (R1)	Saplings (R2)	Saplings (R3)	Total
	0.3–1.0 meter	1.0–3.0 meter	> 3.0 meter	
Arvi	577	267	148	992
Ashti	514	237	69	820
Hingni	432	322	210	964
Karanja	400	248	35	683
Wardha	473	298	46	817
Average	479	274	102	855

2.5 INJURIES TO WHICH THE CROP IS LIABLE

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

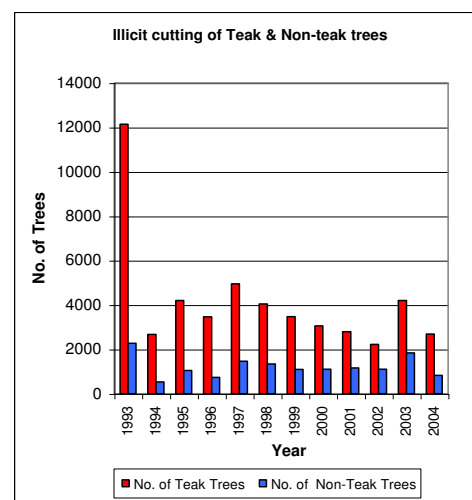
(i) **By man:** The damage by man can be classified into, the following, two categories.

(a) Illicit cutting: There are **7 hyper sensitive beats**, **30 sensitive beats** and 105 normal beats in the division.

Table 2.6 Hypersensitive, Sensitive and Normal Beats

Sr No	Range	Hypersensitive Beats	Sensitive Beats	Normal Beats	Total
1	Arvi	4	9	23	36
2	Ashti	2	7	25	34
3	Hingni	0	8	21	29
4	Karanja	1	3	16	20
5	Wardha	0	3	20	23
Total		7	30	105	142

Illicit cutting for wood including timber, poles and firewood is common throughout 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 is 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.

Table 2.7 Illicit felling during last 10 years .

Year	No. of Trees		Year	No. of Trees	
	Teak	Non-Teak		Teak	Non-Teak
1993	12140	2270	1999	3472	1097
1994	2671	535	2000	3051	1100
1995	4197	1046	2001	2796	1161
1996	3461	735	2002	2222	1103
1997	4949	1463	2003	4198	1841
1998	4043	1342	2004	2686	826

(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.

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

Range	No. of encroachers	Encroachment Area (ha)
Arvi	6	6.20
Ashti	60	54.66
Karanja	----	----
Hingni	3	5.77
Wardha	----	----
Total	69	66.63

The encroachment on forest land after April 1978 is given below in Table

Division	Encroachment found upto Sep/02		Encroachment Evicted upto date		Encroachment remains	
	Nos.	Area (ha)	Nos.	Area (ha)	Nos.	Area
Wardha	911	328.234	27	3.109	884	325.105

(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, generally, very little. 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.

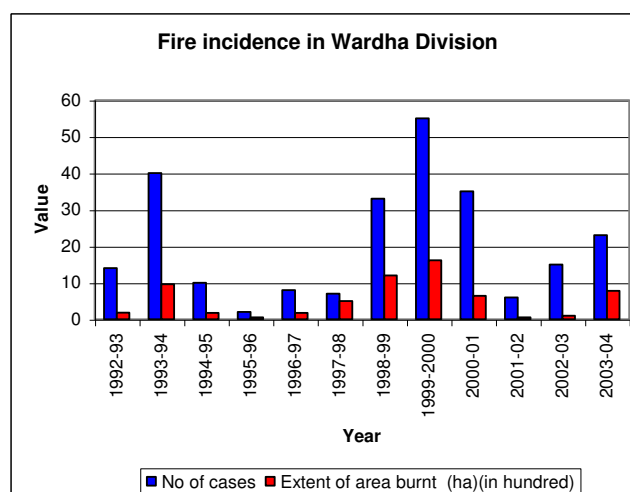
(iv) **By insects:** The attacks of teak defoliator (*Hyblia purea*) and teak skeletonizers (*Hapalia macharalis*) are common in teak and occur almost each year during the period from July to October. Termite attack is also common. But in bigger trees it is confined to dead bark. The damage to week young seedlings and planted seedlings is caused by the termite at the base of the collar.

(v) **By parasites:** Bandh (*Loranthus longiflora*) is generally found on the branches of achar, hiwar, salai and some times on tendu, ain, dhaora and lendia.

(vi) **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.

- (vii) **By frost:** So far no severe frost is recorded in the area.
- (viii) **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.
- (ix) **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.

(x) **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. Fire incidences during 1992-93 to 2003-04 is given in the table below:

Table 2.8

Year	No of cases	Extent of area burnt (ha)	Loss in Rs	Year	No of cases	Extent of area burnt (ha)	Loss in Rs
1992-93	14	182.00	0	1998-99	33	1199.00	5600
1993-94	40	963.00	15000	1999-2000	55	1617.00	24603
1994-95	10	175.00	24602	2000-2001	35	640.50	0
1995-96	2	50.00	0	2001-2002	6	51.00	0
1996-97	8	174.10	221520	2002-2003	15	95.95	0
1997-98	7	498.00	0	2003-2004	23	780.63	73500

Fire are 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 moha flowers and also to get the new flush of grasses. Sometimes fires spread from the adjoining cultivation area. The extent of damages due to Illicit cutting, Grazing, Fire, and other offences during 1992 - 93 to 2003 - 2004 is given in **Appendix 2.1**.

2.6 SOIL EROSION

2.6.01 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.

2.6.02 The soil erosion is proceeding at an alarming rate in all the marginal areas of the Reserved Forests and also in the Protected Forests all over the division. The erosion has increased due to excess harvesting of coupes without soil conservation works, excessive grazing and repeated fires. The soil erosion is most in the Ashti range and scattered patches of Protected Forests in other ranges. Illicit cutting is further accentuating the process of erosion.

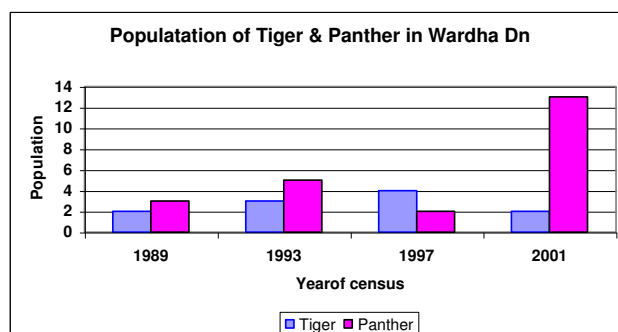
IIB FAUNA

2.7 DESCRIPTION OF THE FAUNA

2.7.01 Fauna of Wardha forest division is not varied. It contains very small number of wild animals and birds. The forest area in the division is scattered in small patches and does not form a contiguous block, because of the scattered nature area is disturbed. The crop is mostly of dry deciduous teak forest with open density except few patches of Dhaga and Bhawan with long interval of drought under such adverse conditions. The incidence of wildlife in this forest is very rare and occasional. The Wardha forest division is very rich in herbivorous population. Most of the wildlife is confined to the compact block of forests of Hingni, Karanja, Arvi and Ashti ranges; and the Bor sanctuary. The Tiger and Panther population in Wardha division and adjoining Bor Sanctuary is given in following table:

Table 2.9 Population of Tiger & Panther in Wardha Forest Division and Bor Sanctuary

Year	Wardha forest division		Bor Wildlife Sanctuary	
	Tiger	Panther	Tiger	Panther
1989	2	3	0	1
1993	3	5	1	2
1997	4	2	0	4
2001	2	13	5	8



The common wild animals found in the tract in question are given, as under:

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

Tiger is usually found in Ashti, Arvi, Hingni and Karanja ranges and in the Bor sanctuary. Panther is found in almost all the ranges. Jackal and Foxes are found very frequently near the inhabited areas. The wild cat is found near scrub forest. Wild dogs are found in the Bor sanctuary and Hingni range.

HERBIVORA: (i) Nilgai (*Boselaphus tragocamelus*) (ii) Sambhar (*Cervus unicolor*) (iii) Cheetal (*Axis axis*) (iv) Barking Deer (*Muntiacus muntjak*) (v) Wild pig (*Sus scrofa*) (vi) Sloth bear (*Melursus ursinus*) (viii) Four horned antelope (*Tetraceros quadricornis*) (ix) Langurs (*Presbytis entellus*).

Nilgai is found all over the tract. Rest of the herbivores is found mostly in the compact block. Hares are common throughout the division.

Table 2.10 Population of other wild animals (excluding Tiger, Panther) as per 2001 census (3688 animals) is given below,

Name	Population	Name	Population	Name	Population
Sloth Bear	11	Chital	53	Jungle Fowl	108
Sambar	145	Chousinga	16	Wolf	11
Nilgai	925	Langur	58	Monkey	422
Wild Boar	909	Hare	110	Moongoose	43
Wild Dog	28	Jungle Cat	14	Saras	1
Stag	28	Hyeana	4	Deer	201
Barking Deer	108	Peacock	440	Fox	53

As per 2004 census wild animal estimated population is 6539, given in the table below:

Name	Population	Name	Population	Name	Population
Sloth Bear	27	Pea Hen	27	Barking Deer	149
Sambar	163	Hyeana	493	Monkey	1886
Rohi	676	Peacock	397	Wild Pig	2046
Chinkara	8	Jungle Fowl	267	Wild Dog	10
Wolf	25	Deer	298	Fox	70
Nilgai	613	Hare	493	Saras	4
Moongoose	52				

RODENTS: (i) Three striped palm squirrel (*Funambulus palmarum*) (ii) Porcupine (*Hystrix indica*) (iii) Hare (*Lepus ruficaudatus*).

SNAKE: Kadu (*Typhlops braminus*), Dutondya (*Iryx conicus*), Ajar (*Python molurus*), Dhaman (*Pytas mucosuc*), Nag (*Naja naja*).

The reach black soil and river region of the south in the district are areas of snake whereas, Ajar is commonly found deep in the forest.

FISHES: Tambir (*Labeo fimbriatus*), Rohu (*Labeo rohita*), Katla (*Katla katla*), Waghur (*Clarias batrachus*), Singharee (*Mystusaor*), Botari (*Channa punctatus*), Dookkar machhi (*Nandus nandus*), Bam (*Masto cembulus pancalus*).

Bor reservoir, four large perennial tanks (Kelzar tank, Deo tanks, Sarangpuri tank and Kapileshwar tank) and other seasonal tank offer habitation places for the fishes.

WILD BIRDS: (i) Painted sand grouse (*Pterocles indicus*) (ii) Common sand grouse (*Pterocles exustus*) (iii) Pea fowl (*Pavo cristatus*) (iv) Grey jungle fowl (*Gallus sonne ratil*) (v) Painted partridges (*Francolinus pictus*) (vi) Grey partridges (*Francolinus pondicerianus*) (vii) Black breasted Rain quail (*Cturnix coronandelicus*) (viii) Indian Bustard quail (*Turnix suscitator*) (ix) Indian or yellow legged button quail (*Turnix tanki*) (x) Pigeon (*Treron phoonicoptera*) (xi) Crane (*Grus antigone*) (xii) Dove (*Streptpotia spp*) (xiii) Cotton teal (*Nettapus coromandelianus*) (xiv) Whistling teal (*Dendrocugna javanica*).

2.7.02 Sand grouse, quails, partridges, pea fowl, jungle fowl, pigeon and dove are found in all parts of the tract. Cranes are found near large tanks but are not regular visitors. Cotton teal and whistling teal are common near tanks.

2.8 GENERAL HISTORY OF THE WILD LIFE CONSERVATION

2.8.01 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 *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.

2.9 LEGAL POSITION

2.9.01 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 any one who hunts, shoots, fishes, poisons water or sets traps or snares, shall be punishable with the fine which may extend upto 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.

2.9.02 Vide Notification G.I.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.

2.9.03 Prior to reorganisation of states, the wildlife conservation in this part was through the implementation of the provisions of the Indian Forest Act, 1927 and the shooting rules framed under section 26(i) and 76(d) by Madhya Pradesh Government as given in Appendix VIII of M P

Forest Manual. Volume II, combined with the Wild Birds and Animal Protection Act 1912 as amended by the Central Provinces Amendment Act of 1935. In 1927, shooting blocks system was started. Under this system, the Conservator of Forests in consultation with the Divisional Forest Officer declared certain blocks of Reserved Forests with abundant game as open for shooting. The Divisional Forest Officer used to issue permits for shooting, wherein the type of game and their number allowed to be hunted together with other relevant conditions were used to be mentioned.

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

1. Its provisions were also applicable out side 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.

2.9.05 The Indian Board of Wildlife was constituted in 1952 with the main object to devise ways and means for conservation of wildlife through co-ordinated legislative and practical measures and sponsoring the setting up of National Parks and Wildlife Sanctuaries. The Parliament enacted the Wildlife (Protection) Act, 1972, which came into force in the State of Maharashtra with effect from 1st June 1973. Since the commencement of this Act, every other Act 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 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. The rules made under this Act are, as follows:

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

2.9.06 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. Bor sanctuary is geographically located adjacent to Hingni range 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. Hence, such clearance is obligatory in case of many of the projects involving forestland of this division because some part of its forests is located in the vicinity of these protected areas.

2.10 SUMMARY OF WILDLIFE (PROTECTION) ACT, 1972

2.10.01 The Wildlife (Protection) Act 1972 provides for effective protection and conservation of wildlife, that is, fauna as well as flora, total ban on hunting of wild animals and severe restrictions on wildlife related trade. The act has been amended from time to time and its amendments done in 1991 and recently in 2002 have brought far-reaching changes in it. Summary of salient features particularly the provisions regarding ban on hunting, restrictions on trade, powers and duties of forest officers and conservation of wildlife outside the protected areas is given below.

1. The scope of the Wildlife (Protection) Act, 1972 has been widened appreciably, which can be summarised as follows:

- (i) The objective of Wildlife (Protection) Act 1972 is Protection of Wild animals, Birds and Plants with a view to ensuring the ecological and environmental security of the country.
 - (ii) The words and phrases related to hunting like game and game reserve are now totally removed from wildlife management.
 - (iii) New categories of PAs have been added. 'Chapter IV – Sanctuaries, National Parks and Closed area', has been changed to 'Chapter IV – Protected Areas' and Protected area has been defined under Section 2(24A). These categories are –
 - 1) Sanctuary (Section 2(26) and 18)
 - 2) National Park (Section 2(21) and 35)
 - 3) Conservation Reserve (Section 36A)
 - 4) Community Reserve (Section 36C)
 - (iv) The category of game reserve was deleted from this chapter by the 1991 amendment and that of closed area has now been deleted through the 2002 amendment.
 - (v) The 1991 amendment brought zoos under its jurisdiction and the 2002 amendment makes norms for proper upkeep of animals applicable to zoos, also applicable to circus and rescue centres.
2. A wild animal can be hunted only under special and exceptional circumstances and that too after following elaborate procedure prescribed for the purpose.
 3. When an animal included in the schedule-I becomes dangerous to **human life** or is disabled/ diseased beyond recovery, it may be hunted but while doing so, it will be killed only when it can not be captured, tranquillised or translocated and further such captured animal shall not be kept in captivity unless it is established that it can not be rehabilitated.

Animals belonging to other schedules however can be allowed to be hunted in cases where they become dangerous to **human property**.
 4. Penalties for the wildlife offences have been made much more severe and amendments done in the year 2002 have inserted a new chapter "V A- Forfeiture of Property Derived from Illegal Hunting and Trade" containing 25 sections. These provisions can be invoked if an illegal property has been acquired by carrying on business involving animals included in schedule I and Part II of schedule II.

5. No one is allowed to carry on trade relating to any animal or animal article etc. included in Schedule I and Part II of Schedule II and severe restrictions are put even on the trade relating to other wild animals.
6. The Wildlife (Protection) Act, 1972 does not allow acquiring of any wild animal, animal article etc. now, yet a large number of individuals do possess the same having owned it prior to promulgation of this act. The act therefore required such individuals to declare these articles within 30 Days of coming into force of this act. CWLW was to issue ownership certificate as per those declarations and after doing the necessary scrutiny. This did not happen due to lack of publicity of the act and consequent ignorance among the public in general about its relevant provisions.

The 2002 amendment to the act has identified this problem and a new section '40A-Immunity in certain cases' has been inserted to provide another chance to such holders of captive animal/animal article etc. Declaration of Wildlife Stock Rules, 2003 have been promulgated to prescribe the time, form and the manner through which such declarations can be made and ownership certificates can be obtained even now. According to these rules, declaration under Section 40A could be done within 180 days from the date of coming into force of these rules. The CWLW shall, as far as possible, decide such cases within 6 months from the date of declaration.

No animal except live elephant or animal article can now be acquired except by way of inheritance.

7. **Delegation of Powers to Forest Officers**

The CWLW of the state has been authorised to delegate his powers, except those which authorised him to permit hunting of an animal under Schedule I that has become dangerous to human life or is so disabled or diseased as to be beyond recovery, under various sections of the act to various forest officers with previous approval of the state government. Besides the state government has conferred powers of Wildlife Wardens (Govt. Order No.WLP/1077/86854/F-1, dt.5.5.1977) as follows:

1) Chief Wildlife Warden (CWLW)	CCF(WL)
2) Addl. Chief Wildlife Warden	CF/CF(WL)/RM
3) Dy. Chief Wildlife Warden	DCF/DFO/DM
4) Wildlife Warden	ACF

5) Asstt. Wildlife Warden RFO

The present delegation under practice is the one which is in force from 18.8.1993 and was ordered vide CCF(Wildlife (Protection) Act 1972) letter No.D-22(D)(1)/C.No.117/1180, dt.18.8.1993. This delegation empowers the forest officers in the field for the various purposes narrated in the act and the manner in which they are to be achieved. This may be summarised as below:

- 1) Receive declaration of animal/ animal article and applications for different purposes under the act. Also power to deal with matters ancillary to the above.
 - 2) Deal with wildlife offences as well as their compounding.
 - 3) Registration of arms license holder.
 - 4) Power to make complaint in the court.
 - 5) Power to grant permit for hunting of an animal other than specified in schedule I, which has become dangerous to human life and property.
 - 6) Power to deal with a wild animal live or dead, which is a government property.
8. Any person (that is, common man) is authorised to make a complaint regarding the commission of a wildlife offence and the competent court shall take cognisance of such complaint provided complaint is made 60 days after such person must have given a notice to wildlife warden concerned.
9. The 1991 amendment introduced a provision for payment of a 50% of fine (imposed under Section 51) or of compensation (accepted and paid while compounding of a case under Section 54) as reward to a person who renders assistance in detection of offence/apprehension of offenders and the amendment of 2002 has now introduced the provision under Section 60B for arrangement of money to facilitate giving reward upto Rs.10,000/- to the informer, that is, the person who renders assistance in detection of offence or the apprehension of the offenders.
10. Definition of livestock has been appreciably widened to include animals like camel, donkey, horses, mules and pigs, and 2002 amendment has specifically made a mention under this definition that livestock does not include any animal included under Schedule I – V of the act.

11. The 1991 amendment to the act also addressed to the conservation of floral bio-diversity, although present scheduled plants (under the schedule VI) are not found in Maharashtra.
12. Zoos have been brought under the perview of the act. No zoo can operate without being recognised by the Central Zoo Authority and no new zoo can be established without obtaining prior approval of this authority. CZA has framed regulations providing elaborate procedure, norms and set of conditions under which a zoo can be established and run. A zoo under the act means a facility where captured animals are kept for exhibition to the public and it also includes Circus (where such animals are used wholly or mainly for performing tricks) and rescue centres.
13. All the arms license holders within 10 km radius from the PA boundary are to be registered with wildlife wardens and no new license in this area can be issued without prior concurrence of the Chief Wildlife Warden.
14. The Wildlife (Protection) Act, 1972 does not recognise rights and concessions of local people over wild animals or articles made from them except things like peacock feathers. In fact any wild animal found live or dead and/ or animal articles etc. are a government property. However, State Wildlife Advisory Board may advise the state govt. in regard to harmonising the needs of the tribals and other dwellers of the forest with protection and conservation of wildlife. The act also provides that any forest produce removed from a PA can be used for meeting the bonafide needs of people living in and around the PA but the same cannot be sold for commercial purposes.
15. Only Central Govt. can alter entries in the various schedules. However, the act empowers the CWLW to state to take appropriate management measures including hunting for an animal/group of animals (of schedule II, III, IV) as a part of scientific management of such animals which have become abundant in a localised area. This may include trans-locating such animal/group of animals for the purpose of population management from a specified area to other suitable places.
16. The Wildlife (Protection) Amendment Act, 2002 has inserted Section 36A to 36D for constitution and management of Conservation and Community Reserves. Thus, the areas linking various PAs may be formed into a Conservation Reserve and private/ community lands, wherein the owner (individual/community) volunteers to conserve wildlife, may be formed into a Community Reserve.

17. Sanctuaries have been brought to almost same conservation status as of National Parks through 1991 and now through the of 2002 amendment -
- There is a complete ban on sale of forest produce recovered for PAs;
 - No construction of tourist facilities or establishment of Zoos etc. inside a PA without prior approval of the National Board for Wildlife is allowed;
 - Forest officers have been empowered to remove encroachments from PAs;
 - Boundary of PAs cannot be altered without National Board's recommendation.
18. Tourism is not recognised as an objective in this Act. Nor is it so under forest acts, namely Indian Forest Act, 1927 and Forest Conservation Act, 1980. Tourism facilities on the other hand within a PA can be established only after concurrence from National Board for Wildlife. National Board for Wildlife is also expected to frame policies on promoting wildlife conservation, impact assessment of various projects as well as matters relating to resolution of disputes in PAs. The National Wildlife Action Plan, 2002-2016 however discusses eco-tourism but in relation to PAs where it is supposed to be subservient to conservation. However, tourism in forest areas outside the PAs is also gathering momentum and hence the strategy and action plan developed under this document (National Wildlife Action Plan, 2002-2016) may become a guideline for forest tourism albeit with lesser restrictions.

2.11 INJURIES TO WILD LIFE

2.11.01 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. Poachers usually shoot the animals when they (wild animals) come to waterhole. Therefore the animals are particularly vulnerable during summer, when number of such water holes are drastically reduced and also water in a water hole recedes to minimum.

It has been recently noticed that a new and very dangerous method of poaching through poisoning of drinking water by mixing urea in large concentration has been innovated by the poachers. When an animal drinks such water, it dies within hours due to intense gas formation in stomach and choking of breathing organs. The poachers then remove 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 trapped in the past but of late the poachers have been found using the improvised traps for killing the large animals like tigers very effectively and regularly.

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 new method which is proving to be a potential threat to animals, besides sometimes being hazardous to local people. No poaching of Tiger and panther is reported in Wardha division during 1995 to March 2005; except that one Panther was poached by electrocution in the year 2000-01; in which 3 poachers are involved and the case is in the court. There is no death of Tiger during 1995 to March 2005. However, the death of Panther cases in the division are shown in Table below:

Table 2.11 Death of Panther during 1995-96 to 2004-05 as under:

Year	Death	No	POR No & date	Cause of death
1995-96	Panther	1	132/16 dt 04.04.95	Natural
1996-97	Panther	1	20-10 dt 01.04.96	Natural
1997-98	Panther	1	1/17 dt 25.02.97	Accident(Felled in Well)
2000-01	Panther	1	43/9 dt 14.05.00	Natural
2002-03	Panther	1	21.04.02	Accident by railway
2004-05	Panther	1	22/10 dt.15.09.04	Natural

2.11.02 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 (तोंडखुरी) foot and mouth disease. Other diseases which may occur are (1) (काळपुरी) Anthrax (2) Rabies (3) (घटसर्प) HS (4) (बुळकांडी) (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.

2.11.03 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. The whole tract experiences water scarcity in summer. These fires aggravate the already existing water scarcity and expose these animals to above mentioned risks.

2.12 MEASURES FOR PROTECTION OF WILDLIFE

2.12.01 Besides the legal provision under the Wildlife (Protection) Act 1972 and the various rules made, thereof, following measures have been undertaken to protect the wildlife in the Division.

2.12.02 Compensation is paid to the owner whose cattle are killed by wild animals in the forest area as well as outside the forest as per GR No. WLP-1002/C.No.258/F-1, dated 27.01.2003.

2.12.03 In 1972, with a view to check illicit shooting of wild animals, the State Govt. sanctioned the grant of reward to the informants in respect of unlicensed shooting, provided that the information is found to be valid and leads to the conviction of the offender. In addition, the State Govt. has decided to grant reward, equal to 50% of the compensation actually recovered from the offender for illicit shooting, to the *Gram Panchayats* or its office bearers or individuals, who rendered co-operation in detecting such illicit shooting.

2.12.04 The following, have been proposed as the focus areas for the protection and development of wildlife and its habitat:

- (i) The areas having large number of wildlife should be delineated and strictly protected from fire.
- (ii) The water holes having perennial water supply should be identified and should be kept under constant watch especially during the summer months.
- (iii) Saltlicks should be developed in suitable sites near the water holes.
- (iv) Areas falling within the F T L – 2 to 4 of irrigation projects, planting of fodder species and edible grasses should be undertaken to provide fodder to the herbivores.

- (v) List of the poachers should be prepared and their movements should be kept under constant vigil.
- (vi) A systematic network of informants should be developed and they should be immediately rewarded after successful completion of the operations on the basis of the information supplied by them.
- (vii) Awareness should be developed in the people by encouraging them to take part in the drive for protection of wild animals.
- (viii) The Wildlife Week should be celebrated as the culmination of the year long drive to protect the wildlife.
- (ix) Eco-tourism is proposed to be encouraged and used by the department to disseminate awareness about wildlife protection and biodiversity conservation among the masses, especially, through organised and conducted tours and awareness camps involving educational institutions and NGOs.

2.13 MANAGEMENT OF FAUNA

2.13.01 National Forest Policy of 1988 speaks about the maintenance of Biological diversity. Restoration of degraded habitats out side protected areas is one of the strategies for action listed in the National Wildlife action Plan (2002-2016). Even after the establishment of network of protected area, wild animals, continue to be much more in number out side the protected area, that is in managed forest. It is true for Wardha division also. The forest of Wardha division provides effective corridor to Bor sanctuary. It is proposed to undertake measures for habitat development for which ecologically sensitive area shall be identified.

2.13.02 Identification of habitats (caves, dens, over hangs, in drops usually along nalas) riparian zones, mesic sites (swamps), biological hotspots (Natural blanks) plantation sites, old tanks, forests adjoining irrigation project (Those between HFL & FTL) shall be done.

2.13.03 The areas frequently occupied by the species, identified above shall be first mapped during the course of implementation of this plan as no such systematic information exists to day. Because of this reason no specific prescriptions are given in this chapter for the time being. However, first requirement of the conservation is to protect these sites and to remove all out side interference from such identified sites. Depending upon the requirement and the funds available, development activities may be planned on year to year basis during this plan period and in consultation with, and as per guidelines from, the Chief Wildlife warden.

- 1) A comprehensive database of the above sites along with the relevant maps shall be created.
- 2) No felling of trees or harvesting of other forest produce shall be allowed in the identified sites and also within 50 meter radius buffer around these sites.
- 3) There is a general restriction on felling of fruit trees like Aonla, Beheda, Hirda, Char, Tendu. Other trees bearing fruits and forming food to the wild animals and birds shall be identified and shall be reserved against felling particularly in the identified sites.

2.13.04 All the special habitat sites shall be strictly protected & monitored regularly against external pressure and all damaging influences, from grazing of domestic cattle, fire & poaching as well as from unregulated tourism. Water holes shall be desilted, if required during summer to provide adequate drinking water.

Water hole development

2.13.05 The water hole density shall be commensurate with the density of wild animals found in the area. Creation of additional water holes (permanent and temporary) is prescribed so that undisturbed water holes are available within 2 to 3 kilometers of the areas frequented by the large herbivores.

Small nalabunds, underground bunds and other technically sound small water harvesting structures may be constructed across the streams.

Small water harvesting structures, including, forest tanks may be taken (submergence area less than 1 hectare) up in the areas. The water harvesting structure with submergence area less than 1/2 hectare should be considered as small structures. However, creation of water holes or water harvesting structure should not damage the riparian ecosystem.

The works of water hole development are taken up in Wardha division during the year 2005-06 through 7% Zilla Parishad grant. Division has received the grant to the tune of Rs 24.61 lakh. Works are as follows:

1. Repairs to anicuts
2. Construction of 2 Vantali.
3. Construction of 30 Borewells, with attached cement tank of 3 meter diameter in 5 ranges.
4. Filling of water holes through water tankers.
5. Construction of cement plugs, Gabian bandharas.

A list of water holes, site wise is annexed in **Appendix 2.2**.

Marking and other restrictions

2.13.06 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.

While harvesting at least 2 down hollow logs, of low commercial value, per hectare shall be reserved for shelter of wildlife.

Tendu collection centers or labour camps shall not be allowed near water holes frequented by the important wildlife species. The labour camps shall be established away from areas of high wildlife density.

Development of fodder and browse

2.13.07 The carrying capacity for grazing is proposed to be determined after excluding the forest area required to meet fodder requirements of the wild animals.

Plantations prescribed in various working circles shall include at least 10 percent of fodder and fruit species of wildlife importance. Gular, Umber, Bor, 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 should be taken up to increase the grazing facilities for the wildlife.

Protection measures

2.13.08 The areas near sensitive water holes frequented by the wildlife may be excluded from grazing, and specially mentioned in the grazing license. Inoculation of cattle grazing near wildlife habitat sites and water holes shall be done.

Removal of flower, fruit and other medicinal parts and harvesting of herbs shall not be allowed in ecologically sensitive areas. The NWFP harvesting should be watched and monitored to prevent loss of genetic material from the forest areas.

Fortnight monitoring

2.13.09 Monitoring of wildlife is done by the field staff specially forest guard and forester. This information about identification is filled up in fortnight proforma which is routed through RFO, ACF and finally by the DCF. Final monitoring and mapping is done in division office. After continuous monitoring and using other supporting data like cattle killings, sighting, on the basis of which animals are tracked and proper watch is kept.

Joint patrolling with police

2.13.10 Joint patrolling on the identified wildlife sensitive routes has been taken up in all the ranges.

Identification of electrocution prone areas

2.13.11 There is growing trend in killing the wildlife animals by electrocution. Normally the farmers take electric current illegally by attaching wire to the overhead line wire in the night. The animals get killed due to electric current. Normally the electric supply get disconnected due to "Tripping". This is immediately known by local lineman and MSEB Sub-station. MSEB officials are involved in Tiger Cell meeting. Tripping prone areas identified, where vigilance is increased.

Vigilance on police patil dairy

2.13.12 The police stations are alerted for keeping watch on herbal medicine seller who are also involved in poaching and trafficking of wild animals parts. The police patils maintain "Musafiri" or record of outsiders who camp in the village. Such medicine sellers indulge in poaching. Hence the police are informed to keep watch on such activities.

Other joint efforts are taken in tracking wildlife offenders, taking joint action like raids are carried out. Overall, district level Tiger cell's function is successful in tracking wildlife offences.

2.14 INJURIES DUE TO WILDLIFE

2.14.01 Incidence of crop damage is very high because of high population of herbivores especially Nilgai and Wild Boars in the entire Wardha district. But they are more prevalent in Zudupi forest adjoining areas of Hinganghat, Deoli and Wardha tahsil. The details about crop damage during the period November 2004 – 31.03.2005, is given below:

Period	No of cases	Crop loss in ha	Wildlife	Compensation (Rs)
Nov 2004 – March 2005	23	22.40 ha	Wild Boar	39,382

2.14.02 The carnivores, tigers and panthers particularly sometimes kill domestic cattle grazing in the forests. There are also cases of human injury and even death due to attacks from wild animals. The villagers sometimes indulge in poisoning the carcass to take revenge and

cases of electrocution of wild animals by the villagers to kill the animal suspected to have killed the cattle have also been reported. In such cases the persons involved in illegal killings of the wild animals do not have any intention of poaching or trade but such activities on the part of local people pose grave danger to animal populations in the forests. Human being attacked by Wild animals during 2002-03 and 2004-05 is given in Table 2.13. The govt. of Maharashtra therefore have 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

2.14.02 The scheme, which was introduced for the first time in 1971, covers the loss of Cow, Buffalo, Bullock, Sheep, Goat and other livestock (as per definition given under Section 2(18A)) due to attack of a Tiger, Panther or any other wild animal. The present rates of compensation as per the GR No.WLP-1002/C.No.258/F-1 of 27.1.2003 are as follows and compensation is to be paid within 3 months.

- | | |
|---------------------------------|--|
| 1) Cow, Buffalo, Bullock | 75% of the market price or Rs.9000/-
and whichever is less; |
| 2) Sheep, Goat, other livestock | 75% of the market price or Rs.3000/-
and whichever is less. |

Cattle killed by wild animals and compensation given by forest department; the details are given below:

Table 2.12 Compensation for the loss of livestock during the 2002-03 to 2004-05

Cattle killed 2002-03		
Total Cases	No of cattle killed	Compensation (Rs)
39	43	96025/-
Cattle killed 2003-04		
Total Cases	No of cattle killed	Compensation (Rs)
27	49	1,18525
Cattle killed 2004-05		
Total Cases	No of cattle killed	Compensation (Rs)
61	71	206305/-

The conditions to be fulfilled are:

- 1) Death to be reported within 48 hours.
- 2) Carcass is not to be removed before case is made.

- 3) No death of any wild animal within 10 km radius area in the next 6 days.
- 4) Immediate investigation by forest officers as to the wild animal, which killed the cattle as well as likely amount of compensation.
- 5) Compensation to be sanctioned by an officer not below DCF/DFO.
- 6) No compensation in case the livestock was grazing illegally.

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, Sloth Bear, Bison, Wild Pigs, Wolf, Hyena, Jackal and wild dogs is covered under the scheme. Present rates of compensation have been fixed through GR No.WLP-1002/C.No.258/F-1, dt.17.1.2003 and dt.20.5.2003. These are as follows:

- | | |
|--|--|
| 1) Death or permanent disability
(Adult as well as minor) | Rs.2.00 lakhs to legal heir. |
| 2) Major injury | Rs.50000/- to the individual injured. |
| 3) Minor injury | Cost of medication preferably in govt. hospital but in case of unavoidable private medication, limit should be up to Rs.7500/- per individual. |

Table 2.13 Compensation for the loss of Human being during the 2002-03 to 2004-05

<u>Human Death/Injury Apr/02 to Mar/03</u>			
	No. of Human beings	No of Cases	Compensation
Person killed	1	1	40,000/-
Serious Injured	--	--	--
Minor Injured	4	4	7195/-
Total	5	5	47195/-
<u>Human Death/Injury 2003-04</u>			
	No. of Human beings	No of Cases	Compensation
Person killed	---	----	----
Serious Injured	2	2	27000/-
Minor Injured	6	6	11892/-
Total	8	8	38892/-

Human Death/Injury 2004-05			
	No. of Human beings	No of Cases	Compensation
Person killed	--	--	--
Serious Injured	--	--	--
Minor Injured	3	3	15190/-
Total	3	3	15190/-

Following are the conditions put for claiming and deciding above compensation:

- 1) Such attack should not have occurred when the individual was indulging in violating the Wildlife (Protection) Act 1972.
- 2) Relative/friend should report the attack within 36 hours.
- 3) Police/forest officer to investigate within 3 days.
- 4) Death/injury due to wild animal is to be certified by the govt. medical officer.
- 5) Compensation due to death is to be given only to legal heir and compensation due to injury is to be given to individual concerned.
- 6) Compensation is to be sanctioned by the officer not below the rank of DCF/DFO.

Chapter III

UTILIZATION OF THE FOREST PRODUCE

3.1 AGRICULTURE CUSTOMS AND WANTS OF THE POPULATION

3.1.01 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 2001 census, the total population of Wardha district is 12.30 lakhs and increase in the population for the last 10 years is 15.30 percent. Taluka-wise break up of population as per 2001 census is, as follows:

Table 3.1. Taluka Wise Breakup of Population

Sr No	Taluka	Area in square kilometer	Population per Sq km	No of villages		Townships	Population in lakh		
				Inhabited	Uninhabited		Male	Female	Total
1	Wardha	791	397	116	37	1	1.62	1.52	3.14
2	Deoli	655	237	103	43	2	0.80	0.75	1.55
3	Hinganghat	907	234	129	57	1	1.10	1.02	2.12
4	Samudrapur	981	118	169	54	0	0.60	0.55	1.15
5	Seloo	675	196	139	33	1	0.68	0.64	1.32
6	Karanja	808	109	102	16	0	0.45	0.43	0.88
7	Arvi	999	143	164	57	1	0.74	0.69	1.43
8	Ashti	494	139	93	59	0	0.35	0.33	0.68
	District	6310	195	1015	356	6	6.35	5.95	12.30

3.1.02 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. As the elsewhere in the state, the Male-Female ratio is in favour of men. For instance, there are 936 women for each 1000 men, which are more than the state average viz. 922 women/1000 men.

3.1.03 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.

3.1.04 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.

3.1.05 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.

3.1.06 As per the Socio-economic survey of the Wardha district for the year 2000-2001, published by the Directorate of Economics and Statistics, Govt. of Maharashtra, Bombay in 2002, 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.

3.1.07 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%.

3.1.08 There are over 8 Agriculture Produce Marketing Committees where the agriculturists bring their excess material for sale. In the Tribal Sub-Plan Areas, as per the (Maharashtra Tribal Economic Conditions Upliftment Act (1956), the Government has declared monopoly over the purchase of food grains as well as the minor forest produce with the exception of Tendu. The Maharashtra Government has recently passed an Act. called Maharashtra Transfer of Ownership of M.F.P. in the Scheduled Areas and the Maharashtra M.F.P. (Regulation of trade) (Amended) Act, 1997 as Act. No. XIX of 1997 on 10th December 1997. According to section 4 of the Ordinance the ownership of the M.F.P. found in the Government lands in the scheduled areas, excluding the National Parks and Sanctuaries, shall vest in the Village Panchayats within whose jurisdiction such area falls. However the ownership of M.F.P does not include the ownership of land or trees in that Panchayat areas. The list of M.F.P covered under the ordinance is specified

in the schedule. Tendu, Apata, Bamboo have been excluded from the purview of this ordinance and still remain the property of the State Government.

3.1.09 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. In the year 1999-2000, irrigation facilities were provided to 19,595 ha of cultivable area. In the near future the projects are expected to provide irrigation to over 35000 ha of the district. Furthermore, on completion of Upper Wardha, Lower Wardha and Lower Wena projects, the irrigation facilities will extend over to 75,000 ha of land of the district.

3.1.10 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. (1991 Census)

3.1.11 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

3.2. MARKETS AND MARKETABLE PRODUCTS

3.2.01 Demand and supply of forest produce and pressure on forests is given in the table below.

Table 3.2 Demand and supply of forest produce during 2000 - 01 to 2004 - 05

Year	2000 - 2001		2001 - 2002		2002 - 2003		2003 - 2004		2004 - 2005	
	Demand	Supply	Demand	Supply	Demand	Supply	Demand	Supply	Demand	Supply
Timber	1100 M ³	915 M ³	1150 M ³	755 M ³	1000 M ³	545 M ³	1000 M ³	425M ³	1000 M ³	410 M ³
Fuelwood	4200 MT	1831 MT	3900 MT	1225 MT	3750 MT	1050 MT	3000 MT	510 MT	2800 MT	470 MT
Pole	10000 Nos	6923 Nos	15000 Nos	1510 Nos	12000 Nos	4950Nos	16000 Nos	5730 Nos	15000 Nos	3488 Nos
Bamboo	4400 Nos	4000 Nos	2500 Nos	2000 Nos	5000	Nil	5000	Nil	5000	Nil
Grass	338.50 MT	338.50 MT	362.50 MT	362.50 MT	306.00 MT	348.00 MT	348.00 MT	348.00 MT	673.50 MT	673.50 MT

Need of the fuel is not met as per requirement. Shortage in fuel is met from dead orange trees and other agriculture produce. People meet their demands of Timber from general auction on depots in Wardha division as well as trees on farm bunds. There was no demand of poles placed to forest department during 2002 – 2003, 2003 – 2004, but there is requirement of poles for agricultural implements and constructions of houses; supply for which is made through auctions and partly through poles available on farm - bunds.

3.2.02 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 it is a common sight to see a lot of local people collecting firewood from the adjoining forests and selling to these dhabas.

(3) **Bamboo:** Bamboo are in general not available in this division except in few patches of Arvi and Hingni ranges. 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, sheda, 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.

3.2.03 **Forest Depots** : The depots in Wardha division where the forest products are brought from different forest areas and auctioned thereof.

Table 3.3 Forest depots in Wardha division.

Range	Depots	Forest Produce	Species
Arvi	Bangadapur	Timber, Poles, Fuel beat	Teak, Bija, Ain, Haldu, Kalamb, Rohan, Bhirra, Dhawada
	Kharangana		
Ashti	Talegaon		
Karanja	Garpit		
Hingni	Kelzar		
Wardha	Shiwanphal		

3.3 OCCUPATION AND INDUSTRIES

3.3.01 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. Bamboos plantations, on suitable areas are proposed one of the priorities to cater these demands in future.

(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. **(Appendix 3.1)**

(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 in 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.

3.4 METHODS OF HARVESTING AND THEIR COSTS

(A) Major Forest Produce (Timber and Firewood)

3.4.01 **Agency for harvesting:** Till 1980 forest coupes for timber and firewood were worked through 3 Agencies, viz. The Forest Department, the Forest Labourer's Co-operative Society and the Contractors. However, as per the policy decision taken by Government of Maharashtra vide its R and FD No FCT/1581/93544/F-1, dated 04.04.1981, harvesting by contractors was totally stopped, with few exceptions, with effect from July 1981. Now main felling and thinning coupes are either worked departmentally or through Forest Labours Co-operative Societies (FLCS). The coupes of subsidiary silvicultural operations are worked departmentally. **During the year 2003-04, 60 Coupes were allotted to 19 Forest Labour Co-operative Societies.**

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

3.4.03 The timber and pole trees are felled first; followed by firewood species. Saw is used for felling and conversion of timber while axe is used for fashioning purposes. After conversion of the felled trees into logs of merchantable sizes, their measurements are taken after carting to the jungle depot and are embossed at the butt end of the logs using digit nails. The volume read off

from the ready reckoner along with the tree number and the log number are also embossed on the butt end.

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

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

3.5 COST OF HARVESTING

3.5.01 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 the current year. While fixing the wage rates for harvesting operations, wages sanctioned by the Government of Maharashtra and cost of living allowance (*Rahniman Bhatta*) are also taken into consideration. The piece-work rates fixed for the year 2004-2005, in the Nagpur circle are provided in the **Appendix 3.2**.

(B) Non Wood Forest Produce (NWFP)

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

Lately it has been found that most of the grass birs remain unsold. In the sold areas very little grass is removed. Most of the time the influential people of the village purchase the grass birs and allow grazing in those areas by taking money from the cattle owners. Due to excessive cattle pressure the site conditions of grass birs have been deteriorated severely; and hence are

not in position to meet the demand of the entire division as well as to fulfil objective of producing quality grass in their present shape.

(2) **Tendu Leaves:** Tendu leaves trade has been nationalized by the Govt. of Maharashtra and its collection and sale is regulated by the provisions of the Act No.LVII of 1969. The area of Wardha division is divided into 20 units which are sold on lump-sum basis by way of open tender. The rates of collection of tendu leaves and target are fixed by the Govt. The collection charges for 2005 season are Rs 680 In Govt land and Rs 700 in private land for 1000 bundles of 70 leaves each. The collection of tendu leaves commences from the last week of April each year and continues up to the first week of June. Tendu leaves are collected by engaging labourers who deliver the leaves at various collection centres called 'Phadis'. At each centre the leaves are then packed in gunny bags. The quantity of tendu leaves is measured in standard bags. A bag containing 1000 pudas is known as a standard bag. A small portion is used locally also for manufacture of bidis. Wardha division comprises of 20 tendu units having annual potential of over 13,200 standard bags of sale value over 85.45 lakhs. During the year 2003-2004 the collection of tendu bags in Wardha Division was 8233.166 standard bags amounting to rupees 49.97 lakhs.

(3) **Other Minor Forest Produce:** Gum units are sold in open auction and annual lease is given to the petty contractors for their collection. Gum unit coincides with the round boundaries. There are 19 gum units.

(4) The total collection of gum during 2002-03 was 24 quintals, approximately. The Maharashtra Government has recently passed an ordinance called Maharashtra Transfer of Ownership of M.F.P in the Scheduled Areas and the Maharashtra M.F.P (Regulation of trade) Ordinance, 1997 as Ordinance No. XIX of 1997 on 10th December 1997. According to section 4 of the Ordinance the ownership of the M.F.P found in the Government lands in the scheduled areas, excluding the Nagar Panchayat and Samitee, shall vest in the Panchayat within whose jurisdiction such areas falls. However, the ownership of M.F.P does not include the ownership of land or trees in those Panchayats area. The list of M.F.P covered under the ordinance is specified in the schedule. The species of state significance such as Tendu, Apata and Bamboo have been excluded from the purview of the ordinance.

3.6 LINES OF EXPORT

3.6.01 The district has a large network of railway lines and roads. It has in total 397 km long Railway lines network, including, the broad gauge of single, double and triple categories of length 65 km, 225 km and 70 km, respectively, and narrow guage single line of 37 km; in addition to the

yard track lines and Pulgaon military siding. The broad-gauge railway lines which pass through the division are Bombay-Calcutta via Nagpur and Delhi-Chennai main lines. These railway lines help to carry forest produce to various consumption centres both within the state and in the country.

3.6.02 The road network in the district extends over to 3590 km. Two National Highways, namely, the NH-6 and the NH-7 pass through the district to a length of 113 km. There are 675 km of State Highway, 651 km of main district roads, 633 km of other district roads and 1154 km of village roads. These are extensively used by timber merchants for transport of timber, firewood and other forest produce to the market places within the state and elsewhere in the country.

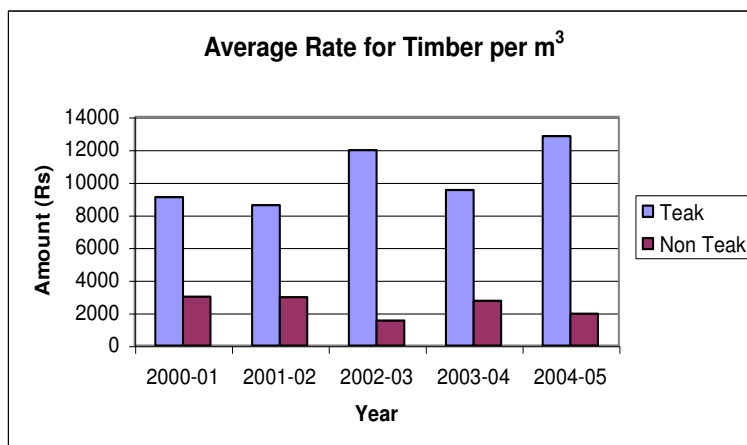
3.6.03 There is an adequate network of forest roads through out the division. Many of these roads have been taken over by the Public Works Department and Zilla Parishad and converted into metal and asphalt roads. The forest roads are maintained by the division as per the requirement and the availability of funds. **(Appendix 3.3)**

3.7 PAST AND CURRENT PRICES

3.7.01 Due to the increase in construction activities coupled with increasing requirement for furniture items for house interiors the demand for timber is steadily going up. As the supply position is not commensurate with the demand, the price of timber has shown a steep rising trend, over the years. Scheduled rates sanctioned by CCF (T) Nagpur for Teak and non teak timber, fuel, stacks and chock timber during 2002 – 03 is given in **Appendix 3.4**. However the average rates for timber, poles and fuel stacks during 2000 – 01 to 2004 –05 are given below.

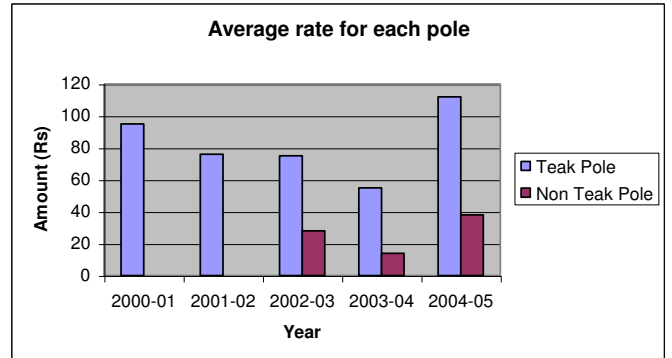
Average Rate for Timber per cumt (Rs)

Year	Teak Pole	Non Teak Pole
2000-01	9085	3000
2001-02	8600	2960
2002-03	11958	1532
2003-04	9516	2737
2004-05	12823	1950



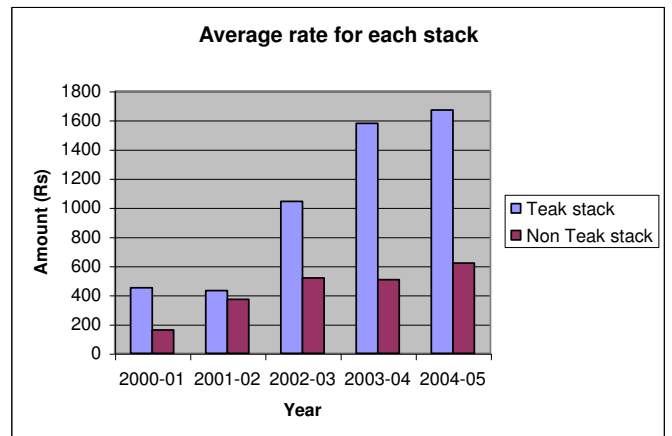
Average Rate for each Pole (Rs)

Year	Teak Pole	Non Teak Pole
2000-01	95	0
2001-02	76	0
2002-03	75	28
2003-04	55	14
2004-05	112	38



Average Rate for each stack (Rs)

Year	Teak stack	Non Teak stack
2000-01	450	160
2001-02	430	370
2002-03	1042	517
2003-04	1578	506
2004-05	1670	620



Chapter No IV

ACTIVITIES OF FOREST DEVELOPMENT CORPORATION

4.1 INTRODUCTION

4.1.01 Large area of the Forest Department was earmarked to FDCM Ltd. for its production forestry purposes in the past. Along with the production forestry; FDCM Ltd. carried out afforestation activity also aiming to convert degraded area into productive stage & generate employment.

4.2 ACTIVITY

4.2.01 Wardha Forest Project Division was formed in the year 1987 under Waste Land Development Programme vide Govt. of Maharashtra's letter No. FLD/ 1086 / 303 / प्र.क.-३/क २. Afforestation Works were taken up from 1988 to 1993 under, E.G.S., F.D.T., WLDP, & RDF Schemes. As the earmarked area offered for Waste land development project was not sufficient to sustain a division thereby, it was decided in the 91st meeting of the Board of Director's of F.D.C.M. Ltd., on 27-11-1995 to close the division. Accordingly The Managing Director of FDCM Ltd, requested The Principal Chief Conservator of Forests, MS Nagpur to arrange for taking over of plantations raised by FDCM Ltd, from 1988 to 1993 vide his letter No. PLN/EGS/66/B/6298, dated 13.3.1996.

Table 4.1 The plantations raised under different schemes (Area in ha)

Sr No	Year of Plantation	W.L.D.P.	F.D.T.	E.G.S.	M.F.P.
1	1988	601 ha.	-	--	--
2	1989	--	--	1139.90	--
3	1990	--	--	1109	--
4	1991	--	890	310	--
5	1992	--	800	300	150
6	1993	--	800	400	--
	Total	601 ha.	2490 ha.	3258.90 ha.	150 ha.

4.2.02 Plantation raised by FDCM Ltd, have been handed over back to department during the year 1993 – 1997.

Table 4.2 Year wise & Scheme wise List of Plantations and Mandays generated

Sr No	Year of Plantation	Scheme	Area of Plantation (in ha)	Mandays generated
1	1988	W.L.D.P.	601.00	376955
2	1989	E.G.S.	1139.90	1106
3	1990	E.G.S.	1109.00	210476
4	1991	E.G.S.	310.00	173487
5	1991	F.D.T.	890.00	76449
6	1992	R.D.F.	150.00	17361
7	1992	E.G.S.	300.00	35748
8	1992	F.D.T.	800.00	146608
9	1993	E.G.S.	800.00	5686
10	1993	F.D.T.	400.00	162652

4.2.03 Teak, Bamboo & Miscellaneous species have been planted in all above plantations. The information regarding Survival Percent is not available.

Chapter V

FIVE YEAR PLANS

5.1 PLAN OUTLAY FOR FORESTS

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

Table 5.1 Statement showing Plan outlay for Forestry

(Forests, Wildlife, Soil Conservation, Tourism, Housing and EAP)

Plan period	Year	Sanctioned Outlay of State(in lakh)	Sanctioned outlay of Forests (in lakh)	Outlay of EAP (in lakh)	Total outlay for Forests (in lakh) (Col 4+5)	Percentage of outlay for Forests to State plan	
						(Col 4 to 3)	(Col 6 to 3)
1	2	3	4	5	6	7	8
8 th plan 1992-93 to 1996-97	1992-93	3160.00	20.98	8.71	29.69	0.66	0.93
	1993-94	3804.00	21.93	33.76	55.69	0.57	1.46
	1994-95	4400.00	23.79	65.33	89.12	0.54	2.02
	1995-96	6069.00	32.33	71.02	103.35	0.53	1.70
	1996-97	8284.00	38.28	82.37	130.65	0.46	1.45
9 th plan 19 97-98 to 2001-02	1997-98	8393.00	26.46	61.80	88.26	0.31	1.05
	1998-99	11600.00	28.39	60.00	88.39	0.24	0.76
	1999-00	12162.00	28.59	96.00	124.69	0.23	1.02
	2000-01	12330.00	52.10	10.50	62.60	0.42	0.50
	2001-02	11721.00	55.29	0.48	55.77	0.47	0.47
10 th plan 2002-03 to 2006-07	2002-03	11135.00	33.03	0.00	33.03	0.29	0.29
	2003-04	12650.00	34.61	0.00	34.61	0.27	0.27
	2004-05	19984.00	31.45	0.00	31.45	0.15	0.15
	2005-06*	11000.00	23.44	1.00	24.44	0.21	0.22

* Subject to revision

5.1.02 Statement showing the **Non Plan Outlay** for Wardha Division during the year 7th, 8th, 9th, & 10th plan is given below.

Five Year Plans	Period of Plan	Sanctioned grant (Rs. in crore)	Expenditure (Rs. in crore)
7 th Plan	1985 - 1990	3.522	3.522
8 th Plan	1992 - 1997	12.495	12.582
9 th Plan	1997 - 2002	15.480	17.796
10 th Plan	2002 - 2007	14.271	15.723

5.1.03 Statement showing the **Plan Outlay** for Wardha Division during the year 1999 to 2004-05 is given below

. Table 5.2 Plan outlay for Forestry for the year 1999 to 2004-05.

Sr No	Five Year Plan	Period of Plan	District Outlay (Rs. In lac)	Sanctioned Outlay to Forest through DPDC (Rs. In lac)	Outlay Percentage	Sanctioned grant including CA & MFP (Rs. In lac)	Expenditure with respect to column 7 (Rs. in lac)
1	2	3	4	5	6	7	8
1	8 th Plan	1992 - 1997	6849.44	95.30	1.39	310.02	295.94
2	9 th Plan	1997 - 2002	7120.64	128.95	1.81	470.06	465.55
3	10 th Plan	2002 - 2005	4842.00	51.31	1.05	217.09	189.13

CA = Compensatory Afforestation
MFP = Maharashtra Forestry Project

Wardha Forest Division received the above grant mainly for plantation activities.

5.1.04 Division received only 1.41% (average) grant of total district outlay which can not help to begin new activities or even to continue ongoing development works.

Chapter VI

STAFF AND LABOUR SUPPLY

6.1 MANPOWER POSITION

6.1.01 Wardha division was originally a part of Nagpur Forest Division. It came into existence by division and reorganisation of the original Nagpur Forest Division on 24.12.1959 by delineating the forest areas of Wardha district as a separate unit of forest management. Its headquarters is located at Wardha and it is headed by an officer in the rank of the Deputy Conservator of Forests.

(Appendix 6.1)

6.1.02 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 vide its G R No FDN-1081/76/03-F-2, dated 11.6.1981 sanctioned reorganisation of ranges and beats with effect from 1.9.1981. The new posts of Accountants were created vide GR No FDM-1879/17-F-2 dated 11.6.1981 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 at each Division vide GR 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 programme and diversifying the forest management.

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

6.1.04 Considering experiences of working in Protection ranges and Development ranges and based on difficulties faced during working; it is felt that protection ranges and development ranges should be merged in one single unit. Therefore, the proposal of merger has already been submitted to govt. vide Principal Chief Conservator of Forests, MS, Nagpur's letter No D / 7 / Estt/ 2 / case no./ 172 / 456. dt 17 / 7 2003 which need to be sanctioned.

6.1.05 The details of the reorganisation proposal for Wardha division given below

Table 6.1 Reorganisation proposal

Present				Total	Proposed	
Protection Range	5	Development Range	2	7	Ranges	8
Protection Rounds	24	Development Rounds	0	24	Rounds	40
Protection Beats	142	Development Beats	0	142	Beats	198

6.1.06 The details of the manpower, including, the office and field staff in the Division is given in Table 6.2.

Table 6.2. Present staff position in the Wardha Division (As on 2005)

Designation	Sanctioned	Filled up	Vacant
A. Gazetted Officers			
Deputy Conservator of Forests	1	1	--
Asst. Conservator of Forests	3	3	--
Range Forest Officer	13	10	3
B. Non Gazetted Staff			
Surveyor	2	2	--
Forester	46	43	3
Forest Guard	233	215	18
Junior. Statistical Assistant.	1	1	--
Chief Accountant	1	1	--
Accountant	15	15	--
Clerk	17	14	3
Driver	2	2	--
Tractor Driver	1	--	1
Cleaner	1	--	1
Daftari	1	--	1
Peon	5	5	--
Chaukidar	5	5	--
Paniwala	1	--	1
Safaiwala	1	1	--
Van Kamgar	150	150	--
Total	499	468	31

6.2 LABOUR SUPPLY

6.2.01 The labour supply in general is inadequate, especially, in the compact block of Arvi, Karanja and Hingni ranges because of less population density due to remoteness of the area. At times, labourers are brought from the adjoining districts, to complete the plantation works. However, with suitable planning and adequate scattering of work centres labourers can be made available for all forestry works. There are many co-operative milk societies, which provide additional income to the villagers besides the agriculture.

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

Chapter VII

PAST SYSTEMS OF MANAGEMENT

7.1 GENERAL HISTORY OF MANAGEMENT

7.1.01 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.

7.1.02 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.

7.1.03 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.

7.2 MANAGEMENT OF THE FORESTS AND TREE GROWTH

7.2.01 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, in the Table 7.1.

Table 7.1 List of working plans for the Reserve forests of Wardha Division

S.N	Working plans in chronological order	Plan period
1	Dobbs' Working Plan	1895 – 1912
2	Dunber Brander's Working Plan	1913 – 1934
3	P. Sagreiya'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

Period of regular working under different working plans:

7.3 FIRST WORKING PLAN: 1895 TO 1912

7.3.01 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 7.2 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.

7.3.02 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.

7.3.03 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 Dobb's plan was become necessary.

7.4 SECOND WORKING PLAN: 1913 TO 1934

7.4.01 Dobb'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.

7.4.02 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.

7.4.03 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.

Modification In The Prescriptions Of Main Felling

7.4.04 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.

7.4.05 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*.

INTRODUCTION OF THINNING

7.4.06 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).

7.4.07 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.

7.5 THIRD WORKING PLAN 1935-36 TO 1946-47

7.5.01 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 4"= 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 7.3 Functional classification of Forrest 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

7.5.02 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 7.4 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 Willages	-	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:

7.5.03 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

7.5.04 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.

7.5.05 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

7.5.06 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

7.5.07 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*.

7.5.08 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

7.5.9 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.

7.5.10 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.

7.5.11 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.

7.6 FOURTH WORKING PLAN 1947-48 TO 1964-65

7.6.01 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 7.5 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

7.6.02 In accordance with functional classification, the following, working circles were formed:

Table 7.6 Working circle wise area in Fourth Working Plan

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

7.6.03 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

7.6.04 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

7.6.05 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

7.6.06 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

7.6.07 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 15" (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.

7.7 FIFTH WORKING PLAN BY THOSRE (1965 TO 1976 EXTENDED UPTO 91)

7.7.01 Mishra's plan was replaced by Thosre's Plan. The whole forest area was restocked, mapped on 4"=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 7.7 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 7.8 Working circle wise area in Fifth Working Plan

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	84.98		0.16
(b) Forest villages	2455.23		4.69
Total:	52327.52		100.00

(1) THE GENERAL HIGH FOREST WORKING CIRCLE

7.7.02 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.

7.7.03 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 semal trees were to be retained.

7.7.04 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.

7.7.05 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:

$$D = \frac{3}{2} (d+3)$$

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

7.7.06 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.

7.7.07 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.

7.7.08 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 1/3rd 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

7.7.09 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.

7.7.10 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.

7.7.11 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

7.7.12 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.

7.7.13 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

7.7.14 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*.

7.8 EX-PROPRIETARY OR PROTECTED FORESTS

7.8.01 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)

7.8.02 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*.

7.8.03 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.

7.8.04 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):

7.8.05 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:

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

7.8.06 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*.

7.9 PERIOD OF REGULAR WORKING SCHEME (BY K H CHATI FROM 1968 TO 1991)

7.9.01 The first working scheme for ex-proprietary forests of Wardha Division was written by Chat. As per MP Govt.'s No 3952-2624-XI dated 10.12.1952 these forests were classified into various categories as below:

Table 7.10 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

7.9.02 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 7.11 The range wise distribution of area in different working circle

Sr No	Range	CWR W. C. (ha)	Improvement 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

7.9.03 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.

7.9.04 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 spacing of 1/3rd 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.

7.9.05 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

7.9.06 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.

7.9.07 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.

7.9.08 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

7.9.09 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 December every year.

7.9.10 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

7.9.11 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*.

7.9.12 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.

7.9.13 *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.

7.10 REGULATION OF GRAZING IN THE FOREST

(A) RESERVE FOREST:

7.10.01 **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.

7.10.02 **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.

7.10.03 **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.

7.10.04 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.

7.10.05 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.

7.10.06 **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.

7.10.07 **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.

7.10.08 For the purposes of gazing 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.

7.11.09 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 gazing 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 areas 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.

7.10.10 **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.

7.10.11 The grazing settlement of Mishra's plan was effected by Verma, Assistant Commissioner in 1947. In all 25 grazing units were formed.

7.10.12 **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.

7.10.13 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:

7.10.14 **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.

7.10.15 **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 Patraks" for each village. In Nistar Patraks, 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*.

7.10.16 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.

7.10.17 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 Chati's 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.

7.11 MANAGEMENT OF AREAS BY FDCM

7.11.01 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.

7.12 THE SIXTH PLAN: DR NAND KISHORE (FROM 1992-93 TO 2001-2002)

7.12.01 The current plan under review 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 Thosre's Plan for Reserved Forests and Chati's Working Scheme for the Protected Forests. The forests were classified on the functional basis and the following Working Circles were formed.

Table 7.12 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)	Percentage
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

7.12.02 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.

7.12.03 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.

7.12.04 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.

7.12.05 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.

7.12.06 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

7.12.07 **(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.

7.12.08 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.

7.12.09 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.

7.12.10 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

7.12.11 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.

7.12.12 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.

7.12.13 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 spacing 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.

7.12.14 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.

7.12.15 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

7.12.16 **(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

7.12.17 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.

7.12.18 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.

Result

7.12.19 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**

7.12.20 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*.

7.12.21 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.

Result

7.12.22 **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**

7.12.23 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.

7.13 RESULTS OF PAST WORKING (From First working plan to Fifth working plan)

(A) RESERVE FOREST

7.13.01 **Growing stock:** The Reserve Forests are under systematic management since 1895. The growing stock has changed in composition and quality. Initially only the accessible areas were worked but with the increase in demand, construction of new roads and bridges, even inaccessible areas were worked. Prior to 1940-41 these areas were worked on a conservative basis and the condition of crop improved. The heavy felling from 1940-41 to 1945-46 in the name of 'War thinning' to meet the requirements of Defence Department resulted in the removal of the best stems of the future to a great extent. This started the gradual deterioration in growing stock. Though this fact was taken into account in the subsequent plans, but the situation did not improve. Field inspections show a considerable depletion in growing stock in almost all the felling series except in *Manoli, Dhaga and Bhawan felling series*. This can be attributed to heavy felling, illicit cutting, grazing and fires. Heavy markings were done not only in the main felling coupe but also in the thinning coupes. Cut back operations were not done as prescribed. Teak is tending to be pure due to disappearance of its associates which are more susceptible to fire and grazing, and coppice less vigorously. Some teak trees have developed hollow at the base due to frequent fires. Illicit cutting is found in areas adjoining to the towns of Ashti, Arvi, Karanja and Wardha. There the scenario is that the crop on the fringes has almost become pure mix crop. The typical example is Keljhar felling series. Where the crop was pure teak, the area has become quite open. Due to constant hacking of trees the growth has also become stunted.

7.13.02 **Reproduction:** The reproduction of teak and other miscellaneous species is unsatisfactory in most of the areas. The regular working of the forests is now over a century old. Almost 3 to 4 rotations of regular working have passed. Naturally the coppice vigour of the forests has considerably reduced. As a result of which the coppice shoots are less vigorous and stunted in growth. Natural regeneration of teak is found satisfactory only in interior areas with good soil and drainage. In rest of the areas it does not establish due to excessive grazing and fire. Among the miscellaneous species *bhirra* is most abundant. Coppice of *bhirra* is not satisfactory but natural regeneration is very good in many parts. The coppice as well as seedling reproduction of *lendia, dhaora, aonla, khair, dhaman, tendu and ain* is not satisfactory and is confined in patches.

7.13.03 **Grazing:** The existence of low quality forest of almost pure teak, growth of *tarota* and *bantulsi* and poor quality of grass and other weeds is mainly due to excessive grazing and to some extent, due to fires in the past. The temporary gain obtained by periodical closures in heavily grazed areas in respect of growth of other vegetation to cover the soil was lost soon after opening of the area to excessive grazing which also resulted in the disappearance of seedling reproduction of the species in dry exposed localities. Of late, a large number of *kathiawari* with multitudes of herds of cattle have been grazing their cattle in the forests. Even the *grass birs*, which were permanently closed to grazing, are often seen with large herds of cattle, belonging to *kathiawari* and local people. The Trench-Cum-Mound (TCM) dug around the plantations or along the boundaries is found ineffective to keep the cattle away. Grazing by wild animals is also seen in miscellaneous plantations all over the area.

(B) PROTECTED FOREST

7.13.04 **Growing stock:** The growing stock consists of mainly teak in Arvi, Karanja, Wardha and Hingni ranges. It varies from more than 50 percent to almost pure patches of teak. Part of the Ashti range also falls in the above category. Salai and mowai are the major species on better soils. In degraded portion, khair is the major species. Quality of the crop is mostly IVb with under stocked and blank patches.

7.13.05 Where the protected forests are large in extent and adjoining to the Reserve forests, they are demarcated on the ground. But in other cases, their boundaries are not clear. In areas adjoining to cultivation, encroachments have taken place, the exact extent of which can not be known without proper demarcation. Due to heavy illicit cutting these forests have become under stocked. They are not even able to meet the local *nistar requirements*.

7.13.06 **Reproduction:** The reproduction of teak and other miscellaneous species is unsatisfactory. Seedling reproduction of teak is found only in areas with deep and well drained soil and less affected by grazing and fire. Seedling reproduction of bhirra, dhaora, khair and palas is seen in patches. The coppice of teak has become stunted due to constant hacking. The coppice reproduction of other species is unsatisfactory.

7.13.07 **Grazing:** The grazing incidence in protected forests is very heavy. The increased cattle population has resulted in almost uncontrolled grazing. In addition to the local cattle, cattle herds of

Kathiawari people are also seen grazing in these forests. Heavy grazing, coupled with fires have depleted these areas.

7.14 SPECIAL WORKS OF IMPROVEMENT UNDERTAKEN

7.14.01 The following works of improvement were undertaken in the past:

- i) Cultural operations, which consisted of cut back operations, climber cutting, cleanings and thinning.
- ii) Fire protection.
- iii) Protection against encroachments, illicit felling and transport.
- iv) Constructions of roads, buildings, tanks, wells, etc.
- v) Plantations and afforestation works.

(i) Cultural operations:

7.14.02 **(a) Thinning:** Thinning in the Reserved forests was introduced in the year 1925. Before the introduction of Sagreiya's plan, thinning had been very heavy and almost all the valuable and accessible forest had been gone over at least once. In Sagreiya's plan thinning was prescribed in the un-allotted areas of Conversion Working Circle and in the Coppice-with Reserve Working Circle. But they were to be carried out only, if necessary. During the World War II (1940-41 to 1945-46) heavy thinning were carried out in the name of '*War thinning*' to meet the requirement of Defence Department. This resulted in the removal of the best stems of the future to a great extent. In the working plans of Mishra and Thosre, thinning was prescribed for forests of General High Forest Working Circle and Coppice-With-Reserve Working Circle. In the working scheme for ex-proprietary forest by Chati, thinning was prescribed in CWR Working Circle. In Dr Nand Kishore's Plan thinning was prescribed in CWR and Improvement Working Circles. However, thinning has not been carried out properly. Either there have been heavy thinning or it has not been carried out at all. In addition, cut back operations, climber cutting and cleaning operations have not been carried out during the currency of present working plan for want of funds.

(ii) Fire protection:

7.14.03 Fire protection was limited to certain areas only, which were considered most important till 1911, when the scheme was modified. Complete protection was restricted to areas closed to grazing and early burning was allowed elsewhere. From 1935 fire protection was carried out as per rules given in *para 89 of the C P and Berar Forest Manual* under which the forests were divided into following three classes.

- (a) **Class-I (Complete or special protection):** It involved isolation of the protected areas by fire lines and cut guide lines which were patrolled by watchers.
- (b) **Class-II (General protection):** It involved isolation of the areas from the surrounding country by fire lines and its division into convenient blocks by internal fire lines. No guidelines were to be cut.
- (c) **Class-III:** It was protection of forest by law only.

(iii) **Protection from encroachments, illicit felling and transport.**

7.14.04 Due to increase in population pressure on forests, protection of forests from illicit felling is becoming increasingly difficult. Besides, the regular protection staff, one mobile squad unit, consisting of one RFO, one forester and one police constable, is working in the division whose main task is to prevent and detect and cases of illicit felling and transport. Moreover as per TCS recommendations functions of field staff up to Range level has been reorganized into **protection and development categories** to lay focus on protection of forests and allied functions. Various check nakas have been erected at vulnerable points to check the illicit transport of forest produce.

7.14.05 Though the scheme of 1/5th boundary demarcation exists both for RF and PF, the condition of boundaries is not satisfactory, especially, in PF areas. Due to the improper demarcation of PF, they are vulnerable to encroachments. The patches of PF surrounded by cultivation are open to encroachment on all sides.

(iv) **Maintenance and construction of roads, buildings, tanks, wells, etc:**

7.14.06 Construction of wells and tanks, roads and cart tracks, and buildings was undertaken to improve the infrastructure facilities in the Division.

7.14.07 Forest roads are vital for effective protection of the forest and need continuous maintenance. Construction of roads and cart tracks facilitate extraction of forest produce and protection of the forest areas. Due to non availability of sufficient funds, the forest roads are not maintained properly.

7.14.08 Construction of residential buildings at many places has facilitated the stay of the staff in the interior areas for effective protection. The buildings are not sufficient to provide accommodation to protective staff, especially, in the interior areas. Due to reorganization of field staff into Protection and Production Units at Forest Guard, Forester and Forest Ranger level there is dire necessity to provide for office and residential facilities at the new places.

(v) Plantation and afforestation:

7.14.9 Efforts have been made since the beginning of the Five Year Plans to raise plantations of valuable species and to restock the blank forest areas by afforestation. Wardha was part of Nagpur Forest Division, till 1960, so the plantations were mainly confined to Nagpur Division. After becoming a separate division the plantations were taken up on a larger scale. In 1987-88, massive afforestation scheme was started under which large scale areas of this division have been taken up for afforestation. The plantations of miscellaneous species taken up, mostly failed probably due to wrong choice of the species and uncontrolled biotic pressure. The details of plantations taken up from the year 1970-71 till date are given below:

Table 7.12 Plantations

Year	Area planted ha			Misc. Species planted	Total ha
	Teak	Bamboo	Fodder		
1970-71	55	-	-	6	61
1971-72	15	-	-	50	65
1972-73	108	-	-	65	173
1973-74	-	-	110	50	160
1974-75	-	-	45	65	110
1975-76	-	-	-	55	55
1976-77	44	-	-	48	92
1977-78	10	-	-	248	258
1978-79	-	-	-	73	73
1979-80	-	-	-	96	96

Year	Area planted ha			Misc. Species planted	Total ha
	Teak	Bamboo	Fodder		
1980-81	10	-	-	200	210
1981-82	36	-	-	208	244
1982-83	300	19	-	246	565
1983-84	100	-	-	34	134
1984-85	-	-	-	805	805
1985-86	-	-	-	833.75	833.75
1986-87	-	140	145	150	435
1987-88	-	165	-	363	528
1988-89	-	185	-	907	1092
1989-90	-	120	-	2503	2623
1990-91	-	-	-	1546	1546
1991-92	-	-	-	2093	2093
1992-93	-	165	-	1544	1709
1993-94	-	-	-	741.49	741.49
1994-95	-	146	-	1320.83	1466.83
1995-96	-	23	-	388.50	411.50
1996-97	-	-	-	367.50	367.50
1997-98	-	50	-	430.50	480.50
1998-99	-	-	-	711.21	711.21
1999-2000	-	-	-	834.69	834.69
2000-01	-	-	-	645	645
2001-02	-	82.50		447.52	530.02
2002-03	-	68		189.62	257.62
2003-04	-	50		153.94	203.94
G Total	678	1213.50	300	18419.55	20611.05

The reasons for failure of plantations based on inspections of field officers are given below.

1. Bamboo plantations are mostly failure because of menace of Wild Pigs. They uproot and eat young seedlings.
2. Soil has become hard and compact due to heavy grazing resulting into reduction in moisture absorption by roots which tend to failure of miscellaneous plantation.
3. Due to compactness of soil a very meagre amount of moisture remains available in soil which does not provide healthy environment for rooting of teak stumps and its further growth.
4. White ants eat roots of miscellaneous species which causes failure in plantation.
5. Seedlings of 6 to 7 months old used in plantation were not sturdy and of good quality which could not survive for a longer period.

CCF (E & N) MS, Nagpur, also evaluated certain plantations under different schemes in Wardha Division. Observations are given as under

<u>Plantation Model</u>	<u>Year of Plantation</u>	<u>Remarks of CCF (E & N) MS, Nagpur</u>
1. RDF –1 (World Bank)	1996 , 1998	<ol style="list-style-type: none"> 1. Sapling of bamboo & semal was destroyed by Wild Bore & other wild animals. 2. Seedling used for plantation were of inferior quality. 3. Survival percentage was less due to illicit grazing & repeatedly occurrence of fire.
2. GUT	1997, 1999	<ol style="list-style-type: none"> 1. Destruction due to herbivorous wild animals. 2. Bamboo plantation failure due to menace of Wild Bore.
3. Reafforestation of degraded forest	1984, 1986, 1988	<ol style="list-style-type: none"> 1. Stunted growth due to plantation taken in water logged area. 2. Wrong choice of species. 3. Planting in small size pits. 4. Illicit grazing and inferior quality teak stump planting.

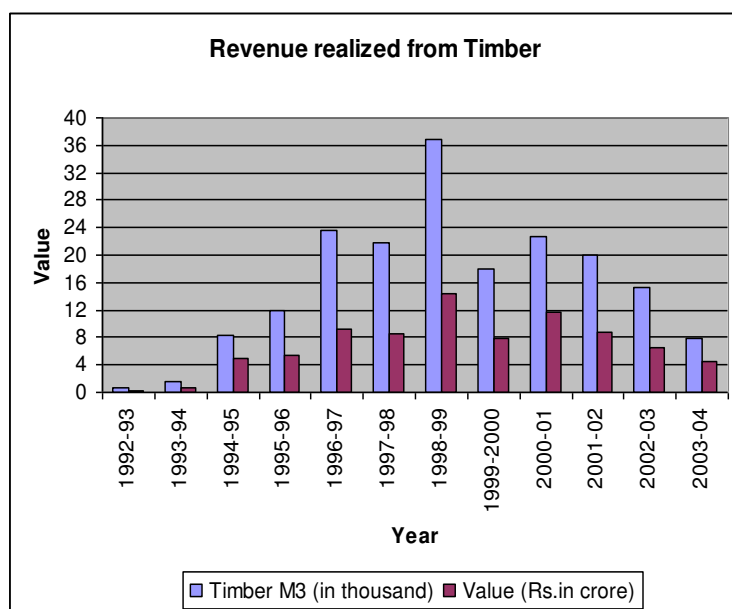
4. Fodder Development Scheme 1991
1. Germination percentage of grass seed was low due to scarcity of rain.
 2. Heavy weeds of Rantulas.

Past Yield

7.14.10 The annual out turn and revenue realised from **timber and fuelwood** for the period from 1992 - 1993 to 2003-2004 is given in **Appendix 7.1**.

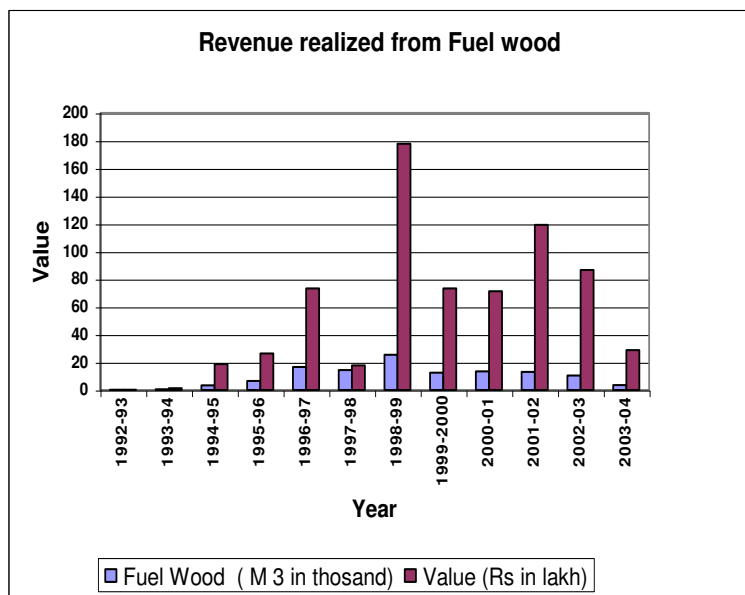
Timber

Year	Timber M ³ (in thousand)	Value (Rs.in crore)
1992-93	0.63	0.33
1993-94	1.64	0.77
1994-95	8.27	4.94
1995-96	11.89	5.37
1996-97	23.67	9.19
1997-98	21.77	8.51
1998-99	36.91	14.46
1999-2000	17.89	7.84
2000-01	22.60	11.72
2001-02	20.05	8.75
2002-03	15.21	6.54
2003-04	7.86	4.49



Fuel Wood

Year	Fuel Wood (M ³ in thosand)	Value (Rs in lakh)
1992-93	0.10	0.12
1993-94	0.53	1.37
1994-95	3.40	18.73
1995-96	6.61	26.38
1996-97	16.71	73.35
1997-98	14.48	17.77
1998-99	25.42	177.69
1999-2000	12.44	73.29
2000-01	13.56	71.27
2001-02	13.18	119.17
2002-03	10.49	86.59
2003-04	3.51	28.88



The variations in the out turn are due to non-working of coupes as per the time schedule given in the working plan.

7.14.11 The annual out turn of minor forest produce and its value is given in **Appendix 7.2**. The major contribution to the revenue is from tendu leaves.

7.14.12 The details of revenue realised from grazing is given in **Appendix 7.3**.

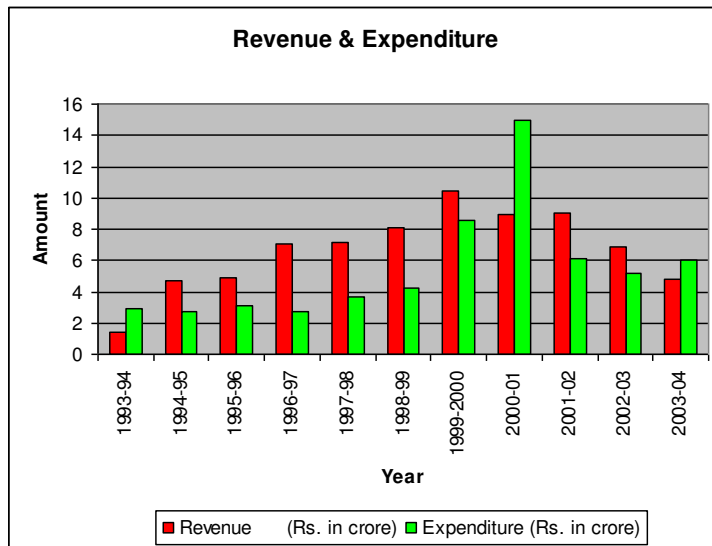
Past Revenue and Expenditure:

7.14.13 The statement of revenue obtained from sale of various forest produce is given in **Appendix 7.4**.

7.14.14 The statement of gross **revenue and expenditure** for each financial years 1993-94 to 2003 - 04 is given in **Appendix 7.5**.

Revenue and Expenditure (1993 – 94 to 2003 – 04)

Year	Revenue (Rs. in crore)	Expenditure (Rs. in crore)
1993-94	1.45	2.93
1994-95	4.68	2.72
1995-96	4.90	3.13
1996-97	7.10	2.71
1997-98	7.15	3.71
1998-99	8.10	4.23
1999-2000	10.47	8.53
2000-01	8.92	14.92
2001-02	9.04	6.13
2002-03	6.86	5.21
2003-04	4.82	6.06



The revenue has been gradually increasing till 1998 - 1999. The sharp increase during 1999 - 2000 is due to working of arrears coupes and adjustment of revenue of previous years. The expenditure in 2000 – 01 is maximum due to large amount of work was carried out under plan budget head.

Chapter VIII

STATISTICS OF GROWTH AND YIELD

STATISTICS OF THE RATE OF GROWTH OF TEAK AND MISCELLANEOUS SPECIES

8.1 GROWTH OF TEAK

8.1.01 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 R F of South Umred range is done and its results applied for Wardha Division and reproduced in the Table 8.1 CAI and MAI curve intersect at 117 years corresponding to a GBH (OB) 125 cms.

Table- 8.1 Growth statistics of teak (Site Quality III / IV)

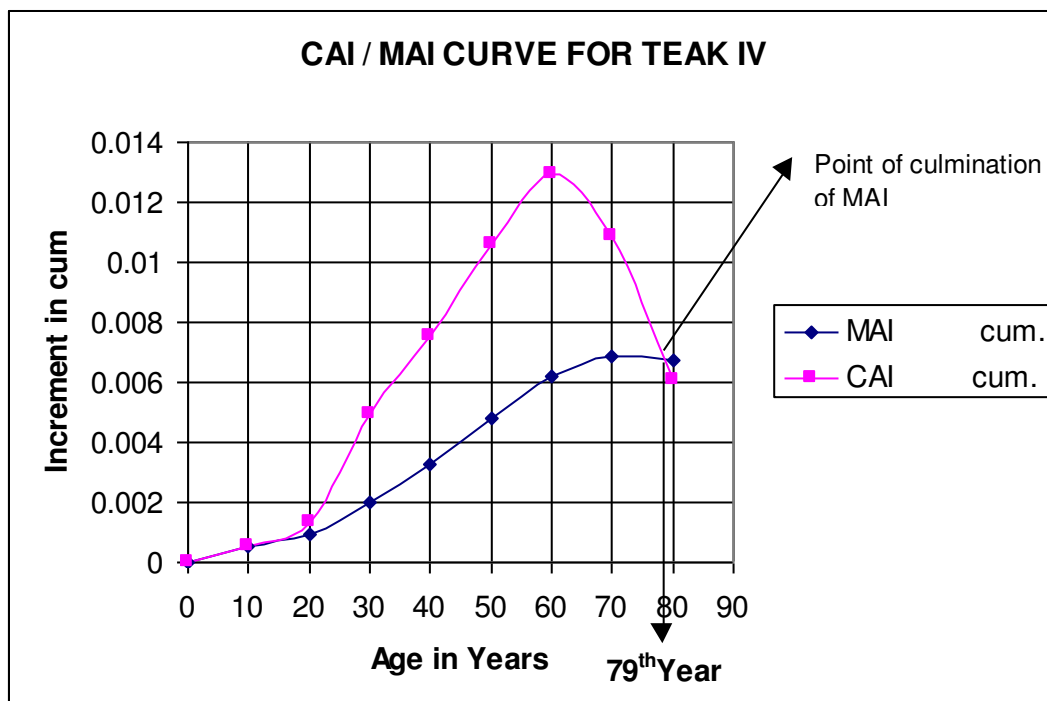
Age in Years	Ht. in mts.	DBH(OB) in cm.	GBH (OB) in cm.	Volume in cum.	CAI cum.	MAI cum.
10	3.70	3.40	10.70	0.0049	0.00049	0.00049
20	7.10	10.20	32.03	0.0250	0.0020	0.0012
30	10.70	14.80	46.47	0.0650	0.0040	0.0022
40	13.20	18.60	58.40	0.1350	0.0070	0.0034
50	14.90	22.40	70.34	0.2400	0.0105	0.0048
60	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. **(Appendix 8.1)**

8.1.02 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 8.2.

Table : 8.2. 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.

8.2 LOCAL VOLUME TABLE

8.2.01 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 8.3.

Table 8.3 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

8.2.02 Local volume table for few miscellaneous species has been prepared by the staff of Working Plan division Nagpur. The field data for this has been collected from Ramtek and Deolapar ranges of Nagpur (T) division is given in table 8.4.

Table 8.4 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

8.3 GROWTH OF MISCELLANEOUS SPECIES

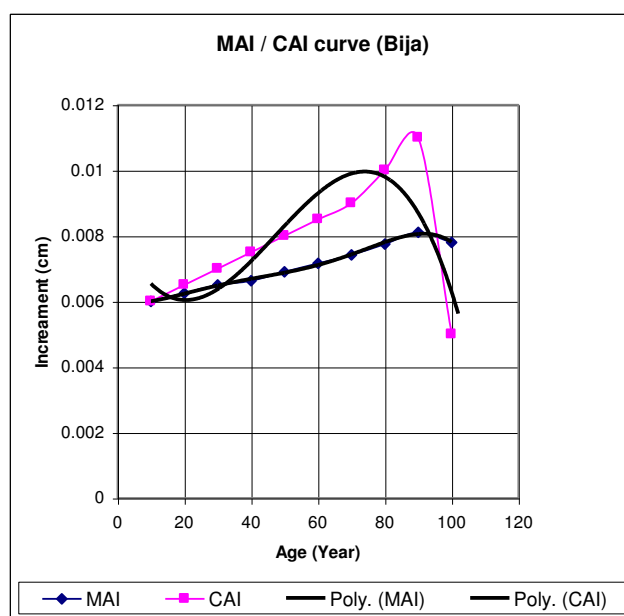
8.3.01 Stem analysis is not carried out for miscellaneous species in Wardha division. However, the growth data of miscellaneous species in Nagpur division is used to determine the annual yield and harvestable girth (**Appendix 8.2**). The growth statistics of the important miscellaneous species like Bija, Dhawada and Garai is given below:

8.3.02 CAI / MAI curves of the following miscellaneous species are given under.

1. Bija
2. Dhawada
3. Garadi

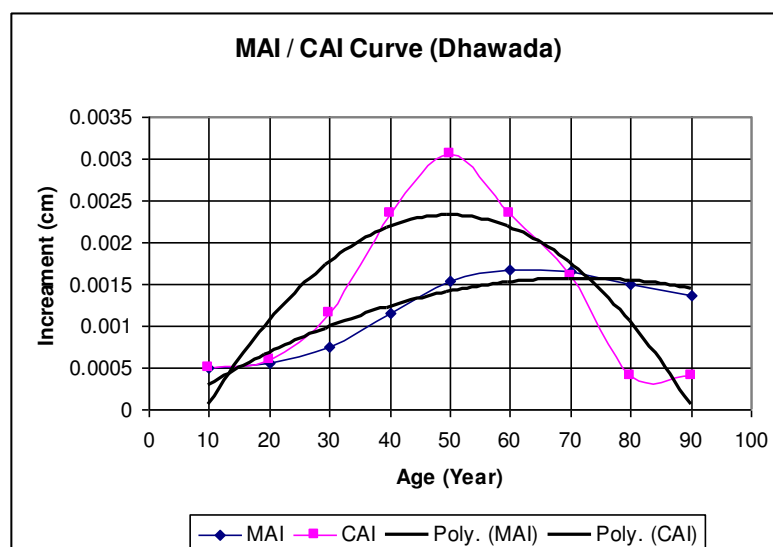
1. BIJA

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



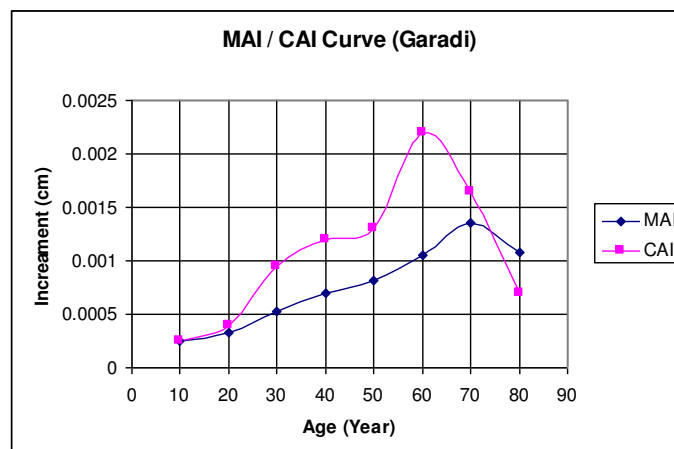
2. DHAWADA

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



8.4 STOCK MAPPING

8.4.01 The stock mapping based on ocular estimation was not done for this plan. The satellite imageries (November 2003) have been used to classify the forest patches according to density as revealed in the Normalized Density Vegetation Index (NDVI) mapping. For detailed preliminary treatment map, density showing maps are provided for each compartment. The following are the grey values at which various densities have been interpreted (the figures are not standardized). The results of Normalized Density Vegetation Index (NDVI) for various working circle compartments wise are given in **Appendix 8.3**. The following are the grey values at which various densities have been interpreted (the figures are not standardized).

Range of grey values	Interpreted vegetation/ type	Colour
0-44	Water bodies	Blue
45 -140	blank	Yellow
141-160	Density less than 0.4	Light green
161 - 190	Density 0.4 to 0.6	Green
191-216	Density more than 0.6	Dark green

8.5 ENUMERATION

8.5.01 The enumeration of trees and the regeneration survey of the forest crop in the division is carried out by Forest Resources Survey Unit, Chandrapur during October 2002 to April 2003. The sampling design was systematic line-plot survey and the intensity of sampling was 1(one) percent.

8.5.02 Systematic line-plot sampling was carried out at the intersections of 600-meter grid. Species and girth distribution (15 cm girth classes) of trees counting were done in 0.36-hectare plots (60 meter x 60 meter).

8.5.03 Regeneration count of seedlings and coppice shoots of teak and other miscellaneous species was done in three height classes (0.3 to 1.0; 1.0 to 3.0 and above 3.0 meters) in 0.04-hectare (20 meter x 20 meter) sub-plots.

8.5.04 Recording of forest types, site quality, density have been included as an integral part of the enumeration exercise.

8.5.05 Enumeration data was analysed and enumeration results have been computed separately for each working circle. Stem density, basal area and frequency of each species have been calculated. The results of enumeration and regeneration for various working circle compartment wise are given in

Appendix 8.4.

8.6 DIGITAL DATABASE

8.6.03 Conservator of Forests, Working Plan Division, Nagpur has prepared a comprehensive digital database in GIS environment for the Wardha division. The reserved forest have been included in the digital database. The Survey of India toposheet at 1:15840 (4" = 1 mile) scale were used to capture the reserved forest boundaries of the old forest block and the village maps at (16" = 1 mile) scale were used to capture the reserved forest boundaries declared in 1978.

8.6.04 The protected forest have been included in the digital database. The village map (Bandobast Map) 16" = 1 mile scale were used to capture boundaries of survey number which are notified as a protected forest.

8.6.05 Area of the Zudupi jungle in the division which was transferred from Revenue department; also included in GIS by using the village maps (which are prepared from MRSAC) at 1:5000 scale. Totpsheet at 1:50000 scale were used to capture the contours, drainage, major and minor roads and some important features in the division.

8.7 ANALYSIS OF THE CROP

8.7.01 Reserved forests of the division were stock mapped for the first time in the years 1931-33 at the time of revision of the working plan by Dunber Brander. The stock maps were revised with each revision of the working plan. Protected Forests of the division were stock mapped for the first time during preparation of the working scheme by Chati. The latest revision of stock mapping was made at the time of the revision of the working plan by Dr Nand Kishore.

8.7.02 The Inventory Management System developed by department was used for analysis of the inventory data leading to provide, the following, statements for the purpose of estimation of the growing stock for treatment under various working circles;

1. Girth class-wise estimated growing stock in respect of important 32 tree species and rest of species included in 'Other'.
2. Estimated growing stock per hectare separately for ain, bija, lendia, shisham, tiwas, teak, kalam, khair, salai, semal, dhaora, garari and rest of species included in 'Other'.
3. Girth class-wise percentage distribution of each of the above species in the growing stock

Part-II

Future Management Discussed and Prescribed

Chapter IX

BASIS OF PROPOSAL

9.1 THE NATIONAL FOREST POLICY

9.1.01 The National Forest Policy was first enunciated in 1894 and was revised in 1952, after independence. It was again revised in shape of the National Forest Policy 1988, which is, presently, in force.

The **basic objectives and thrust areas** enshrined in the National Forest Policy 1988 are given as under:

- Maintenance of environmental stability through preservation and where necessary, restoration of the ecological balance that has been adversely disturbed by serious depletion of forests.
- Conserving the natural heritage of the country by preserving the remaining natural forests with the vast variety of flora and fauna, which represents the remarkable biodiversity and genetic resources of the country.
- Checking the soil erosion and denudation in the catchments area of the rivers, lakes and reservoirs in the interest of soil and water conservation for mitigating flood and droughts and for retardation of siltation of reservoirs.
- Checking the extension of sand dunes in the desert areas and along the coastal tracts.
- Increasing substantially 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 existing forests.

The principal aim of the Forest Policy must be to ensure environmental stability and maintenance of ecological balance including atmospheric equilibrium which is vital for sustenance of all life forms, human, animal and plant. The derivation of direct economic benefit must be subordinated to this principal aim.

9.1.02 **Essentials of Forest Management** embodied in the National Forest Policy 1988 are given as follows:

- Existing forests and forest lands should be fully protected and their productivity improved. Forests and vegetal cover should be increased rapidly on hill slopes, in catchments of the rivers, lakes and reservoirs and ocean shores and 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 to other communities residing in and around the forests. Such produce should be protected, improved and their production enhanced with due regard to generation of employment and income.
- Schemes and projects which interfere with forests that clothe 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 Government having approved management plan, which should be in keeping with the National Forest Policy.
- The rights and concessions enjoyed by the tribal and other rural poor living within and near the forests should be fully protected. Their domestic requirements of fuel wood, fodder, minor forest produce and construction timber should be the first charge on forest produce.
- Inculcate in the people, a direct interest in forests and make them conscious of the value of trees, wildlife and nature in general through forest extension, education and training.

9.2 NATIONAL FORESTRY ACTION PROGRAMME

Introduction

9.2.01 Having about 2.5% of world's geographic area, India at present is supporting 16% of planet'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 forests causing serious damage to regeneration and productivity. The use of forests beyond its carrying capacity and encroachments are the main cause of continuous degradation of forests. At present 70% forests have no natural regeneration and 55% are prone to fire.

9.2.02 To reverse the process degradation and for sustainable development of forests, the Government of India have prepared National Forestry Action Programme (NFAP), a comprehensive strategic plan. These programme are as follows:

Programmes

- i) Protect Existing Forest Resources
- ii) Improve Forest Productivity
- iii) Reduce Total Demand
- iv) Strengthen Policy and Institutional Framework
- v) Expand Forest Area

Conclusion

1. For sustainability of forests, productivity of forest plantations to be increased at least 3 to 5 cu m per ha per year by promoting regeneration and enrichment plantations.
2. Hygiene of forests to be improved through suitable silvicultural practices.
3. 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 agroforestry.
4. Plantations on non-forest wastelands to be done mostly with fuelwood species as 70% of the wood produced from forests are used as fuelwood. Species of pulpwood and other industrial wood may be encouraged in farm forestry.

9.3 NATIONAL WILDLIFE ACTION PLAN

9.3.01 Despite above all, Ministry of Environment and Forests, Govt. of India has formulated National Wildlife Action Plan (2002-2016) , based upon the decision taken in the XXI meeting of

the Indian Board of Wildlife held in January 2002. The plan had outlined the strategies and action points for wildlife conservation. The strategy for action is to be adopted under wildlife action plan on the following parameters:

- I. *Strengthening and Enhancing the Protected Area Network*
- II. *Effective Management of Protected Areas*
- III. *Conservation of Wild and Endangered Species and Their Habitats*
- IV. *Restoration of Degraded Habitats outside Protected Areas*
- V. *Control of Poaching, Taxidermy and Illegal Trade in Wild Animal and Plant Species*
- VI. *Monitoring and Research*
- VII. *Human Resource Development and Personnel Planning*
- VIII. *Ensuring People's Participation in Wildlife Conservation*
- IX. *Conservation Awareness and Education*
- X. *Wildlife Tourism*
- XI. *Domestic Legislation and International Conventions*
- XII. *Enhancing Financial Allocation for Ensuring Sustained Fund Flow to the Wildlife Sector.*

9.3.02 Division has to identify and prioritize degraded habitats outside PAs for the natural regeneration of forests/wetlands; identify and restore linkage and corridors between wildlife habitats using a combination of satellite imageries and ground truthing. The budgets allocated by different sectors can be harmonized and used to enhance the process of natural regeneration outside PAs through carefully monitored soil and water conservation works and effective protection activities. Plantations of appropriate indigenous species coupled with the removal of exotics should be done wherever necessary, apart from working with scientific institutions specializing in ecological restoration of degraded Eco system.

9.4 COURT JUDGEMENT AND RELATED COMMITTEES

9.4.01 Hon'ble Supreme Court passed an order in writ petition (202 of 1995) in the matter of "Godavarman Thirumalkpad" V/s Union of India. The order speaks about the felling of trees in all forests is to be remain suspended except in accordance with the working plans of the State government, as approved by Central government.

9.4.02 Hon'ble Supreme Court passed an order on dated 22.09.2000 in Inter Locutory application No 424 saying that regeneration of forest should commensurate with felling carried out under working plan. To achieve this it must be ensured that no felling be carried out without allocating necessary fund to regenerate the felled areas. In the event of failure in regeneration or any shortfall in carrying out regeneration operation no further felling shall be undertaken until the failure/shortfall is made up.

9.4.03 Following the directions of Hon'ble apex court in their order dated 22.09.2000 in IA No 424; the instructions/directions of the core group constituted to decide the extent of felling . Central government shall be strictly complied with and felling be carried out by State government only after obtaining permission from core group constituted by MoEF, New Delhi.

9.5 GOVT. OF MAHARASHTRA GR No MSC / 2000 / c. NO. 143 / F – 2, DATED 25 / 04 / 2003, REGARDING JOINT FOREST MANAGEMENT

9.5.01 Joint Forest Management approach was adopted for degraded forest area of the state vide GR, Dated 16 March 1992 and now new guidelines dated 25th April 2003 have been issued. It has authorized Forest Department to take-up JFM activities in well-stocked areas also on experimental basis, and to share usufruct with the villagers. All JFM activities should be in consonance to prescription of the working plan.

9.6 FUNCTIONAL CLASSIFICATION OF FORESTS:

9.6.01 The broad principles of classification of forests on functional basis have been embodied in Resolution No. MRF-1365/132211-Y, dated December, 6, 1968 issued by Government of Maharashtra. The following, functional classes have been recognized by the state.

Protection Forests: It includes forests on steep slopes (25^o and above) or 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.

Tree Forests: These forests are situated in remote tracts that are mainly capable of growing large sized timber and other products of commercial value.

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.

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.

Miscellaneous forests:

- a) **Grass reserves:** These are small blocks of forests situated amidst cultivated tracts carrying scrubby growth and capable of producing good fodder grasses.
- b) **Remaining areas** needed for other purposes.

9.6.02 The functional classification of the forest has been made by taking into consideration the above aspects besides the growing stock and condition of site. The various types of forests will be treated as follows:

1. **Tree Forest :** This type of forest includes the better quality forests, especially the site quality III and IVa areas, capable of producing medium to large-sized timber, which are comparatively away from local habitations. They have been worked under Conversion and CWR system in the past except areas under protected forests. They will be managed to produce medium to large sized timber. Steep slopes will be excluded from harvesting operations, but will be covered for soil and moisture conservation works. The natural regeneration will be tended and areas having inadequate natural regeneration will be planted with suitable valuable species. The percentage of teak in the existing crop is fairly high tending to pure patches at places. Therefore, plantation of teak and other miscellaneous species shall be so designed to that proportion of teak and miscellaneous species will be of 50:50 ratio in the resulting crop. These areas have been proposed to be worked under **SCI working circle**.

2. **Minor Forest:** These areas will be managed to meet the local need of small timber, poles and fuel wood. The growing stock is mainly of site quality IVa and IVb with patches of quality III. The density varies from 0.4 to 0.6 and natural regeneration is deficient in open areas. These forests have been worked under CWR system under the previous plans. These forests will be managed under Improvement system. Large scale soil and moisture conservation works are proposed to be taken in open and eroded areas. NR and rootstock will be tended and

supplemented with AR of suitable species. The well stocked areas will be worked as for SCI prescriptions and will provide small timber, poles and fuel wood to meet the local needs.

3. Pasture Land: These area includes forests which is adjoining to villages with heavy biotic interference. They are not capable of producing even small timber and fire wood to any appreciable quantity. These areas will primarily be managed to provide fodder by introducing fodder trees species and superior grasses. Rotational grazing will be prescribed. Soil and moistures conservation works will be taken along with planting and sowing of fodder grass and trees to meet poles, fuel wood and fodder demand of local people.

4. Miscellaneous Forests: These includes small scattered patches which are unsuitable for any type of working described earlier and areas earmarked for other purposes. The small patches will be managed as per local requirement by involving local people through JFMCs. Whereas, other areas will be worked as per the purpose for which they are earmarked.

5. The functional classification of forests in the Wardha Division has been given in the table 9.1.

Table 9.1. Functional categories of forests in the Wardha Division (Area in ha)

Forest category	Reserved Forests	Protected Forest	Other forest	Total area	Percentage
Tree forest	27801.354	7029.926	0.000	34831.280	35.76
Minor forest	19297.004	13285.844	0.000	32582.848	33.45
Pasture forest	2756.893	11377.410	46.840	14181.143	14.56
Protection forest*	2748.860	702.070	584.920	4035.850	04.14
Miscellaneous forest	71.490	35.094	11666.490	11773.074	12.09
Total	52675.601	32430.344	12298.250	97404.195	100.00

- NOTE : PROTECTION FOREST IS TRANSFERRED TO BOR WILD LIFE SANCTUARY

9.7 FACTORS INFLUENCING OBJECTS OF MANAGEMENT

9.7.01 The forests are primarily poor in quality, having high proportion of teak and need enrichment by miscellaneous species in the stocking. A large chunk of forest tract is under stocked, open and degraded that needs improvement in stocking through tending of existing rootstock and plantations.

9.7.02 The coppice vigour of teak and miscellaneous species have declined due to repeated coppicing under coppice systems for over 3 to 4 rotations leading to deterioration in growth and quality of teak and other valuable species. It also has led to increase in proportion of teak in the stocking leading to pure patches of teak at places in the division.

9.7.03 The natural regeneration of teak and miscellaneous is not up to the mark. Seedling and sapling were observed at places but far short of required numbers as the established natural regeneration to serve as normal future crop.

9.7.04 A large extent of forest areas falls in the catchments of irrigation projects and water bodies thereby need specific treatment in the interest of longevity of these bodies having focus on soil and moisture conservation to check siltation.

9.7.05 A large portion of forests of the division adjoins water bodies and the Protected Areas, namely, Bor Dharan Wildlife Sanctuary, thereby, require treatment in conformity with the wildlife and bio-diversity conservation and eco-tourism.

9.7.06 The forests suffer heavy biotic pressure, especially, uncontrolled grazing, resulting in compact soils devoid of humus and trampling the young regeneration. Excessive grazing and uncontrolled fires are the main adverse factors causing degradation of forests in the division. The situation requires some bold measures to minimize these adverse influences.

9.7.07 The NWFPs species form a substantial proportion of the forest crops that contribute substantially to the livelihood of local communities especially the tribal. The forest areas rich in NWFPs require special thrust for their sustainable management and use in the interest of local communities, by involving them through JFMCs and local NGOs having the skill of processing and value addition.

9.8 GENERAL OBJECTS OF MANAGEMENT

9.8.01 Following general objectives of forest management have been identified in pursuance of the National Forest Policy, 1988; and other directives issued by the state and the union governments, from time to time:

- i) To preserve forest cover on hill slopes, along streams, watercourses and water bodies in order to prevent soil erosion and to check siltation in reservoirs; and to maintain their essential protective and life support functions, including, regulation of the water regime.
- ii) To meet expectations of wild life protection and biodiversity conservation from managed forests.

- iii) To restore and augment tree cover in under-stocked and degraded forests, and to improve productivity and growing stock of natural forests using appropriate modes of management and techniques.
- iv) To alleviate the poverty in the forest dependent villages.
- v) To enhance productivity of firewood, fodder, non-wood forest produce, small timber and other construction wood required for meeting local household demands, particularly, of the tribal communities.
- vi) To involve women community in forestry management.
- vii) To improve fodder and grazing availability to local communities.
- viii) To ensure optimum sustained yield of desirable forest produce and services consistent with other objectives as well as National and State forest policies.

9.9 SPECIAL OBJECTS OF MANAGEMENT

- (i) To gradually convert stunted teak coppice crop with reduced coppicing vigor into 'high forest' by suitable silvicultural techniques and tending operations in existing NR and rootstock
- (ii) To improve the existing crops by Improvement measures aims at nursing back these forests to normalcy.
- (iii) To restore the vegetative cover 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, possibly through JFM.
- (iv) 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
- (v) To augment fodder requirements of the villages. Mostly it is grass resources, which are to be supplemented, wherever required, with palatable legumes and tree fodder.

9.10 TREATMENTS PRESCRIBED

9.10.01 Management treatment will depend upon requirements of environment stability, protection of topography, biodiversity conservation, characteristics of growing stock in the forest and objectives of management.

9.10.02 Existing protection forests will be preserved and augmented. Soil and moisture conservation works should improve moisture regime and prevent soil erosion and siltation in the water bodies.

9.10.03 Suitable tending and soil working operations will be carried out to stimulate the growth of the naturally regenerated seedlings and rootstock.

9.10.04 Timber, if silviculturally available, will be extracted from dense tree forests capable of producing medium to large-sized timber and poles on sustained basis.

9.10.05 Open forest areas and traditional pastures will be managed with active participation of tribal and village communities for meeting local domestic needs.

9.10.06 Uncontrolled grazing, fire, poaching, illicit cutting and uncontrolled encroachment are the threats for sustainable growth for forest, shall be curbed.

The general approach of the treatment has been described, as follows:

9.10.07 The entire forests on steep and precipitous slopes will be protected from harvesting. 30 meter wide strip on both sides of streams and watercourses will also be protected from harvesting in the similar manner.

9.10.08 Forest areas susceptible to erosion and falling in catchments areas of medium and large irrigation projects and reservoirs shall be protected and given separate treatment having focus on soil and water conservation, afforestation eco-restoration and eco-tourism.

9.10.09 Recommended soil and moisture conservation works should restore ecological balance and ensure biodiversity conservation.

9.10.10 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 hole management in forest areas.

9.10.11 Compilation of a comprehensive database of floral and faunal resources as well as ecologically sensitive sites in the division is proposed.

9.10.12 Preference will be accorded to natural regeneration and rootstock management. Natural regeneration and promising coppice growth will receive suitable tending and soil working to stimulate growth and development. Areas having good natural regeneration of valuable species shall be protected from fire and grazing. Artificial regeneration will be used as supplementary activity, at places, where natural regeneration is inadequate or is not likely to succeed.

9.10.13 Management of forests close to villages will be given priority for meeting demands of local people for small timber, poles, firewood, pasture, 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.

9.10.14 Non-wood timber forest produce (NWFP) has great potential for sustainable economic development of local communities with conservation of forest resources. Sustainable NWFP production will be given high priority in the forest management.

9.10.15 Sustainability of forest resources is proposed as the guiding principle for managing demands for 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 and livestock improvement.

9.10.16 Involving local people in managing forests and generating awareness in rural and tribal areas is considered indispensable for the forest conservation.

9.10.17 Reducing biotic pressure on forests, particularly, illicit felling, unsustainable grazing and encroachment near villages will be considered on priority basis.

9.10.18 Forests capable of producing medium to large sized timber will be harvested under the Selection-Cum-Improvement management system. For production of small timber, poles and fuel wood to meet the local and the nistar requirements. Improvement System is proposed to continue in areas of poor quality and stunted growth.

9.10.19 Boundary demarcation will be carried out in time-bound manner for ensuring territorial integrity of forests. The Revenue and Forest Departments shall ensure maintaining forest boundaries, updating land records and reconciling revenue records in accordance to forest notifications.

9.11 ANALYSIS AND VALUATION OF THE CROP

9.11.01 The analysis of forest crop is carried out after enumeration of the crop. The species and tree girth distribution from the enumeration data and density distribution from satellite imageries is used for the purpose.

9.11.02 Areas susceptible to high erosion and falling in the catchments of large water bodies are included in the Catchments Area Management Working Circle.

9.11.03 Compartments or part thereof under the non-forest use, forest nurseries or other special purposes such as Forest Research have been included under Miscellaneous Area Management Working Circle. As well as non-forest area 875.525 ha shall be utilized for compensatory afforestation.

9.11.04 Compartments having sufficient dense tree cover and mature trees fit for harvesting are allotted to the Selection-cum-improvement Working Circles (SCI). This working circle is expected to produce timber and firewood.

9.11.05 Compartments having preponderance of pole crop, dense tree cover without enough mature trees are designated as the Improvement Working Circles (IWC). These compartments are expected to produce poles, small timber and firewood.

9.11.06 Areas having sparse tree crops, open areas without tree growth and isolated small forest patches are included in the Afforestation and Root-stock management Working Circle (Aff&RSM). In such areas the focus would be upon tending of existing NR and rootstock supplemented by seedling plantation, wherever necessary. Involvement of the local community is considered focal for management of such areas as well as afforestation of open areas and isolated patches.

9.11.07 The compartments and areas close to the habitations which are unsuitable for raising timber crops due to their refractory nature and grass birs have been proposed to be managed under Grass and Fodder Resource Management (G & FRM) working circle to cater the needs of local rural people. The Pasture forests areas of Arvi, Ashti, Karanja and Wardha ranges have also been brought under this working circle as they are highly degraded and are unlikely to produce commercial timber. The plantations in these areas in the past have not been successful. However, by allowing regulated grazing in these areas, the grazing pressure on the remaining better quality forests of these ranges may be reduced.

9.12 WORKING CIRCLES AND THEIR DISTRIBUTION

9.12.01 For the purpose of formation of working circles, a compartment has been used as unit for distribution. The allocation of compartments is based on preponderance of suitability to

specific working circle. In all 6 (six) area-specific and four overlapping working circles are prescribed (Table 9.2) Abstract for allotment of compartment to various Working Circle and Felling series is given in **Appendix 9.1**.

Table 9.2. Distribution of forest areas in working circles

Sr No	Working circle	Reserved Forestss	Protected Forests	Acquired Private Forest	Zudpi Jungle	Non Forest Land	Total area (ha)	Percentage
1	Selection-cum-Improvement (SCI)	27801.354	7029.926	0.000	0.000	0.000	34831.280	37.30
2	Improvement (IWC)	10991.444	9635.193	0.000	0.000	0.000	20626.637	22.09
3	Afforestation & Rootstock Management (Aff&RSM)	464.580	3349.902	46.840	0.000	0.000	3861.322	4.14
4	Grass & Fodder Resource Management (G&FRM)	2352.313	8027.508	0.000	0.000	0.000	10379.821	11.12
5	Protection & Catchments Area Management (P&CAM)	8245.560	3650.651	0.000	0.000	0.000	11896.211	12.74
6	Miscellaneous (MIS)	71.490	35.094	202.28	10543.780	920.43	11773.074	12.61
	Total	49926.741	31728.274	249.12	10543.780	920.430	93368.345	100.00
Overlapping Working Circles								
7	Wildlife (Overlapping)						Entire Area	
8	*NWFP (Overlapping)						Entire Area	
9	#JFM (Overlapping)						Entire Area	
10	Protection (Overlapping)						Entire Area	

- * Non-wood Forest Produce and # Joint Forest Management

9.12.02 The reallocation of forest areas under various working circles of Dr. Nand Kishore's plan has been given in Table 9.3. The SCI (newly constituted) working circle of this plan has been constituted out of CWR working circle area. CWR compartments, which have been worked in previous plan, are put under Improvement Working Circle because young to middle aged crop in the area needs to reach at maturity for future productive selection forests. The compartments, which have not been worked under last plan, are included under SCI working circle in the current plan, having dense forest of mature and over mature crop capable of producing timber and poles; is available for harvesting. Old pasture, Grass birs and areas of protected forests adjoining to villages have been included in the Grass & Fodder Resource Management working circle. Areas

having sparse tree crop, open areas of Protected Forests in Arvi, Ashti, Hingni and Karanja ranges are included in Afforestation and Root Stock Management working circle. Tending operations of root stock and afforestation works have been proposed in such area. Areas susceptible to high erosion occurring in the catchment of large water bodies have been included in the Protection and catchment area management working circle. Mostly soil conservation works have been prescribed in this working circle. Areas for non forest use and such as nurseries research have been included in Miscellaneous working circle. As well as non forest area obtained from project authorities meant for compensatory afforestation have also been included in Miscellaneous working circle.

Table 9.3 Statement showing areas allotted to different working circles viz a viz previous plan

Dr Nand Kishore's Plan		Present Plan Working Circles (area in ha)							
Working Circle	Area (ha)	SCI	IWC	Aff&RSM	G&FRM	P&CAM	MIS	Wildlife Dn	Total Area
CWR	42500.04	27472.553	9524.090	73.126	69.094	5231.945	0.000	0.000	42370.808
IWC	21109.55	6576.027	8275.170	0.000	4924.505	1846.258	0.000	0.000	21621.960
FFP	16957.51	782.700	2743.923	3513.540	4947.833	4787.874	0.00	0.00	16775.870
MIS	710.53	0.00	83.454	227.816	438.389	30.134	106.584	0.00	886.377
Wildlife Nature Conser-vation	4033.55	0.00	0.00	0.00	0.00	0.00	0.00	4035.850	4035.850
Other	0.00	0.00	0.00	46.84	0.00	0.00	11666.49	0.00	11713.33
Total	85311.18	34831.280	20626.637	3861.322	10379.821	11896.211	11773.074	4035.850	97404.195

9.12.03 The SCI working circle areas are largely concentrated in Arvi, Ashti, Hingni, Karanja, ranges while the Improvement working circle areas are distributed in Arvi, Ashti, Hingni, Karanja, Wardha ranges. G&FRM working circle areas are distributed among almost all the ranges except Hingni Range. Where as AFF&RSM working circle areas are distributed in Arvi, Ashti, Hingni and Karanja ranges.

Table 9.4 Distribution of Working Circles amongst ranges

(1) Selection-cum-Improvement Working Circle

Range	Reserved Forests		Protected Forests		Total	
	Comptt No	Area (ha)	Comptt No	Area (ha)	Comptt No	Area (ha)
Arvi	50	10057.078	17	3378.675	67	13435.753
Ashti	17	4186.12	4	869.744	21	5055.864
Hingni	27	5352.08	9	1679.835	36	7031.915
Karanja	27	5929.716	6	1031.607	33	6961.323
Wardha	8	2276.36	1	70.065	9	2346.425
Total	129	27801.354	37	7029.926	166	34831.280

(2) Improvement Working Circle

Range	Reserved Forests		Protected Forests		Total	
	Comptt No	Area (ha)	Comptt No	Area (ha)	Comptt No	Area (ha)
Arvi	4	726.969	20	2749.742	24	3476.711
Ashti	21	5114.000	10	1096.277	31	6210.277
Hingni	8	1456.656	29	3951.975	37	5408.631
Karanja	7	1763.610	12	1627.052	19	3390.662
Wardha	7+1P	1930.209	1	210.147	8+1P	2140.356
Total	47+1P	10991.444	72	9635.193	119+1P	20626.637

(3) **Afforestation & Root Stock Management Working Circle**

Range	Reserved Forests		Protected Forests		Acquired Private Forests		Total (ha)	
	Comptt No	Area (ha)	Comptt No	Area (ha)	Village No	Area (ha)	Comptt No	Area (ha)
Arvi	1P	305.780	8	678.554	0	0	8+1P	984.334
Ashti	0	0.000	14	1896.900	0	0	14	1896.900
Hingni	1	147.670	4	376.853	2	31.07	7	555.593
Karanja	1	11.130	8	397.595	1	15.77	10	424.495
Wardha	0	0.000	0	0.000	0	0	0	0.000
Total	2 + 1P	464.580	34	3349.902	3	46.84	39+1P	3861.322

(4) **Protection & Catchment Area Management Working Circle**

Range	Reserved Forests		Protected Forests		Total	
	Comptt No	Area (ha)	Comptt No	Area (ha)	Comptt No	Area (ha)
Arvi	20 + 1P	5538.330	10	1845.085	30 + 1P	7833.415
Ashti	1	276.810	3	460.799	4	737.609
Hingni	10	1953.700	5	680.451	15	2634.151
Karanja	2	476.720	2	12.433	4	489.153
Wardha	0	0.000	5	651.883	5	651.883
Total	33 + 1P	8245.560	25	3650.651	58 + 1P	11896.211

(5) **Grass and Fodder Resource Management Working Circle**

Range	Reserved Forests		Protected Forests		Total	
	Comptt No	Area (ha)	Comptt No	Area (ha)	Comptt No	Area (ha)
Arvi	4	430.610	8	799.367	12	1229.977
Ashti	8	1312.723	50	6359.628	58	7672.351
Hingni	0	0.000	0	0.000	0	0.000
Karanja	1	264.660	23	618.088	24	882.748
Wardha	2+1P	344.320	9	250.425	11+1P	594.745
Total	15+1P	2352.313	90	8027.508	105+1p	10379.821

Miscellaneous Working Circle :

Range	Reserved Forests (ha)		Protected Forests (ha)		Zudpi Jungle		Acquired Forest		Non Forest Land		Total	
	Comptt (No)	Area (ha)	Comptt (No)	Area (ha)	Village (No)	Area (ha)	Village (No)	Area (ha)	Village (No)	Area (ha)	Comptt / village	Area (ha)
Arvi	2(P)	71.49	0	0	33	817.66	3	117.37	6	127.99	2P / 42	1134.510
Ashti	0	0	0	0	45	780.2	0	0	17	763.79	0 / 62	1543.990
Hingni	0	0	0	0	62	1082.77	0	0	2	28.65	0 / 64	1111.420
Karanja	0	0	8	35.094	40	1182.48	0	0	0	0	8 / 40	1217.574
Wardha	0	0			317	6680.67	1	84.91	0	0	0 / 318	6765.580
Total	2(P)	71.49	8	35.094	497	10543.78	4	202.28	25	920.43	8+2P / 526	11773.074

9.13 BLOCKS AND COMPARTMENTS

9.13.01 Reserved Forests of this division has been distributed in 229 compartments. 26 forest block contribute 210 compartments of old Reserved Forests, while remaining 19 compartments declared as a new Reserve in 1978 in different villages. All the compartments in Reserved Forests have been retained their original numbers.

9.13.02 Protected Forests (PF) covering in 249 villages have been organised in 266 compartments, in such a way that each forest patch has a distinct compartment number irrespective of its size. The distinct patches within these compartments numbers are assigned with district sub compartment numbers. For instance, if compartment number 5, constitutes 5 distinct patches of forests, they are assigned 5/1, 5/2, 5/3, 5/4, 5/5 as given in Appendix No 1.8 of chapter I. The notified area of such villages is considered for the purpose of area accounting.

9.13.03 The Wardha Division has 920.43 hectares as unclassified forests (Non Forest lands against Seven Projects). The division has moved proposal under section 4 of Indian Forest Act, 1927 for declaring these areas as the Reserved Forests. Compartments have not been formed in these areas.

9.13.04 The Wardha Division have acquired 249.12 hectares Private Forest Land under Private Forest Act 1975 in seven villages. Compartments have not been formed in these areas, where as the patches are combined with adjoining protected forest compartments.

9.13.05 The Revenue Authorities have handed over 105.438 km² of Zudupi Jungle in 497 villages to the Wardha Division in the year 1990. **(Appendix No. 9.2)** Compartments have not been formed in such areas.

Table 9.5 Distribution of Forest Compartments in working circle

Sr No	Working circle	Reserved Forests (Comptt)	Protected Forests (Comptt)	Acquired Private Forest (Villages)	Zudpi Jungle (Villages)	Non Forest Land Village	Total Number Comptt / Village
1	Selection-cum-Improvement (SCI)	129	37	0	0	0	166
2	Improvement (IMP)	47 + 1P	72	0	0	0	119 + 1P
3	Afforestation & Rootstock Management (A&RSM)	2 + 1P	34	3	0	0	36+1P + 3V
4	Grass & Fodder Resource Management (G&FRM)	15 + 1P	90	0	0	0	105 + 1P
5	Protection & Catchments Area Management (P&CAM)	33 + 1P	25	0	0	0	58 +1P
6	Miscellaneous (MIS)	2P	8	4	497	25	8 + 2P + 526V
	Total	226 + 6P	266	7	497	25	492+6P+ 529V

Abbreviation: P - Part, V - Village,

Note - 6 part compartment constitute 3 compartments distributed in 5 working circles.

9.14 PERIOD OF THE PLAN

9.14.01 The schedule of various operations have been provided for 20 years. This plan, however, is proposed to be implemented for a period of 10 (Ten) years from the year of approval. However, the mid-term review may be carried out if the circumstances demand and if concerned Chief Conservator of Forests (Territorial) comes forward with proposal for review.

9.14.02 Additional Principal Chief Conservator of Forests (Production & Management), Maharashtra State, Nagpur may issue necessary supplementary instructions on aspects not covered in the plan.

Chapter X

SELECTION-CUM-IMPROVEMENT WORKING CIRCLE

10.1 GENERAL CONSTITUTION OF THE WORKING CIRCLE

10.1.01 The areas capable of producing timber, poles and firewood are allotted to this working circle. The aim is to gradually convert the teak coppice areas into high forests by encouraging natural regeneration supplemented by artificial regeneration. It includes areas which support straight bole and sound trees of both seedling and coppice origin. It includes 34831.280 ha of total areas comprising of 27801.354 ha of reserved forests and 7029.926 ha of Protected Forests. It is extending over an area of 37.40 percent of total forest area of the division.

10.1.02 Based on result of enumeration data and satellite imageries, existing stock map details the following, criteria is proposed for allocation of compartments to the SCI areas:

- The areas having basal area more than 8sq.mt. per ha. and selection trees (above harvestable girth) more than 10 per ha, and density 0.4 to 0.8 are included under SCI Working Circle.
- Compartments suitable for producing timber of medium and large size and not critically important for the protection of topography.
- Compartments having dense teak forest of IVa quality having patches of quality III and IVb inextricably mixed in the crop.
- Bulk of old CWR Working Circle areas (not worked under previous plan) having stunted but straight and sound teak crop of site quality IV capable of producing timber and poles.
- Part areas of Improvement and Pasture working circles supporting dense and sound crop and capable of producing timber and poles.

10.1.3 Area statement is given in the **Table 10.1**

Table 10.1 Range wise compartments and Area allocation to SCI working circle (in ha) on basis of existing stock map.

Range	Compt. included	Dense Forests	Open Forests	Blanks	Grass Lands	Sub-mergence	Plantations	Total Area ha
Arvi	67	10914.117	1771.046	186.190	0.000	0.000	564.400	13435.753
Karanja	33	4834.479	1449.114	105.730	0.000	0.000	572.000	6961.323
Hingni	36	5248.966	698.879	83.070	190.000	0.000	811.000	7031.915
Ashti	21	3794.407	962.837	25.620	0.000	0.000	273.000	5055.864
Wardha	9	1414.220	516.255	60.950	75.000	0.000	280.000	2346.425
Total	166	26206.189	5398.131	461.560	265.000	0.000	2500.400	34831.280
Percentage		75.24	15.50	1.33	0.76	0.00	7.18	100.00

10.2 GENERAL CHARACTER OF THE VEGETATION

10.2.01 As per the enumeration results, composition and structure of forest crop in SCI area is given in Table 10.2 below. The forests are mixed in nature and contain all aged trees.

Table 10.2 Species and girth wise distribution in SCI areas: (Source: enumeration data)

Species	Stem per ha. in Girth Classes (GBH Range in cm.)									Total	Basal Area sq.mt / ha
	16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-above		
Ain	1.28	1.72	1.62	1.04	0.86	0.45	0.21	0.14	0.15	7.47	0.25
Aonla	0.32	0.39	0.40	0.28	0.24	0.10	0.06	0.01	0.01	1.82	0.06
Behada	0.21	0.22	0.20	0.16	0.10	0.15	0.06	0.08	0.10	1.29	0.06
Bija	0.31	0.38	0.18	0.17	0.08	0.14	0.02	0.07	0.02	1.36	0.04
Bhirra	7.13	8.41	6.14	4.03	1.54	0.92	0.41	0.10	0.09	28.77	0.64
Biba	0.33	0.60	0.29	0.23	0.03	0.01	0.01	0.00	0.00	1.50	0.03
Bel	1.87	2.04	2.55	1.92	0.88	0.40	0.21	0.01	0.01	9.90	0.26
Char	0.33	0.37	0.38	0.36	0.21	0.09	0.17	0.01	0.06	1.98	0.07
Chichwa	0.37	0.21	0.16	0.12	0.10	0.13	0.05	0.07	0.08	1.30	0.05
Dhaman	0.76	0.74	0.38	0.24	0.02	0.02	0.00	0.00	0.00	2.16	0.03
Dhawada	2.86	3.09	2.40	1.67	1.14	0.80	0.43	0.20	0.13	12.71	0.38
Garadi	2.90	5.92	5.12	2.22	0.77	0.00	0.00	0.00	0.00	16.94	0.32
Haldu	0.12	0.22	0.36	0.07	0.00	0.00	0.00	0.00	0.16	0.93	0.04
kalam	0.59	0.70	0.71	0.68	0.42	0.27	0.29	0.08	0.14	3.86	0.16
Kasai	0.23	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.01
Khair	2.86	3.51	2.51	0.89	0.34	0.17	0.07	0.02	0.08	10.46	0.13
Kullu	0.89	0.82	0.24	0.05	0.00	0.00	0.00	0.00	0.05	2.05	0.03
Lendia	3.86	3.36	2.12	1.21	0.40	0.13	0.03	0.01	0.01	11.13	0.18
Moha	0.29	0.22	0.11	0.15	0.03	0.18	0.06	0.06	0.57	1.67	0.13
Mokha	0.30	0.32	0.00	0.09	0.07	0.09	0.11	0.09	0.00	1.08	0.04
Mowai	0.41	0.54	0.69	0.64	0.49	0.34	0.24	0.09	0.09	3.54	0.15

Species	Stem per ha. in Girth Classes (GBH Range in cm.)									Total	Basal Area
	16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-above		
Palas	12.38	10.52	7.26	3.54	1.36	0.59	0.29	0.10	0.18	36.22	0.66
Rohan	0.25	0.34	0.35	0.18	0.07	0.05	0.03	0.06	0.03	1.38	0.04
Salai	0.72	0.22	0.30	0.73	0.34	0.32	0.39	0.32	0.25	3.60	0.21
Semal	0.04	0.00	0.04	0.15	0.02	0.02	0.04	0.06	0.12	0.50	0.04
Shisam	0.21	0.30	0.52	0.29	0.03	0.06	0.00	0.03	0.03	1.46	0.04
Shiwan	0.00	0.05	0.09	0.09	0.12	0.05	0.00	0.08	0.00	0.48	0.03
Teak	50.00	62.38	49.82	28.74	13.31	6.47	2.59	0.95	0.54	214.81	4.80
Tendu	6.53	2.42	0.67	0.42	0.24	0.20	0.24	0.05	0.03	10.81	0.15
Tiwas	0.53	0.71	0.43	0.12	0.12	0.00	0.13	0.00	0.00	2.04	0.04
Other	15.72	11.33	4.02	1.42	0.64	0.38	0.22	0.11	0.25	34.09	0.48
Total	114.63	122.06	90.34	51.90	23.97	12.55	6.37	2.82	3.17	427.80	9.55

10.2.02 The forests area mainly comprises of Dry Teak Forests and Southern Dry Mixed Deciduous Forests in type and composition and supports high proportion of teak especially in former type. The forest crop mainly ranges from middle aged to mature and is of uneven-aged character and composition. They are rich in floral diversity and include many NWFP species of great significance for the livelihood of local forest dwelling communities. Majority of these areas have been worked 4 times under Coppice Systems. Hence, the crop is primarily of coppice origin but straight and sound to a large extent. NR of teak and other prominent associates is found at places but is far from adequate and more so its establishment is an issue of concern due to proneness of these areas to forest fires and heavy grazing.

10.2.03 Teak is the predominant species and found in well-drained areas having good loamy soil. It constitutes over 60 to 80 percent of crop and form pure patches of teak at places. The common associates of teak are; *Bhirra, Dhaora, Lendia, Ain, Tendu, Kalam, Mowai, Achar, Moha, Aonla, Chinch and Bel* are common edible fruit-bearing species.

10.2.04 The crop is middle-aged to mature with occasional young and over-mature trees. Dominant site qualities are IVa, but areas of site quality III and IVb are also found mixed in the crop. The density varying from 0.4 to 0.8.

10.2.05 Natural regeneration of teak and other common species is scanty and found in well drained areas having good soil and little biotic interference. Establishment of NR varies from place to place depending upon fire and grazing damage. The reproduction is mostly from coppice. Due to prolific coppicing nature and favourable treatment in the past teak has increased in proportion in stocking leading to pure patches of teak at places. However, crop has undergone 4 rotations under coppice system leading to reduction in vigour of coppice reproduction. Regeneration of

miscellaneous species requires focus to restore the mixed nature (50:50) and high forest character of forest crop in the division.

10.3 BLOCKS AND COMPARTMENTS

10.3.01 Allotment of compartments in the working circle has been given in **Appendix 10.1**.

10.4 SPECIAL OBJECTS OF MANAGEMENT

10.4.01 The special objects of management of forest areas under SCI Working Circle are given, as follows:

- i) To gradually convert stunted teak coppice crop with reduced coppicing vigor into 'high forest' by suitable silvicultural techniques and tending operations in existing NR and rootstock.
- ii) To obtain sustained supply of medium to large-sized timber and poles.
- iii) To maintain mixed forest composition and high forest character of the forest crop and improve density of stocking by tending existing NR and rootstock and supplement it with AR.
- iv) To improve the proportion of valuable miscellaneous trees species in the crop by suitable tending operations and providing growing space for naturally regenerated seedlings of such species.

10.5 ANALYSIS AND VALUATION OF THE CROP

10.5.01 **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.

10.5.02 **Age and density:** The crop is mostly middle aged to mature having density varying from 0.4 to 0.8. The dense forest areas form about 3/4th of the crop in SCI areas.

Table 10.3 Area details of SCI working circle on the basis of satellite imageries.

Range	Comptt included	Density > 0.6	Density 0.4 to 0.6	Density < 0.4	Blank	Submergence	Total ha
Arvi	67	4922.747	5857.672	1812.396	839.800	3.138	13435.753
Karanja	33	2927.695	2359.808	798.481	857.766	17.574	6961.324
Hingni	36	5331.148	1041.608	325.72	312.691	20.747	7031.914
Ashti	21	1271.785	1873.746	1148.271	744.807	17.255	5055.864
Wardha	9	1704.695	312.317	235.424	91.556	2.433	2346.425
Total	166	16158.070	11445.151	4320.292	2846.620	61.147	34831.280
Percentage		46.39	32.86	12.40	8.17	0.18	100.00

10.5.03 **Site Quality:** Site quality governs the harvestable girth. It can be determined by average height of about 100 mature dominant trees of Teak or its associates in the forest patches of consistent characteristics. However, site quality does not change much in time span of 20 years and hence the information from the previous plan has been used to delineate and digitise the various site quality classes.

Table 10.4 Site Quality wise area distribution in SCI working circle (area in ha.)

Site Quality	Arvi	Ashti	Hingni	Karanja	Wardha	Total No
Teak III	0	0	351.19	0	0	351.19
Teak IVA	1301.236	173.61	1823.901	0	279.5	3578.247
Teak IVB	9380.109	3098.627	2568.486	4494.719	453.23	19995.17
Mixed III	0	0	0	0	0	0
Mixed IVA	0	0	24.69	0	35.62	60.31
Mixed IVB	191.082	522.17	408.75	339.76	645.87	2107.632
Total	10872.427	3794.407	5177.017	4834.479	1414.22	26092.550
Plantation	564.4	273	811	572	280	2500.4
Under Stock	1771.046	962.837	698.879	1449.114	516.255	5398.131
Grass Land	0	0	190	0	75	265
Submergence	41.69	0	71.95	0	0	113.64
Scrub	32.37	0	0	0	0	32.37
Encroachment	8.9	25.62	40	0	4.93	79.45
Blank	144.92	0	43.07	105.73	56.02	349.74
Total	13435.753	5055.864	7031.916	6961.323	2346.425	34831.28

10.5.04 **Enumeration:** Enumeration is carried in **842 plots** over an area **303.12 ha**. Inventory work includes complete enumeration of species and girth distribution of all trees, regeneration and recording of site quality, density. This data is used for relative different species girth wise, basal area of species which ultimately is further used for allocation of working circle. Analysis of the data collected from these sample plots is given in **Appendix 8.4**.

10.5.05 **Regeneration:** Data on regeneration status is collected along with enumeration of the crop. The seedlings are enumerated in the following three categories, as given in the Table 10.5. The data is analysed and used to devise prescriptions for regeneration of forest areas by both the natural and artificial means. The focus is on tending of existing 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.

Table 10.5 Seedlings and saplings per hectare in the SCI areas

Range	Seedlings (R1)	Saplings (R2)	Saplings (R3)	Total
	up to 1.0 meter	1.0–3.0 meter	> 3.0 meter	
Arvi	777	346	217	1340
Ashti	792	191	42	1025
Hingni	545	443	291	1279
Karanja	651	386	52	1089
Wardha	280	258	45	583
Average	677	351	169	1197

10.6 SILVICULTURAL SYSTEM

10.6.01 SCI System prescribes removal of mature trees above the harvestable girth that creates 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 advantage over, the clear felling and coppice systems, in its ability to address issues related to the biodiversity conservation and maintenance of site conditions and mixed and high forest nature of the forest crops.

10.6.02 Except teak, forests of Wardha Division supports very few valuable species of good coppicing nature. Moreover, a significant part of these forests have been worked under Coppice Systems for 4 successive rotations leading to reduction in their coppicing vigour. In view of these reasons, coppice systems are not considered suitable for the forests of Wardha Division.

10.6.03 In view to above, and to maintain the mixed composition and high forest character of the forest crop and to achieve the objective of management these forests are proposed to work under SCI working circle. Local demands of small wood can be met from SCI coupes as well as from thinning operations in other WCs by making administrative changes in the disposal of harvested material.

10.6.04 Old plantations and forest areas 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 areas poor in natural regeneration will be artificially regenerated by Shivan, Sisoo, Sirus, Kinhi, Semal, *Khair*, *Neem*, *Maharukh*, *Sandal*, *Babool*, *Ain*, *Moha* and other local suitable species. Plantations will not be taken up in SCI areas unless minimum 5 hectares of open area having crown density less than 0.4 is available in an annual coupe.

10.7 HARVESTABLE GIRTH

10.7.01 Harvestable girth for teak species in SCI working circle is determined at maximum volume production as per CAI & MAI curve in stem analysis exercises, fixed as 105 cm for site quality IV.

10.7.02 Preliminary Working Plan Report of Wardha Forest Division when discussed in State Level Committee, suggestions were received during discussion to set up a committee to see the magnitude of hollow trees distribution data, reasons for the same and decide the working circle. The committee was formed under chairmanship of Add. Principal Chief Conservator of Forests (Production & Management), MS, Nagpur. The committee visited the area of Wardha Forest Division and inspected teak stands and felled timber in the depot for assessing the hollowness problem. The hollowness to the tune of 50% was observed. The committee found since the area was worked under CWR repeatedly in last 4 rotations, which leads to hollow timber. This has been supported by Dr Nand Kishore's working plan which says that trees beyond girth of 60 to 75 cm, start developing hollowness. Therefore, although the exploitable girth in site quality IV of teak fixed at 105 cm, it will not be practical to harvest teak trees only above 105 cm girth. But hollow teak trees above 75 cm girth can be harvested.

10.7.03 However, this issue has been discussed in State Level Committee during approval of DWP Wardha on dated 26th July 2005 and suggestions were received from the respected committee members, that the fixation of harvestable girth and percentage of removal of hollow teak trees above 75 cm girth may be determined after considering the data of stem analysis done in Wardha division by the then CF, Nagpur and due discussion with CCF(T) Nagpur.

10.7.04 On the basis of stem analysis data done by the then CF, Nagpur and enumeration data (done by SOFR unit Chandrapur); annual increment over the area of SCI working circle and volume to be extracted each year is calculated and given as under table 10.6.

Table 10.6: Annual increment and Volume for Teak trees over SCI working circle

Girth Class (cm)	Mid Girth (cm)	No. of Trees per ha	CAI (m ³)	Annual Increment per ha (m ³)	Vol. Per Tree (m ³)	Vol. Per ha (m ³)	Vol. Per ha. (75 cm above)
1	2	3	4	5	6	7	8
15-30	22.5	50	0.00015	0.0075	0.0025	0.125	
31-45	38	62.38	0.0015	0.0936	0.02	1.248	
46-60	53	49.82	0.003	0.1495	0.045	2.242	
61-75	68	28.74	0.004	0.115	0.07	2.012	
76-90	83	13.31	0.0037	0.0492	0.12	1.597	1.597
91-105	98	6.47	0.0014	0.0091	0.165	1.068	1.068
106-120	112.5	2.59	0	0	0.215	0.557	0.557
121-135	128	0.95	0	0	0.265	0.252	0.252
135 above	142.5	0.54	0	0	0.315	0.17	0.170
Total		214.8		0.4239		9.271	3.644
			SCI WC area	34831.28 ha	Total Coupe area	1742 ha	1742 ha
				14761.322		16147.9	6346.89

10.7.05 The current annual increment is 0.4239 cumt per ha and hence over the total area of 34831.28 ha of SCI working circle it comes to 14761.322 cumt. The total volume of the trees above 75 cm gbh per ha 3.643 cumt, hence annually it comes to 6346.81 cumt. which is less than the total incremental volume over the area.

10.7.06 The issue was discussed at length with CCF(T) Nagpur & CCF(WP) Nagpur along with the above data, it is decided that all hollow teak trees above 75 cm girth are prescribed to be harvested. The harvesting will start from higher girth class to lower girth class. Hollow trees will be harvested first on priority and then other sound teak trees subject to their silviculture availability. Harvesting for teak shall be limited to volume mentioned under table 10.6, column 8, per year in SCI working circles.

10.7.07 The opening created by harvesting are to be regenerated naturally or artificially through plantation of suitable species.

10.7.08 *Ain* is proposed to be bracketed with *Bija* in the growth pattern. Harvestable girth for other miscellaneous species, because of their widely varying growth pattern, has been determined based on the assumption of maximum volume production setting in at relatively lower girth in *the*

species. Felling of *Shisham* and *Haldu* trees is not prescribed because of restricted distribution in the division. Vide GR No FLD-4657 / 193064 / E dated 19 / 12 /1968 felling of all fruit trees has been banned. (Appendix 10.2)

10.7.09 Species has been classified into four groups on the basis of their growth pattern. Harvestable girth for various species, classified in different groups, are given, as follows, in Table 10.7.

Table 10.7 The 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 75 cm. above for hollow trees
Group 2	Ain, Bija,	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%)

10.8 CHOICE OF SPECIES

10.8.01 Teak will receive the top priority for retention. However, if sound teak trees make more than 50% of stems above 75 cm in GBH, other healthy growing valuable species will be considered for retention. The order of priority for non-teak species for retention will be *Tiwas*, *karam*, *Shisham*, *Saja*, *Siwan*, *Dhaora*, *Bhirra*, *Mowai*, *Salai*, *Dhaman*, *Lendia*, *Tendu*, *Rohan*, *Khair*, etc.

10.9 YIELD CALCULATION

10.9.01 The yield calculation is based on Sagreiya's¹ approach to the Brandis Formula. Yield calculation has been carried out separately for teak (*Group 1*), *Ain*, *Bija* (*Group 2*) and species listed in the *Group 3* & *4* Yield for group 5 species has not been done as these species are reserved against felling. (Appendix 10.3).

¹ Indian Forester June 1956

10.9.02 The number of stems per ha reaching the harvestable size have been calculated on the basis of de Liocourt's law, that is, first r and a are calculated and then no of trees in higher girth classes in each cycle have been found out. The survival percentage is obtained by applying de Liocourt's law and realizable recruitment in successive felling cycles has been calculated by Sageriya's formula. The working is carried out on a 20 year felling cycle and hence the yield available in each felling cycle throughout the rotation period has been calculated. The stock in hand has been liquidated through out the rotation period and thus the yield available in various cycles is harmonised for the rotation period.

1. On this basis, the trees per ha are 2.135. The per tree volume from the stem analysis of teak in Wardha forests may be taken as 0.120 m^3 . Thus, annual yield for teak in a coupe will be as follows:

$$\frac{2.135 \times 0.120 \times 34831.28}{16} = 557.73 \text{ m}^3$$

Similarly, yield for Group 2 species is as follows

$$\frac{0.0295 \times 0.75 \times 34831.28}{16} = 48.165 \text{ m}^3$$

3. In case of Group 3 species i.e. Dhawda, Tiwas, Kalam etc., the harvestable girth is fixed at 90 cm and, hence, per tree volume from the local volume table is 0.040, Therefore, the yield available is as follows:

$$\frac{0.0328 \times 0.040 \times 34831.28}{16} = 28.561 \text{ m}^3$$

4. In case of Group 4 species i.e. Garadi, Lendia and Khair, the harvestable girth is 45 cm. Therefore, per tree volume from the local volume table is 0.06 and the available yield is:

$$\frac{0.477 \times 0.06 \times 34831.28}{16} = 62.304 \text{ m}^3$$

Past experience shows about the failure of miscellaneous plantations at many places, as well as the regeneration is also very difficult in above group 2, group 3 and group 4 species. Therefore, it is prescribed to remove only 50% yield in above group 2, 3, & 4 species.

10.10 FELLING CYCLE, FELLING SERIES AND ANNUAL COUPES

10.10.01 **Felling Cycle:** Felling cycle is fixed at 20 years.

10.10.02 **Felling series and annual coupes:** The entire area of this working circle has been divided into **16 Felling Series** with average area of the felling series **2176.95 ha** and each felling series is further divided in 20 coupes with average area of the coupe **108.85 ha**. **(Appendix 10.4)**

10.10.03 **Regulation of yield:** The yield is regulated by area.

10.11 COUPE DEMARCATION, TREATMENT MAP

10.11.01 The coupe demarcation, preparation of treatment maps and marking will abide by the prescriptions mentioned in the chapter of Miscellaneous Regulations.

10.11.02 The main annual coupes shall be demarcated one year in advance along with coupes due for Cleaning and Thinning. The coupe shall be divided into four sections, if necessary, to effectively control the various coupe operations.

10.11.03 **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.

10.12 TREATMENT PRESCRIBED

10.12.01 The treatment proposed for various treatment type areas shall be as follows:

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: steep slope*. Smaller areas of steep slope, even if not marked on the map, will also receive the prescribed treatment.
- 20 meter wide buffer along streams will be measured from the bank or the high flood mark. Similar buffer of the A2-type areas will be marked along water bodies and tanks.
- The A3-type (excessive erosion prone) includes seasonally flooded areas.

The following activities can be taken up in such areas:

- i) **Soil and moisture conservation:** Gully plugging and other soil and moisture conservation works (except contour trenching), as described in the chapter of Miscellaneous Regulations shall be taken in the A3-type areas. Such works may be taken up in the A2-type areas, if not detrimental to the riparian ecosystem.
- ii) **Bush sowing:** Bush sowing of *Khair*, *Neem*, *Maharukh*, *Sandal*, *Acacia tortilis*, *Babool* and other local seeds is prescribed. Any one species should not constitute more than one-third of the disseminated seeds.
- 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.
- 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

Under stocked can be categorised into 2 types:

B₁ type - Open forests (density < 0.4) with rootstock (625 saplings per hectare)

B₂ type - Open forests (density < 0.4) without rootstock

The following Compartments 208, 209 of Hingni Range and compartment 325 of Wardha Range along with other compartments in working circle are included in B₁ type.

Table 10.7

Compt. No	Total Area (in ha)	Grass land Area (in ha)
1	2	3
208	248.48	50.00
209	354.93	140.00
325	296.23	75.00

Although these three compartments are in B₁ Type; the area in col. (3) shall be given treatment of grass land management. The grass lands shall be permanently closed for grazing but with a provision of drawing fodder from it on 'cut and carry away' basis.

Root Stock Management – Preference will be given to encourage natural regeneration considering the existence of sufficient rootstock in majority of areas and its management. Tending of rootstock in the B₁ type 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 shall be removed. Such coppice shoots should also be close enough to the ground so that it will not topple after gaining volume and weight and would be able to develop root system of its own subsequently.
- 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 60 centimetre 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 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, species, which are less in number in stocking, shall however be given preference. 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 scrape weeding of one-meter diameter should be carried out in the first week of August around the shoots of seedling coppice within the rootstock management area.
 - 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.

Plantations: Plantations will not be taken up in SCI areas unless minimum 5 hectares of open areas having crown density less than 0.4 is available in annual coupe. Such suitable sites of the B2-type areas may be brought under the plantations. The choice of bamboo planting, mixed

species plantations or teak-stump planting will be done site specific. Stump planting of teak may be considered in areas with crown density less than 0.2. All planting operations and subsequent operations should follow the guidelines for planting operations described in the chapter of Miscellaneous Regulations.

C Type Areas: Old Plantations and pole crop

It includes groups of naturally grown poles, having 15 to 45 cm GBH and old plantations.

Thinning: Thinning of old plantations and pole crop will be carried out maintaining average spacing of one-third of the crop height in such patches. *The post-thinning crop should have basal area and number as close to the relevant stand or yield table for that site quality as possible.* Detailed guidelines for thinning have been included in para 20.10 of Chapter 20 Miscellaneous Regulation. 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

Areas having density 0.4 or over showing adequate regeneration 400 or above established seedlings:

- i) **Enumeration in annual coupes:** Species and girth-class of all trees above harvestable girth are prescribed to be recorded for enumeration.
- ii) **Harvesting:** Mature trees above harvestable girth are prescribed for harvesting. However hollow teak trees above 75cm girth are prescribed to be harvested. The harvesting will start from higher girth class to lower girth class. Hollow trees will be harvested first on priority and then other sound teak trees subject to their silviculture availability. Harvesting for teak shall be limited to volume mentioned under table 10.6, column 8, per year in SCI working circle. The opening created by harvesting are to be regenerated naturally or artificially through plantation of suitable species. Well-formed and vigorous seed origin trees will be preferred for retention.
- iii) **B-grade Thinning:** If the congestion is expected to persist in some patches after the harvesting, the B-grade thinning in the same girth class will be carried out in such patches. *B-grade or moderate thinning is defined as removal of dead, dying, diseased, suppressed, defective dominated stems and whips in this order².* Removal of inferior individuals will start from suppressed class and then to some of the dominated class of

² FRI. 1983. Abridged Glossary of Technical Terms. Forest Research Institute & Colleges, Dehra Dun. Page 224.

the crop. Advanced growth having too many branches not desirable to prune or lop may also be removed.

- iv) **Tending of natural regeneration:** Singling and spacing out will be carried out among saplings of teak and other valuable species listed in the following section for the rootstock management. Spacing operations should leave nearly 400 saplings per hectare. The natural regeneration present should be encouraged by soil working and mulching around them in accordance with the guidelines for the rootstock management described in this chapter.
- v) **A 5 to 20 ha patch on an average in such coupes if found suitable for teak shall be taken up for creating plantations from genetically superior stock through over-wood removal.**

E -Type Areas: Blank Areas

1. Areas are devoid of trees or with crown density 0.1 and below.
2. Soil and moisture conservation works/measures, as prescribed in the chapter of Miscellaneous Regulations.
3. Teak, suitable miscellaneous species and bamboo shall be planted in conformity with Plantation Guidelines and site conditions. Natural Blanks will normally be not taken up for afforestation.

10.13 MARKING RULES

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

10.13.02 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.

10.13.03 The following rules shall 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 and malformed over mature 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 only one, the most promising / stool, shall be marked.

C Type Areas: Old plantations and groups of young poles:

1. The congested pole crop shall be marked for thinning to maintain spacing equal to 1/3rd of the crop height and/or to bring down stem number as per the yield table.
2. The dead, dying and malformed poles shall be marked for thinning.
3. The congested old plantation areas shall be marked for thinning retaining number of stems per hectare as per yield table.
4. 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 Teak (*group1*), Ain, Bija (*group 2*) and the *Group 3 (listed species)* trees above the harvestable girth and approach class are prescribed to be enumerated in 15 cm girth-classes, before marking.
2. All hollow teak trees above 75 cm girth are to be marked. Felling marking is prescribed to proceed from highest girth-class to lower girth-classes; and no trees, except hollow shall be marked for felling unless silviculturally available. Trees of seed origin shall be preferred for retention.
3. Over-wood removal (5 – 10 ha. patch) shall create openings for growth of teak for this purpose all except the following categories of teak, shall be marked for removal.
 - i. All young to middle aged fruit bearing trees up to 20 trees per hectare will be retained.
 - ii. Young middle aged trees of Semal, Khair, Rosewood and superior misc. trees up to 20 trees per hectare uniformly spread over the area will be retained.
 - iii. No removal of over-wood up to 20 m on either side of nallas, streams and riverbanks is to be done. Only dead trees from such strips shall be removed.
 - iv. 20 m. wide strip of natural forest is to be retained on all sides of the section and between such section.

4. All edible fruit bearing species, such as, *moha, achar, tendu, aonla, sitafal, chinch, bel, etc.* and minor forest produce species such as *kullu, Semal, Salai, etc.* shall be reserved against felling.
5. All dead and malformed trees, retaining 2 trees per hectare, shall be marked for felling. To avoid excessive felling it is prescribed that malformed trees having straight clear bole exceeding 2.5 metre height from ground level shall not be marked for felling.
6. All live high stumps and all but one vigorously growing coppice pole per stool shall be marked for felling.

E Type Areas: Blank Areas- Marking is not prescribed.

10.14 METHODS OF REGENERATION

10.14.01 Natural Regeneration and rootstock management 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. The treatment, as prescribed above, shall be given to such areas. Tending operations as prescribed for natural regeneration in the D-type areas and rootstock management in the B1- type areas will be taken up with the coupe operations.

10.14.02 Plantations shall be taken only in the B2-type, D-type and the E-type areas, (except natural blanks) having inadequate NR in a patch of minimum 5 ha in extent. For plantations, Plantation Guidelines shall be followed.

10.14.03 Preference shall be given to the bamboo plantations.

10.14.04 Stump planting of teak may be considered in areas with crown density less than 0.2 and found unfit for bamboo planting. The remaining plantation area will be brought under the mixed species plantations using suitable species; Shivan, Mahrukh, Kinhi, Semal, Sisso, Babul fodder grasses such as Paonia, Marvel, Sheda.

10.15 CUTBACK OPERATIONS, CLEANING AND THINNING

10.15.01 **Cutback operations** - Cutback operations shall be carried out, in the 2nd year coupe working in the annual coupes. **(Appendix 10.5)** All the left over marked trees during the main coupe operations shall be harvested. 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). All trees damaged during the main coupe felling shall be marked for removal as well as multiple coppice shoots and poles shall be reduced to one per stool. All newly risen coppice shoots shall be removed to encourage establishment of seedling regeneration.

10.15.02 **Cleaning** - Cleaning in the 6th year will be done. All areas of the natural regeneration tending, rootstock management and plantations shall be recorded in the divisional notebook and shall be cleaned. All inferior species including the unwanted undergrowth interfering or likely to interfere with the growth of NR of teak and other valuable species shall be cut. Climber cutting, shrub clearance, dressing of high stumps, extraction of marketable down logs should be carried out in the entire coupe. Coppicing of damaged and malformed saplings and singling of coppice shoots shall be carried out. All newly risen teak coppice shoots shall be removed. Established seedling regeneration of teak and other miscellaneous species shall be spaced out suitably. Spacing of dense growth will follow the stand table of the concerned species. In absence of the stand table, thumb-rule of keeping the spacing at one-third of the average height will be followed.

10.16 THINNING

10.16.01 Thinning is prescribed to be carried out in those plantations, having at least 50 percent survival. Such areas shall be recorded in the divisional notebook, and considered for the 11th year thinning operations, as per thinning guidelines. Thinning is proposed to be carried out in old plantations and patches of dense pole crop by maintaining average spacing of one-third of the crop height. The post-thinning crop should have basal area and number as close to the relevant stand or yield table for that site quality as possible. Poles of vigorously growing non-teak species should be preferred for retention so long as not less than 50 percent of the crop is dominated by teak.

10.17 CLOSURE TO GRAZING AND FIRE PROTECTION

10.17.01 Protection from fire and grazing is essential for success of natural and artificial regeneration. All annual coupes shall remain closed to grazing; and shall be provided strict fire protection, till completion of the 6th year coupe cleaning operations.

Chapter XI

THE IMPROVEMENT WORKING CIRCLE

11.1 GENERAL CONSTITUTION OF THE WORKING CIRCLE

11.1.01 The Improvement Working Circle (IWC) covers 20626.637 hectares comprising 10991.444 ha of Reserved Forests and 9635.193 ha of Protected Forests.

11.1.02 It includes a bulk of forests of Coppice with Reserve Working Circles and part of Fuel, Fodder and Pasture working circle of the plan under review. It also includes areas of successfully converted crop under the High Forest Working Circle during earlier plans. It mainly, comprises, forests mostly pole crop that need rest for sometime, and old teak plantations.

11.1.03 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 crop has been included in this working circle.

11.1.04 Following criteria have been used for allocation of compartments to the IWC.

- Areas having basal area up to 8 sq mt per ha; are included.
- Majority of CWR areas worked in previous plan; are included. Areas worked, having young to middle aged crop are aimed at to mature as future productive selection forests, doing hygienic operation of improvement.
- Although meeting criteria for SCI areas in regard to density, composition and site quality, compartments having preponderance of pole crop and plantations.
- Compartments having teak and miscellaneous forests of quality IV with more open forest and blanks and some compartments of fuel, fodder and pasture working circle having young to middle aged crop.

The distribution of areas by Ranges is given in the table below:

Table 11.1 Compartments allocation to Improvement Working Circle.

Range	Compt.	Dense Forests	Open Forests	Blanks	Grass Lands	Submergence	Plantations	Total Area
Arvi	24	818.517	2171.017	70.217	0.000	27.480	389.480	3476.711
Karanja	19	1825.982	579.070	420.070	0.000	0.000	565.540	3390.662
Hingni	37	1721.547	1215.790	111.740	0.000	0.000	2359.554	5408.631
Ashti	31	3087.918	2073.552	275.297	0.000	0.000	773.510	6210.277
Wardha	9	1027.070	389.806	90.480	50.000	0.000	583.000	2140.356
Total	120	8481.034	6429.235	967.804	50	27.48	4671.084	20626.637
Percentage		41.12	31.17	4.69	0.24	0.13	22.65	100.00

11.2 GENERAL CHARACTER OF THE VEGETATION

11.2.01 On the basis of enumeration results the species composition and their girth distribution in forest areas under this working circle is given below:

Table 11.2 Species and girth distribution from enumeration data in IWC areas.

Species	Stem per ha. in Girth Classes (GBH Range in cm.)									Total	Basal Area sq m / ha
	16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-above		
Ain	0.05	0.25	0.16	0.20	0.05	0.00	0.00	0.03	0.00	0.74	0.02
Aonla	0.05	0.25	0.16	0.20	0.05	0.00	0.00	0.03	0.00	0.74	0.02
Behada	0.54	0.54	0.57	0.21	0.16	0.09	0.04	0.12	0.06	2.32	0.07
Bija	0.00	0.16	0.01	0.00	0.11	0.00	0.07	0.03	0.03	0.40	0.02
Bhirra	9.51	10.27	8.54	4.45	2.33	1.00	0.40	0.21	0.09	36.81	0.8
Biba	0.61	0.24	0.38	0.06	0.00	0.00	0.00	0.00	0.00	1.29	0.02
Bel	0.76	0.89	0.68	0.46	0.43	0.21	0.09	0.01	0.05	3.58	0.1
Char	0.48	0.80	0.30	0.22	0.16	0.07	0.04	0.06	0.00	2.12	0.05
Chichwa	0.91	0.25	0.08	0.04	0.06	0.03	0.12	0.09	0.12	1.69	0.06
Dhaman	0.67	0.69	0.10	0.02	0.00	0.00	0.06	0.00	0.00	1.53	0.02
Dhawada	5.23	5.21	2.91	1.67	1.28	0.63	0.37	0.17	0.10	17.56	0.04
Garadi	0.78	3.46	0.87	0.13	0.06	0.00	0.00	0.00	0.00	5.30	0.07
Haldu	0.00	0.00	0.13	0.00	0.00	0.35	0.00	0.00	0.00	0.47	0.03
Hirda	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.93	0
kalam	0.20	0.42	0.83	0.57	0.32	0.29	0.11	0.14	0.51	3.40	0.2
Kasai	0.28	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.56	0.01
Khair	6.32	7.57	4.84	2.13	0.72	0.28	0.05	0.03	0.01	21.93	0.37
Kullu	1.10	0.26	0.09	0.00	0.00	0.12	0.00	0.00	0.00	1.56	0.02
Lendia	4.69	3.77	1.43	0.58	0.35	0.18	0.08	0.00	0.00	11.08	0.16
Moha	0.19	0.22	0.05	0.10	0.17	0.00	0.04	0.06	0.35	1.17	0.09
Mokha	0.25	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.76	0.01
Mowai	0.84	0.85	0.74	0.86	0.91	0.63	0.26	0.33	0.26	5.67	0.27
Palas	11.25	9.69	5.69	1.88	0.65	0.17	0.05	0.01	0.01	29.40	0.41
Rohan	0.40	0.39	0.32	0.59	0.29	0.17	0.24	0.04	0.07	2.51	0.1
Salai	0.16	0.17	0.33	0.69	1.03	1.14	0.49	0.39	0.26	4.66	0.35
Semal	0.00	0.00	0.00	0.00	0.20	0.35	0.35	0.00	0.00	0.89	0.07
Shisam	0.69	0.28	0.13	0.00	0.14	0.00	0.00	0.00	0.00	1.24	0.02
Shiwan	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.40	0.01
Teak	49.98	53.64	36.51	19.44	8.56	3.49	1.47	0.65	0.71	174.45	3.44
Tendu	6.48	2.92	1.49	0.43	0.28	0.11	0.03	0.01	0.02	11.76	0.14
Tiwas	0.66	0.86	0.09	0.06	0.00	0.10	0.00	0.00	0.00	1.77	0.02
Other	10.04	5.65	2.37	0.97	0.55	0.22	0.25	0.14	0.29	20.48	0.33
Total	114.02	109.94	69.78	36.87	18.86	9.63	4.59	2.53	2.91	369.15	7.34

11.2.02 The crop consists of mixed type varying from pure teak to pure miscellaneous forests and varies considerably in composition, density and growth. The prominent associates of *Teak* are; *Bhirra*,

Saja, Dhaora, Lendia, Mowai, Salai, Tendu, Rohan, Char, Karam, Khair, etc. Proportion of teak is high varying from 20 to 80 percent. The areas are potentially suitable for teak forests and other valuable miscellaneous species. Natural regeneration of common species is present, but its establishment varies, depending upon fire and grazing damage. Natural regeneration is poor for teak as well as for its associates.

11.2.03 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.

11.3 BLOCK AND COMPARTMENTS

11.3.01 Details of the allotment of compartments to Improvement Working Circle have been given in **Appendix 11.1.**

11.4. SPECIAL OBJECTS OF MANAGEMENT

11.4.01 The special object of management for this working circle is to improve the existing crops by tending operations and supplementary plantations. Improvement measures aim at nursing back these forests to normalcy.

11.4.02 To check soil erosion and conserve soil moisture, essential for creating conditions conducive for rejuvenation and growth of NR and rootstock.

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

11.5 ANALYSIS AND VALUATION OF THE CROP

11.5.01 **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.

11.5.02 **Age and density:** The crop is mostly young to middle with scattered mature trees having density 0.4 to 0.6.

Table 11.3 Area details of IWC on the basis of satellite imageries.

Range	Comptt included	Density > 0.6	Density 0.4 to 0.6	Density < 0.4	Blank	Sub-mergence	Total ha
Arvi	24	511.243	1348.482	751.246	864.578	1.162	3476.711
Karanja	19	1184.551	988.467	884.066	327.275	6.303	3390.662
Hingni	37	2247.048	1606.437	797.702	732.925	24.519	5408.631
Ashti	31	1175.142	1958.895	1533.72	1531.369	11.151	6210.277
Wardha	9	1479.197	366.502	197.543	77.068	20.046	2140.356
Total	120	6597.181	6268.783	4164.277	3533.215	63.181	20626.637
Percentage		31.98	30.39	20.19	17.13	0.31	100.00

11.5.03 **Site Quality:** 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.

Table 11.4 Site Quality wise area distribution in IWC (area in ha.)

Site Quality	Arvi	Ashti	Hingni	Karanja	Wardha	Total ha
Teak III	0	0	227.01	25.09	0	252.1
Teak IVA	0	85.04	367.22	0	84.73	536.99
Teak IVB	799.207	1503.894	873.003	1800.892	63.96	5040.956
Mixed III	0	0	0	0	0	0
Mixed IVA	0	0	34.27	0	25.9	60.17
Mixed IVB	19.31	1498.984	220.044	0	852.48	2590.818
Total	818.517	3087.918	1721.547	1825.982	1027.07	8481.034
Plantation	389.48	773.51	2359.554	565.54	583	4671.084
Under Stock	2171.017	2073.552	1209.852	579.07	389.806	6423.297
Grass Land	0	0	0	0	50	50
Scrub	66.987	160.747	61.48	331.97	1.21	622.394
Encroachment	0	49.8	0.5	0	2	52.3
Blank	3.23	64.75	49.76	88.1	87.27	293.11
Submergence	27.48	0	5.938	0	0	33.418
Total	3476.711	6210.277	5408.631	3390.662	2140.356	20626.64

11.5.04 **Enumeration:** Enumeration is carried out in **558 plots** over area **200.88ha**. Inventory work includes complete enumeration of species and girth distribution of all trees, regeneration, and recording of the site quality, density. Analysis of the data collected from these sample plots is given in **Appendix 8.4**. This data used for the relative distribution of species girthwise, basal area of the species which ultimately is used for allocation of working circle.

11.5.05 **Regeneration:** Average numbers of seedlings and saplings per hectare in the IWC areas are found out from regeneration survey carried out along with the enumeration of the crop.

Table 11.5 Regeneration recorded in the Improvement Working Circle

Range	Seedlings (R1)	Saplings (R2)	Saplings (R3)	Total No
	0.3–1.0 meter	1.0–3.0 meter	> 3.0 meter	
Arvi	412	217	99	728
Ashti	655	321	127	1103
Hingni	425	269	154	848
Karanja	564	358	57	979
Wardha	779	343	51	1173
Average	530	292	113	935

11.6 SILVICULTURAL SYSTEM

11.6.01 The good quality dense forests having young to middle aged crop are aimed at to mature 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, like *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. Supplementary plantations of suitable species in open forests and forest blanks would result in improvement of stocking. The best suited system of treatment is improvement felling supplemented by tending of naturally generated crop and rootstock. The future crop has been visualized to have mixed composition, having **Teak as 50 percent, and Miscellaneous species as 50 percent in the stocking.**

11.6.02 This working circle aims at improvement of the crop, and therefore, harvesting is not visualised in the area. **However, for the purpose of managing a few dense patches of (8481 ha) over-mature trees the harvestable girth adopted for the SCI areas will be applied.** However, in this working circle no commercial felling except for improvement felling shall be carried out. This will also lead to opening of canopy to some extent resulting in regeneration of light demander species.

11.7 CHOICE OF SPECIES

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

11.7.02 The choice of species for plantation is proposed to include *Teak, Shivan, Maharukh, Kinhi, Semal, Sissoo, Babool, etc.* For fodder grasses, such as, *Paonia, marvel and Sheda* are proposed. Bamboos are proposed for planting at suitable sites.

11.8 TREATMENT CYCLE, TREATMENT SERIES

11.8.01 **Treatment cycle:** The treatment cycle is fixed at 20 (twenty) years.

11.8.02 **Treatment series and annual coupes:** The entire area of this working circle is divided into 11 treatment series with **average area of treatment series 1875.15 ha**. The area of each treatment series is further divided into 20 (twenty) coupes with **average area of the coupe 93.75 ha. (Appendix 11.2)**

11.8.03 **Regulation of yield:** The treatment is not adapted for yield. The silvicultural tending operations will be regulated by area.

11.9 COUPE DEMARCATION, TREATMENT MAP

11.9.01 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.

11.9.02 **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. Non workable areas, like those having slope more than 25° and a 20 m belt on both sides of perennial nallah, crops having crown density < 0.4, 0.4 - 0.6, > 0.6 with and the forest blanks; are required to be shown distinctly on map.

11.9.03 **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 be include –

- i) A₁ type areas, which have slope more than 25°.
 - ii) A₂ type areas i.e. 20 m wide strip on both sides of streams.
 - iii) A₃ type areas; which are susceptible to excessive erosion.
1. Soil and moisture conservation works/measures, as prescribed in the Chapter of Miscellaneous Regulations.

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. Teak, suitable miscellaneous species and bamboo shall be planted in conformity with the Ecological Index and the Plantation Guidelines.

C-Type Areas: Old Plantations and 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) **Enumeration in annual coupes:** Trees above harvestable girth are recorded.
- ii) **Marking for harvesting:** Mature trees in few dense patches above harvestable girth are marked as in SCI working circle. Well-formed and vigorous trees will be preferred for retention.
- iii) **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.
- iv) **Cutback operations:** The cutback operations shall be carried out in the year following harvesting of mature trees, if any, trees damaged during harvesting shall be removed.
- v) However, in this working circle no commercial felling except for improvement felling shall be carried out.

E -Type Areas: Blank Areas except natural blanks

1. Soil and moisture conservation works/measures, as prescribed in the Chapter of Miscellaneous Regulations.

2. Teak, suitable miscellaneous species and bamboo shall be planted in conformity with the Ecological Index and the Plantation Guidelines.

11.10 MARKING RULES AND PRESCRIPTIONS

11.10.01 Marking technique and prescriptions described in the Chapter of the Miscellaneous Regulations shall be followed.

11.10.02 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.

11.10.03 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 and malformed, over mature 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 only one, the most promising / stool, shall be marked.

C Type Areas: Old plantations and groups of young poles:

1. The congested pole crop shall be marked for thinning to maintain spacing equal to 1/3rd of the crop height and/or to bring down stem number as per the yield table.
2. The congested old plantation areas shall be marked for thinning retaining number of stems per hectare as per yield table.
3. 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 *Teak, Ain, Bija, Dhaoda* trees above the harvestable girth, if any, are to be enumerated in 15 cm girth-classes, before marking.
2. All healthy edible 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.
3. All dead and malformed trees, retaining 2 trees per hectare and all live high stumps shall be marked for felling.

4. Mature trees that have developed hollowness and show visual sign of decay will be marked for felling if, silviculturally, available.
5. All, but one, vigorously, growing coppice pole per stool shall be marked for felling.
6. Felling marking is prescribed to proceed from highest girth-class to lower girth-classes; and no tree shall be marked for felling unless, silvi-culturally, available.
7. However, in this working circle no commercial felling except for improvement felling shall be carried out.

E-Type Areas: Blank Areas- No marking is prescribed

11.11 METHODS OF REGENERATION

Natural Regeneration

11.11.01 Natural regeneration shall be given preference over the plantations. The existing NR and rootstock shall be tended as per prescriptions on rootstock management. Plantations shall be taken as a supplementary activity to NR in the under stocked areas.

11.11.02 Tending operations for natural regeneration in the D-type and rootstock management in the B1-type shall be taken up along with the coupe operations.

- 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 60 centimetre in height will be nursed as future crop*. Spacing operations, if required, will be carried out to leave nearly 400 saplings per hectare at an average of 5 metre spacing. The natural regeneration shall be assisted and encouraged by soil working and mulching around them, in the following manner.
 - a) **First year operations:** Weeds in one-meter diameter around saplings of valuable species shall be cleared during the first week of July. Uprooted weed, grasses and leaf-litter shall be mixed in the upper layer of soil as the organic mulch and facilitate loosening and aeration of the soil by worms and insects. One soil working shall be carried out in October.

- b) **Second year operations:** The soil working in October will be repeated in the following year. However, one scrape weeding of one-meter diameter shall be carried out in the first week of August around the shoots of coppice seedlings.
- c) **Third year operations:** Singling of coppice shoots, management of damaged and malformed saplings, climber cutting and shrub clearance shall be done.

Artificial Regeneration

11.11.03 Plantations in the B2-type, D-type and the E-type area are prescribed as per plantation guidelines. Preference will be given to the bamboo plantations. Areas suitable for bamboo will be brought under the bamboo plantations. Stump planting of teak may be considered in areas with crown density less than 0.2 and found unfit for bamboo planting. The remaining plantation area will be brought under the mixed species plantations using suitable species *Shivan*, *Maharukh*, *Kinhi*, *Semal*, *Sissoo*, *Babbul* and fodder grasses such as *Paunia*, *Sheda*, *Marvel* at suitable site.

11.12 CUTBACK OPERATIONS, CLEANING AND THINNING

Cutback Operation

11.12.01 The cutback operations will be carried out in the 2nd year of coupe working (**Appendix 11.3**). All trees damaged during the harvesting of mature trees shall be removed. All left over multiple coppice shoots and poles shall be reduced to one per stool. All newly risen coppice shoots shall be removed to encourage establishment of seedling regeneration.

11.13 CLEANING IN THE SIXTH YEAR

11.13.01 Cleaning shall be carried out in the sixth year of the coupe working. All areas of the natural regeneration tending, rootstock management and plantations shall be recorded in the divisional notebook and shall be cleaned. All inferior species including the unwanted undergrowth interfering or likely to interfere with the growth of NR of teak and other valuable species shall be cut. Climber cutting, shrub clearance, dressing of high stumps, extraction of marketable down logs shall be carried out. Coppicing of damaged and malformed saplings and singling of coppice shoots shall be carried out. All newly risen teak coppice shoots shall be removed. Established seedling regeneration of teak and other miscellaneous species shall be spaced out suitably.

11.14 THINNING

11.14.01 Thinning is proposed to be carried out in old plantations and patches of dense pole crop by maintaining average spacing of one-third of the crop height. The post-thinning crop should have basal area and number as close to the relevant stand or yield table for that site quality as possible.

11.14.02 Thinning is prescribed to be carried out in those plantations, having at least 50 percent survival and carried out in the 11th year of coupe working as per thinning guidelines.

Poles of vigorously growing non-teak species should be preferred for retention so long as not less than 50 percent of the crop is dominated by teak.

11.15 CLOSURE TO GRAZING AND FIRE PROTECTION

11.15.01 Protection from fire and grazing is essential for success of natural and artificial regeneration.

11.15.02 All annual coupes will be provided strict fire protection and will remain closed to grazing, till completion of the 6th year cleaning operations.

Chapter XII

THE AFFORESTATION AND ROOTSTOCK MANAGEMENT WORKING CIRCLE

12.1 GENERAL CONSTITUTION OF THE WORKING CIRCLE

12.1.01 The open forest areas having density less than 0.4 and with rootstock and shrubby growth as well as open forests without rootstock, where artificial regeneration appears necessary to restore productivity, are included in this working circle.

12.1.02 The Afforestation and Rootstock Management Working Circle (AFF & RSM) forms about 4.08% of the forest areas of the division. It includes 3861.322 Ha of the forest areas comprising both the Reserved Forests to the extent of 464.580 ha and Protected Forests 3349.902 ha and Acquired Private Forests 46.840ha.

Table 12.1 Compartments allocation to AFF & RSM Working Circle.

Range	Comptt included	Dense Forests	Open Forests	Blanks	Grass Lands	Sub-mergence	Plantations	Total Area ha
Arvi	9	127.897	618.559	23.963	0	0	213.915	984.334
Karanja	10	74.34	139.654	85.811	0	0	124.69	424.495
Hingni	7	97.66	139.343	0	0	0	318.59	555.593
Ashti	14	906.071	422.93	337.479	0	0	230.42	1896.9
Wardha	0	0	0	0	0	0	0	0
Total	40	1205.968	1320.486	447.253	0	0	887.615	3861.322
Percentage		31.23	34.20	11.58	0.00	0.00	22.99	100.00

Bulk of the Fuel, Fodder and Pasture Working Circle and sizeable part of Coppice With Reserve Working Circles of the plan under review are included in this working circle.

12.1.03 The following criteria has been proposed for allocation of compartments to the AFF & RSM Working Circle:

- Compartments having blank areas.
- Compartments having poor quality open forests, which need some tending operations to be productive.
- Compartments showing potential for natural regeneration indicated by the presence of good shrubby vegetation & rootstock.

- Average basal area of the crop in the compartments allotted to this working circle is less than 5 sq mt per ha.

12.2 GENERAL CHARACTER OF THE VEGETATION

12.2.01 This working circle generally comprises of degraded open forest areas interspersed with forest blanks or brushwood. The blank areas have dominance of shrubby growth and inferior grasses. The common grasses include *Ghonad*, *Kusal*, *Bhurbhusi*, *Marvel* and *Sheda*. While *Ghot*, *Khair*, *Eruni*, *Bharati*, *Ber*, etc. are the common thorny or brushwood species. *Tarota*, *Gokhru* and *Bantulsi* are the common weeds. Lantana has infested in many places.

12.2.02 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 PF areas allotted to this WC, especially, those near the habitations, are degraded to the extreme condition and lays bare without any significant tree crop.

12.2.03 The crop consists mainly of scattered trees or patches of open forests. The principal species is Teak and its common associates are *Saja*, *Dhaora*, *Bhirra*, *Rohan*, *Tendu*, *Lendia*, *Salai*, *Mowai*, *Char*, and *Palas*, etc. *Anjan*, *Jamun* and *Ficus* are found along streams (Table 12.2).

Table 12.2 Species and girth distribution in Aff & RSM areas per ha.

Species	16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-above	Total	Basal Area sq m / ha
Ain	2.02	0.84	1.03	0.29	0.13	0.06	0.00	0.00	0.00	4.39	0.06
Aonla	0.00	0.00	0.00	0.14	0.00	0.28	0.00	0.00	0.00	0.42	0.03
Behada	0.42	0.09	0.33	0.19	0.37	0.00	0.06	0.05	0.28	1.78	0.09
Bhirra	3.07	4.34	4.93	2.66	1.67	0.79	0.57	0.30	0.16	18.51	0.55
Biba	7.64	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	8.10	0.04
Bel	0.00	0.05	0.23	0.40	0.26	0.00	0.07	0.00	0.00	1.01	0.04
Char	1.81	0.42	0.56	0.14	0.08	0.00	0.00	0.28	0.00	3.27	0.07
Chichwa	2.41	0.19	0.46	0.00	0.00	0.93	0.00	0.00	0.19	4.17	0.12
Dhaman	3.70	0.36	0.07	0.00	0.00	0.00	0.00	0.00	0.00	4.13	0.02
Dhawada	3.87	6.74	2.29	2.56	1.23	0.49	0.16	0.21	0.00	17.55	0.39
kalam	0.00	1.16	0.06	0.06	0.23	0.00	0.00	0.06	0.00	1.56	0.04
Khair	17.43	17.79	4.86	2.02	0.57	0.11	0.19	0.00	0.00	42.98	0.52
Lendia	3.82	1.88	1.25	0.60	0.66	0.05	0.02	0.10	0.00	8.38	0.14
Moha	0.28	0.14	0.00	0.00	0.00	0.11	0.00	0.14	0.46	1.13	0.10
Mowai	0.27	0.24	0.09	0.34	0.79	0.14	0.31	0.60	0.12	2.89	0.20
Palas	11.13	8.37	3.93	1.49	0.44	0.13	0.00	0.00	0.00	25.49	0.32
Rohan	0.00	0.40	0.04	0.19	0.30	0.00	0.14	0.06	0.00	1.13	0.05
Salai	0.00	0.47	0.07	0.44	0.57	1.21	0.88	0.50	0.58	4.70	0.39
Teak	27.51	19.45	16.29	11.27	6.41	3.15	1.58	1.23	0.74	87.62	1.15

Tendu	5.20	1.68	0.81	0.42	0.15	0.04	0.14	0.00	0.00	8.44	0.10
Tiwas	0.00	1.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.39	0.02
Other	4.35	4.60	2.88	0.95	1.27	0.22	0.07	0.16	0.44	14.95	0.36
Total	94.91	70.61	40.65	24.15	15.14	7.71	4.16	3.67	2.97	263.98	4.80

12.2.04 The site quality varies between IVb and IVa. The canopy density of the vegetation varies from 0.1 to 0.4. The crop is generally young with occasional middle aged or mature trees.

12.2.05 Natural regeneration of common species is present but its extent is far from being adequate. Heavy grazing pressure has resulted in compaction of the soil with little sub-soil moisture. Young recruits of species like *Ain*, *Dhaoda*, *Bhirra* and *Teak*, etc. are found in many compartments but die-back without getting established. Due to excessive grazing, fires and refractory nature of areas establishment of NR is very poor.

Table 12.3 Average Regeneration recorded in the Afforestation & Rootstock Management Working Circle (each hectare).

Range	Seedlings (R1)	Saplings (R2)	Saplings (R3)	Total No
	0.3–1.0 meter	1.0–3.0 meter	> 3.0 meter	
Arvi	295	281	119	696
Ashti	551	138	19	708
Hingni	0	0	0	0
Karanja	316	262	34	613
Average	357	184	45	586

12.3 BLOCK AND COMPARTMENTS

12.3.01 Details of the AFF & RSM compartments have been given in **Appendix 12.1**.

12.4 OBJECTS OF MANAGEMENT

12.4.01 The special objectives of management of this working circle are, as follows:

- To restore the vegetative cover 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, possibly through JFM.
- To check the loss of top soil by adopting suitable soil and moisture conservation measures and to increase the water absorption capacity of the soil.
- To meet the local demands of fuel wood, small timber and poles through active involvement of Gram Panchayats and other village institutions.

- To improve the quantity and quality of fodder by planting fodder tree species and introducing superior and high yielding fodder grasses and legumes.

12.5 ANALYSIS AND VALUATION OF THE CROP

12.5.01 **Stock mapping:** The conventional stock mapping is replaced by the extensive enumeration exercise and crown density mapping through image analysis of satellite imageries.

12.5.02 **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.

Table 12.4 Area details of Aff & RSM Working Circle on the basis of satellite imageries.

Range	Compt. included	Density > 0.6	Density 0.4 to 0.6	Density < 0.4	Blank	Sub-mergence	Total ha
Arvi	9	215.768	363.271	116.941	287.492	0.862	984.334
Karanja	10	52.19	61.55	73.768	236.987	0	424.495
Hingni	7	118.791	155.294	113.33	165.099	3.079	555.593
Ashti	14	392.997	294.475	331.887	848.799	28.742	1896.900
Total	40	779.746	874.590	635.926	1538.377	32.683	3861.322
Percentage		20.19	22.65	16.47	39.84	0.85	100.00

12.5.03 **Site Quality:** Site quality governs the harvestable girth. The information from the previous plan has been used to delineate and digitise the various site quality classes. Site qualities wise area distribution is given in table below:

Table 12.5 Site Quality wise area distribution in AFF&RSM working circle (area in ha)

Site Quality	Arvi	Ashti	Hingni	Karanja	Wardha	Total ha
Teak III	0	0	23.39	0	0	23.39
Teak IVA	0	167.977	58.98	0	0	226.957
Teak IVB	41.677	420.442	15.29	74.34	0	551.749
Mixed III	0	0	0	0	0	0
Mixed IVA	0	0	0	0	0	0
Mixed IVB	86.22	305.142	0	0	0	391.362
Total	127.897	893.561	97.66	74.34	0	1193.458
Plantation	213.915	230.42	318.59	124.69	0	887.615
Under Stock	618.559	422.93	139.343	139.654	0	1320.486

Grass Land	0	0	0	0	0	0
Scrub	23.963	283.11	0	85.811	0	392.884
Encroachment	0	25.244	0	0	0	25.244
Blank	0	26.615	0	0	0	26.615
Submergence	0	15.02	0	0	0	15.02
Total	984.334	1896.9	555.593	424.495	0	3861.322

12.5.04 **Enumeration:** Most of the areas under this Working Circle belong to the PF, which are mainly degraded with little growth. Enumeration is carried out in 90 plots over an area of 32.40 ha. It includes complete enumeration of species and girth distribution of all trees, regeneration and recording of site quality and density. Teak constitutes over 33% of the total stock in the working circle. Analysis of the data collected from these sample plots is given in **Appendix 8.4**.

12.6 SILVICULTURAL SYSTEM

12.6.01 The area will be regenerated with both the Teak, Miscellaneous tree species and Bamboos. No harvesting is required in this working circle. 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.

12.6.02 The areas of this working circle have inadequate sub-soil moisture, highly compact soil structure and heavy biotic pressure are the main limiting factors for the establishment of seedlings in this area. Top soil has been washed away and as a result vast areas do not have even adequate soil-depth to support tree crop. As a consequence, a large chunk of these areas lay bare without any significant vegetation. Hence, intensive soil and moisture conservation measures and tending of existing rootstock have been proposed to be given priority over plantation.

12.6.03 In addition, concept of '*Ecological Index*' has been proposed for deciding the number of seedlings to be planted per hectare, over the traditional method of planting based only on *soil-depth zonation approach*. Ecological Index of a site gives an idea as to number of plants which could be sustained per hectare on a particular site depending upon the various locality factors of the area. It is based upon the climatic and edaphic conditions prevailing in the area and is determined by the formula, as follows.

$$\text{Ecological Index} = \frac{P \times D}{Tr \times EPT}$$

Where

P = Annual precipitation in mm.

D = Number of rainy days in a year.

Tr = Range of maximum temperature averages.

EPT = Potential evapo-transpiration in mm.

12.6.4 There is no need for planting more seedlings per ha than those could be sustained on a particular site. The emphasis is to grow the optimum number of seedlings per ha, which should grow into a healthy future stock with little mortality. Ecological Index for these areas is calculated on the basis of data at *Wardha station* to determine the number seedlings to be planted per hectare in these areas. **The ecological index for Wardha division is 7.89. Therefore, 1500 seedlings per hectare shall be planted in these areas.** A sample calculation of the Ecological Index has been shown in **Appendix 12.2.**

12.7 CHOICE OF SPECIES

12.7.01 Valuable local species suitable for the site and favoured by the local village communities will be preferred in plantations. *Teak, Shisham, Khair, Siwan, Sisoo, Siras, Chichwa, Aonla, Chinch, Neem, Sitaphal, etc.* shall be considered. **Seedlings of edible fruit-yielding forest species may constitute up to 10 percent and seedlings of medicinal plants up to 10 percent of the stock.** *Ficus* species 2 in number per ha shall also be used in plantations. **An officer not below the rank of Assistant Conservator of Forests will approve the final choice of species.** The broad information of the different species growing in different types of soil conditions is given in **Appendix 12.3.**

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

12.7.03 Seeds of *Sheda, Paonia, Marvel* and *Stylo hemata*, are to be sown at suitable places.

12.8 TREATMENT CYCLE, SERIES AND ANNUAL COUPES

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

12.8.02 **Treatment series and annual coupes:** Working circle has been divided into 4 treatment series with **average area of felling series 965.33 ha.** Each treatment series has been further divided into 20 (twenty) annual coupes with **average area of coupe 48.27 ha.** Details are provided in **Appendix 12.4.**

12.8.03 **Regulation of yield:** No yield is prescribed for this working circle. The treatment will be regulated by area.

12.9 DEMARCATION, TREATMENT MAP AND PRESCRIPTIONS

12.9.01 The coupe demarcation, will abide by the prescriptions mentioned in the chapter of Miscellaneous Regulations.

12.9.02 **Treatment Map: Delineation of various treatment types areas** on treatment maps will adhere to the following general guidelines:

- An area having more than 25° slopes and more than a quarter hectare in extent must be shown on the map as the *A1-type: steep slope*. Smaller areas of steep slope, even if not marked on the map, will also receive the prescribed treatment.
- 20 meter wide buffer along streams will be measured from the bank or the high flood mark. Similar buffer of the *A2-type* areas will be marked along water bodies and tanks.
- The *A3-type* (excessive erosion prone) includes seasonally flooded areas.
- In *B1-type* area natural regeneration would be considered adequate if at least 400 saplings per hectare are present. The same criteria will be applied for the rootstock.
- The **C-type areas** would include groups of naturally grown poles of 15 to 45 cm GBH and old plantations.
- The *E-type* areas (forest blanks) are devoid of trees or with crown density 0.1 and below.

12.9.03 The Range Forest Officer shall prepare *Treatment Map* of the coupe after a thorough inspection of the coupe, showing the various *Treatment Type areas*. The Assistant Conservator of Forests will check the treatment map and will make corrections in the map, if necessary. The Deputy Conservator of Forests will approve the treatment maps after careful examination.

12.9.04 The treatment map will bear date of inspection by the Range Forest Officer and the Assistant Conservator of Forests under their signatures.

12.9.05 **Treatment Prescribed:** The treatment prescribed for various treatment-type areas, as follows:

A Type Areas: Protection Areas

1. i) **Soil and moisture conservation:** Gully plugging and other soil and moisture conservation works, as described in the chapter of Miscellaneous Regulations shall be taken in the *A3-type* areas. Such works may be taken up in the *A2-type* areas, if not detrimental to the riparian ecosystem.

- ii) **Bush sowing:** Bush sowing of *Khair*, *Neem*, *Maharukh*, *Sandal*, *Babool* and other local seeds is prescribed to be carried out in addition to planting of 20% fruit and medicinal plant species. Any one species should not constitute more than one-third of the disseminated seeds.
 - 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.
 - iv) **Harvesting Prohibited:** Harvesting of standing trees (dead or alive) is strictly prohibited. The marketable downlogs of valuable species such as *Teak*, *Shisam* and *Tiwas* may be extracted.
2. No harvesting is prescribed in these areas except, wind fallen trees.

B Type Areas: Under-stock Areas

These areas are categorised into 2 types

B₁ Type - Open forest (density < 0.4) with rootstock.

B₂ Type - Open forest (density < 0.4) without rootstock.

- 1) **Rootstock management:** Tending of rootstock in the B1-type will be carried out in accordance to the guidelines for the rootstock management described as under.

GUIDELINES FOR THE ROOTSTOCK MANAGEMENT

- 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 shall be removed. Such coppice shoots should also be close enough to the ground so that it would not topple after gaining volume and weight and would be able to develop root system of its own subsequently.
- ii) **Coppice management of damaged and malformed saplings:** The saplings and poles up to 45 cm GBH having one third of the stem damaged and malformed shall be coppiced by cutting flush to the ground. Such coppicing, however, should not expose the ground, 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 60 centimetre in height will be nursed as future crop*. Spacing operations, if required, will be carried out to leave nearly 400 saplings per hectare at an average of 5 metre spacing. The natural regeneration shall be assisted and encouraged by soil working and mulching around them, in the following manner.
- 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. However, one scrape weeding of one-meter diameter will be carried out in the first week of August around the shoots of coppice seedlings.
 - c) **Third year operations:** Singling of coppice shoots, climber cutting and shrub clearance shall be repeated in third year.
- 2) **Plantations:** Suitable sites of the B2-type areas may be brought under the plantations. Bamboo, miscellaneous species and teak stumps shall be planted as per site suitability. Stump planting of teak may be considered in areas with crown density less than 0.2. All planting operations shall follow the guidelines described in the chapter of Miscellaneous Regulations.

C Type Areas: Old Plantations and Pole crop

1. i) **Thinning:** Thinning of old plantations and pole crop will be carried out maintaining average spacing of one-third of the crop height in such patches. *The post-thinning crop should have basal area and number as close to the relevant stand or yield table for that site quality as possible*. Poles of vigorously growing non-teak species should be preferred for retention if teak is more than 50 percent of the crop in stocking. Thinning is to be carried out as per guidelines prescribed under para 20.10 Chapter 20.
2. No planting shall be done in these areas.

D Type Areas: Well-stocked Areas

- i) **Root Stock Management:** as per prescriptions.

- 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.

E Type Areas: Blank Areas except natural blanks

1. All planting operations and subsequent operations shall follow the guidelines for plantations described in the chapter of Miscellaneous Regulations.
2. Soil and moisture conservation works/measures, as prescribed in the chapter of Miscellaneous Regulations.
3. Teak, suitable miscellaneous species and bamboo shall be planted in conformity with the Ecological Index and Plantation Guidelines.
4. Two stage plantation (Restoration phase, plantation phase) shall be taken up; on refractory site.

12.10 METHODS OF REGENERATION

Natural Regeneration

12.10.01 Natural regeneration shall be given preference over the plantations. The existing NR and rootstock shall be tended as per prescriptions on rootstock management. Plantations shall be taken as a supplementary activity to NR in the under stocked areas.

12.10.02 Tending operations for natural regeneration in the D-type and rootstock management in the B1-type shall be taken up along with the coupe operations.

- 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 *more than 60 centimetre in height will be nursed as future crop*. Spacing operations, if required, will be carried out to leave nearly 400 saplings per hectare at an average of 5 metre spacing. The natural regeneration shall be assisted and encouraged by soil working and mulching around them, in the following manner.
- a) **First year operations:** Weeds in one-meter diameter around saplings of valuable species shall be cleared during the first week of July. Uprooted weed, grasses and leaf-litter shall be mixed in the upper layer of soil as the organic mulch and facilitate loosening and aeration of the soil by worms and insects. One soil working shall be carried out in October.
- b) **Second year operations:** The soil working in October will be repeated in the following year. However, one scrape weeding of one-meter diameter shall be carried out in the first week of August around the shoots of coppice seedlings.
- c) **Third year operations:** Singling of coppice shoots, management of damaged and malformed saplings, climber cutting and shrub clearance shall be done.

Artificial Regeneration

12.10.03 Plantations shall be taken only in the B2-type and the E-type areas of Ashti, Arvi, Hingni ranges having inadequate NR. Plantations are proposed to be undertaken in accordance with the Ecological Index of the site and Plantation Guidelines described in the Chapter of Miscellaneous Regulations. Plantation register is to be maintained as per Appendix 21.4.

12.10.04 Preference shall be given to the bamboo plantations. Areas suitable for bamboo will be brought under the Bamboo plantation.

12.10.05 Stump planting of teak may be considered in areas with crown density less than 0.2 and found unfit for bamboo planting. The remaining plantation area will be brought under the mixed species plantations using suitable species, such as Neem, Karanj, Shivan, Maharukh, Kinhi, Semal, Sisso, Babul, Anjan, Kalam, Haldu, Hirda, Behada, Kavith.

12.10.06 On refractory sites of E and B2-type areas **the two-stage plantation activity**, as described under Plantation Guidelines is proposed. Areas will be fenced.

Two Stage Plantation Activity

12.10.07 **Two-Stage Plantation in Afforestation areas:** Two stage plantation, that is, the restorative phase followed by planting phase.

Restorative Phase: Restorative phase is proposed to include the soil and moisture conservation works and fencing in the year of coupe operations. Seed sowing of neem, chandan, maharukh and babul will be done in bushes. Planting of Agave on TCM and *Khus* on earthen soil conservation structures will be carried out in the following year. The restorative phase will be judged in the fourth year of the coupe working. Effectiveness of fencing and success of the soil and moisture conservation measures will mark the completion of the restorative phase. All the areas covered under restorative phase shall not be allowed to be switched over in the fourth year to the planting phase. The areas do not have adequate regeneration (600 seedlings per hectare) from rootstock and seed sowing, such areas only will be switched over to planting phase. It shall be applicable only after its evaluation. The areas failing these tests shall not be covered under plantation programme.

Areas having adequate regeneration from rootstock and seed sowing will be tended as described for the rootstock management. PPO/PYO (pre-planting operations) shall be taken up in the fourth year of coupe working, while the seedling planting and other FYO (first year operations) activities shall be carried out in the following year, that is, the fifth year of coupe working. Other plantation works will follow in the sequence.

12.10.08 Involvement of the Joint Forest Management Committees, Village Forest Protection Committees, Village Panchayats or other active Village Organisations would be an integral component of the plantation activity.

12.10.09 One stage plantation activity shall be taken up on non-refractory sites of B2 and E type areas as per plantation guidelines prescribed under miscellaneous regulation.

12.11 CLOSURE TO GRAZING AND FIRE PROTECTION

12.11.01 Protection from fire and grazing is essential for success of natural and artificial regeneration.

12.11.02 Plantations will be provided fire protection and complete closure to grazing for 5 years or more as per the provisions in BFM Vol.II depending upon the growth and establishment of seedlings so that when the areas are open for grazing, the established seedlings are beyond the reach of cattle from browsing. The DCF will examine the area closed for grazing at the end of 5th year operation and decide whether the coupe requires further closure depending upon growth of seedlings and recommend to CCF(T) for its further closure for a specific period, so that the seedlings get established.

Chapter XIII

PROTECTION & CATCHMENTS AREA MANAGEMENT WORKING CIRCLE

13.1 GENERAL CONSTITUTION OF THE WORKING CIRCLE

13.1.01 The majority of the areas having catchment more than 500 ha of all the major, medium and minor irrigation projects of Wardha Division, are included in this working circle. It extends over to 11896.211 ha of forest areas, comprising of 8245.560 ha as the Reserved Forests and 3650.651 ha as the Protected Forests, forming 12.84 percent of total forest area of the division.

13.1.02 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.

13.1.03 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 13.1 Compartments allocation to P & CAM Working Circle:

Range	Comptt	Dense Forests	Open Forests	Blanks	Grass Lands	Sub-mergence	Plantations	Total Area ha
Arvi	31	2604.561	3968.334	157.99	120	37.53	495	7383.415
Karanja	4	369.08	111.305	8.768	0	0	0	489.153
Hingni	15	1356.897	606.419	97.585	3.25	0	570	2634.151
Ashti	4	157.02	147.31	433.279	0	0	0	737.609
Wardha	5	135.12	368.203	44.56	0	0	104	651.883
Total	59	4622.678	5201.571	742.182	123.25	37.53	1169	11896.211
Percentage		38.86	43.72	6.24	1.04	0.32	9.83	100.00

13.2 GENERAL CHARACTER OF THE VEGETATION

13.2.01 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. The PF included in this circle is mainly open with little or no vegetation.

13.2.02 The site quality of the crop varies from IVa to IVb. The quality is generally IVb in the upper slopes and IVa in the lower slopes. At few places quality III on plains, along streams and valleys. The density of crop generally varies from 0.2 to 0.8, having well stocked patches as well as under stocked and open areas.

13.2.03 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 13.2.

Table 13.2 Species and Girth distribution in the P&CAM working circle (area/ha)

Species	16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-above	Total	Basal Area sq m / ha
Ain	1.88	2.13	1.77	1.19	1.22	0.48	0.49	0.16	0.09	9.42	0.31
Aonla	0.56	0.17	0.00	0.00	0.00	0.28	0.00	0.00	0.00	1.01	0.03
Behada	0.85	0.53	0.49	0.18	0.27	0.08	0.02	0.04	0.19	2.67	0.09
Bija	0.23	0.12	0.46	0.00	0.19	0.00	0.00	0.00	0.00	1.00	0.02
Bhirra	14.50	9.84	5.82	3.44	2.17	1.21	0.67	0.19	0.30	38.15	0.08
Biba	0.58	1.50	0.58	0.23	0.00	0.23	0.00	0.00	0.12	3.24	0.02
Bel	1.33	1.39	1.19	1.03	0.71	0.23	0.08	0.02	0.10	6.09	0.17
Char	0.19	0.80	1.02	0.21	0.35	0.22	0.13	0.03	0.00	2.95	0.09
Dhaman	0.05	0.23	0.11	0.07	0.06	0.00	0.00	0.00	0.00	0.51	0.01
Dhawada	3.71	3.23	2.11	1.18	1.12	0.67	0.36	0.18	0.12	12.68	0.34
kalam	1.88	0.84	1.32	0.75	0.49	0.63	0.13	0.04	0.09	6.16	0.18
Kasai	0.00	1.11	0.56	0.56	0.00	0.00	0.00	0.00	0.00	2.22	0.05
Khair	10.62	11.93	5.99	2.01	0.86	0.13	0.05	0.00	0.00	31.59	0.45
Lendia	7.21	4.33	1.58	0.61	0.34	0.21	0.03	0.00	0.00	14.31	0.18
Moha	0.71	0.00	0.00	0.06	0.07	0.12	0.06	0.12	0.34	1.46	0.09
Mowai	1.29	1.40	0.82	1.17	0.81	0.50	0.29	0.17	0.18	6.64	0.25
Palas	11.72	9.05	5.73	2.37	0.91	0.43	0.14	0.14	0.05	30.53	0.49
Rohan	0.39	0.36	0.34	0.66	0.23	0.06	0.05	0.00	0.19	2.28	0.09
Salai	0.55	0.54	0.88	0.81	1.29	1.29	0.90	0.56	0.69	7.51	0.05
Teak	66.49	50.14	44.86	23.95	11.82	4.97	2.08	1.04	0.71	206.05	4.23
Tendu	4.12	2.44	1.32	0.58	0.21	0.12	0.03	0.03	0.28	9.13	0.17
Tiwas	0.00	0.40	0.40	0.40	0.00	0.00	0.00	0.00	0.00	1.19	0.03
Other	11.06	5.27	2.50	0.87	0.70	0.39	0.14	0.09	0.57	21.58	0.38
Total	139.90	107.75	79.84	42.32	23.83	12.24	5.65	2.82	4.00	418.34	7.80

13.2.04 Natural regeneration of common species is present, but their establishment vary with damage from grazing and fire. The coppice reproduction of teak is found in the catchments of water bodies and dams, however, its growth is malformed and stunted due to excessive grazing pressure and repeated hacking by the local people (Table 13.3).

Table 13.3 Average Regeneration recorded in the Protection & Catchment Area Management Working Circle (each hectare)

Range	Seedlings (R1)	Saplings (R2)	Saplings (R3)	Total No
	0.3–1.0 meter	1.0–3.0 meter	> 3.0 meter	
Arvi	460	175	78	713
Ashti	222	100	0	322
Hingni	380	308	253	941
Karanja	233	212	28	473
Wardha	756	488	71	1315
Average	433	233	113	779

13.2.05 The details of the compartments included in this working circle has been provided in the **Appendix 13.1**.

13.3 SPECIAL OBJECTS OF MANAGEMENT

13.3.01 The dams and water bodies are the life line of Wardha district. They play a crucial role in the development and well being of the people of this tract. 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.

13.3.02 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.

13.3.03 To preserve and increase the vegetal cover and to help in enhancing water regime of the forest tracts.

13.3.04 To develop and optimise the natural biodiversity, wildlife and scenic potential of these areas to cater to the nature and wildlife conservation and education as well as eco-tourism needs of the people of this region.

13.4 ANALYSIS AND VALUATION OF THE CROP

13.4.01 **Stock mapping:** The conventional stock mapping has been replaced by the extensive enumeration exercise and crown density mapping through image analysis of satellite imageries.

13.4.02 **Age and density:** The crop is mostly middle aged with scattered patches of mature and young crop. The density of the crop varies from 0.2 to 0.8 having fair share of open and dense patches. The dense areas make a significant part of the crop.

Table 13.4 Area details of P&CAM working circle on the basis of satellite imageries.

Range	Compttt included	Density > 0.6	Density 0.4 to 0.6	Density < 0.4	Blank	Sub-mergence	Total ha
Arvi	31	1599.056	2237.965	1278.891	2196.32	71.183	7383.415
Karanja	4	102.784	315.224	56.706	14.417	0.022	489.153
Hingni	15	1074.948	822.828	398.664	335.861	1.85	2634.151
Ashti	4	85.559	170.77	190.51	289.998	0.772	737.609
Wardha	5	239.692	119.583	217.966	74.533	0.109	651.883
Total	59	3102.039	3666.370	2142.737	2911.129	73.936	11896.211
Percentage		26.08	30.82	18.01	24.47	0.62	100.00

13.4.03 **Site Quality:** Site quality governs the harvestable girth. The information from the previous plan has been used to delineate and digitise the various site quality classes. Area details of its distribution is given in table below:

Table 13.5 Site Quality wise area distribution in P&CAM working circle (area in ha.)

Site Quality	Arvi	Ashti	Hingni	Karanja	Wardha	Total
Teak III	0	0	0	0	0	0
Teak IVA	75.23	0	230.52	0	0	305.75
Teak IVB	1324.713	0	1028.027	365.85	57.28	2775.87
Mixed III	0	0	0	0	0	0
Mixed IVA	146.6	0	0	0	0	146.6
Mixed IVB	1035.68	157.02	28.25	0	77.84	1298.79
Total	2582.223	157.02	1286.797	365.85	135.12	4527.01
Plantation	495	0	570	0	104	1169
Under Stock	3962.214	147.31	606.419	111.305	368.203	5195.451
Grass Land	120	0	3.25	0	0	123.25
Scrub	124.803	421.959	11.325	5.538	0	563.625
Encroachment	12.56	7.28	4.19	0	44.56	68.59
Blank	20.627	4.04	82.07	3.23	0	109.967
Submergence	65.988	0	70.1	3.23	0	139.318
Total	7383.415	737.609	2634.151	489.153	651.883	11896.211

13.4.04 **Enumeration:** Enumeration has been carried out in **283 plots** over an area **101.88 ha** (0.86% intensity) Inventory works include complete enumeration of species and girth distribution of all trees; regeneration and recording of site quality and density.

13.5 SILVICULTURAL SYSTEM

13.5.01 Silvicultural system is proposed on the pattern of watershed management viz. ridge to base. 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. Areas of catchments are treated as a units.

13.5.02 No harvesting is proposed in areas (11250.380 ha) directly draining into the water bodies. However, in view to meet the nistar needs of local people 'low intensity working' is proposed in remaining well stocked areas, which are not directly draining in to water bodies. The criteria proposed in regard to reservation against felling and harvestable girth for teak as in SCI areas are proposed for P&CAM areas as well.

13.5.03 These areas are proposed to receive strict protection from grazing and fire and unwanted human interference.

13.6 TREATMENT CYCLE, TREATMENT SERIES AND ANNUAL COUPES

13.6.01 **Treatment cycle:** Treatment cycle is fixed at 20 years.

13.6.02 **Treatment series and annual coupes:** The area of this working circle is comprised of catchments of 17 water bodies. The catchments divided into **6 treatment series with average area of felling series 1982.70 ha**. Each having 20 coupes of **average area of coupe 99.13 ha** manageable size, preferably, matching the size of the compartment **Appendix 13.2**.

13.7 DEMARCATION, TREATMENT MAP AND PRESCRIPTION

DEMARCATION

13.7.01 The coupe demarcation, preparation of treatment maps and marking will abide by the prescriptions mentioned in the chapter of Miscellaneous Regulations.

13.7.02 The main annual coupes shall be demarcated one year in advance. The coupe shall be divided into four sections, if necessary, to effectively control the various operations.

13.7.03 The Range Forest Officer shall prepare *Treatment Map* of the coupe after a thorough inspection of the coupe, showing the various *Treatment Type areas*, on the compartment maps. The Assistant Conservator of Forests will check the treatment map and will make corrections in

the map, if necessary. The Deputy Conservator of Forests will approve the treatment maps after careful examination.

13.7.04 The treatment map will bear date of inspection by the Range Forest Officer and the Assistant Conservator of Forests under their signatures.

13.7.05 The A, B, C, D and E type areas shall be distinctively marked on the treatment map, along with areas having adequate NR or rootstock and areas suitable for plantations.

TREATMENT MAP

- An area having more than 25° slopes and more than a quarter hectare in extent must be shown on the map as the *A1-type: steep slope*. Smaller areas of steep slope, even if not marked on the map, will also receive the prescribed treatment.
- 20 meter wide buffer along streams will be measured from the bank or the high flood mark. Similar buffer of the A2-type areas will be marked along water bodies and tanks.
- The A3-type (excessive erosion prone) includes seasonally flooded areas and such pockets marked on the land use maps.
- Natural regeneration would be considered adequate if at least 400 saplings per hectare are present. The same criteria will be applied for the rootstock, and used for defining the B1-type.
- The **C-type areas** would include groups of naturally grown poles, having 15 to 45 cm GBH and old plantations.
- The D - type areas would include well-stocked forest patches.
- The E-type areas (forest blanks) are areas devoid of trees or with crown density 0.1 and below.

TREATMENT PRESCRIPTION

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

A Type Areas: Protection Areas

1.
 - i. **Soil and moisture conservation:** Continuous Contour Trenches, Gully plugging and other soil and moisture conservation works, as described in the chapter of Miscellaneous Regulations shall be taken in the A3-type areas. Such works may be taken up in the A2-type areas, if not detrimental to the riparian ecosystem.
 - ii. **Bush sowing:** Bush sowing of *Khair, Neem, Maharukh, Sandal, Babool and other local seeds* is 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.
 - 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. Plantations of suitable miscellaneous species and bamboo as per ecological index of the site and the plantation guidelines be taken.

B Type Areas: Under-stocked Areas

1. 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 60 centimetre in height will be nursed as future crop*. Spacing operations, if required, will be carried out to leave nearly 400 saplings per hectare at an average of 5 metre spacing. The natural regeneration shall be assisted and encouraged by soil working and mulching around them, in the following manner.
 - i. **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.

- ii. **Second year operations:** The soil working in October will be repeated in the following year. However, one scrape weeding of one-meter diameter shall be carried out in the first week of August around the shoots of seedling coppice.
 - iii. **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.
2. **Plantations:** Suitable sites of the B2-type areas may be brought under the plantations. The bamboo species, mixed species plantations or teak-stump planting will be done as per site specific requirement. Stump planting of teak may be considered in areas with crown density less than 0.2. All planting operations and subsequent operations shall be done as per plantation guidelines. Teak, suitable miscellaneous species and bamboo shall be planted in conformity with the Ecological Index.
3. No harvesting in B Type area.

C Type Areas: Old Plantations and pole crop

1. **Thinning:** Thinning of old plantations and pole crop will be carried out as per thinning guidelines 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.
2. No planting shall be done in these areas.

D Type Areas: Well-stocked Areas

1. No harvesting is prescribed in areas, however in view to meet the Nistar needs of local people low intensity working is done in well stocked patch as per prescription in SCI working circle.
 - 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 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.
2. No plantation is prescribed in these areas.

E -Type Areas: Blank Areas

1. Soil and moisture conservation works/measures, shall be taken up as per following guidelines

- The soil and moisture conservation works would start along with the marking of coupe and be completed before the onset of monsoon. Wherever feasible, the local material obtained from climber cutting, and shrub clearance shall be used for brushwood check dams to arrest the soil loss.
- 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.
- **Continuous Contour Trenches:** CCTs as soil conservation measure could be taken in suitable places with due precautions.

The contour trenching is prescribed in areas having density less than 0.4 and slope below 25°. The size of the trench is prescribed as 30 cm deep and 45 cm wide. Dug up soil from the trenches will form a ridge on the downhill side, and pebbly material from the trench will be neatly pitched on the lower side. *Agave* bulbils, khus tussocks and other suitable soil binding species will be planted on the mound at one-meter interval in two staggered rows set 20 centimetres apart on the downhill side. The mound will also have sowing of seeds of Khair, Babhul and Neem, etc. Chilati seeds may be preferred on refractory sites.

Trenches near the nala are prescribed to be discontinued and curved upward at both sides of the nala at 45° to prevent the run off of water stored. Contour trenches will normally be not more than 10 meter in length, and two contour trenches will be spaced at least 5 meter apart (horizontal distance).

The quantum limit of contour trenches is prescribed to be not exceeding 300 running meter per hectare in the B-type areas, 600 running meter per hectare in the E-type areas and 100 running meters in the C-type and the D-type areas.

- **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 (not more than 1 ha submergence area) are proposed to be taken up in exceptional circumstances without causing damage to the tree and will prove basically helpful for water conservation and abundance of water for wild animals.

2. Teak, miscellaneous species and bamboo shall be planted on areas except natural blanks in conformity with Ecological Index and the Plantation Guidelines. Active involvement of JFM committees, local village community will be a necessary requirement for success of plantations.

13.7.07 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.

13.8 GRAZING CLOSURE, FIRE PROTECTION AND OTHER REGULATIONS

13.8.01 Protection from fire and grazing is essential for success of natural and artificial regeneration. Grazing closure will be enforced in the entire areas.

13.8.02 The entire areas will be provided by Class-I fire line protection.

Chapter XIV

GRASS AND FODDER RESOURCES MANAGEMENT WORKING CIRCLE

14.1 GENERAL CONSTITUTION OF WORKING CIRCLE

14.1.1 The forests included under this working circle are-

- i. Area under Fuel, Fodder and Pasture Working Circle in the previous plan (4947.833 ha)
- ii. Area of Ashti, Arvi, Karanja and Wardha ranges which were previously under Improvement, CWR and Miscellaneous working circle. (5431.998 ha)
- iii. Area of the grass land in RF & PF is (472.870 ha) included under category (i) and (ii) above.

Hence, the total area under this working circle is 10379.821 ha.

14.1.2 The areas mentioned above have been transferred to this working circle because they are highly degraded and are burdened with heavy grazing pressure. Failed plantation areas adjoining to villages have been considered for Grass & Fodder Management. Rotational grazing along with the protection to the site and soil and moisture works are expected to improve the site. This working circle includes the areas incapable of producing timber or fuel to an appreciable extent and the areas over which the grazing demand is heavy.

14.1.3 Scrub areas, because of their closeness and convenient location adjoining to villages, are put under this working circle.

14.1.4 Areas allotted to this working circle are generally with basal area less than 5 but occasional and scattered dense forest patches are also covered under this working circle.

14.1.5 Area allocation along with the extent of dense and open forests, grass lands and blanks has been tabulated below:

Table 14.1 Compartments and Area allocation to G & FRM Working Circle (in ha)

Range	Compt. included	Dense Forests	Open Forests	Blanks	Grass Lands	Sub-mergence	Plantations	Total Area ha.
Arvi	12	0	984.773	58.204	99.000	0	88.00	1229.977
Karanja	24	93.8	255.557	253.29	197.710	0	82.391	882.748
Ashti	58	780.029	2217.708	4110.814	2.000	2.30	559.500	7672.351
Wardha	12	71.336	230.516	105.233	174.16	6.50	7.000	594.745
Total	106	945.165	3688.554	4527.541	472.87	8.8	736.891	10379.821
Percentage		9.11	35.54	43.62	4.56	0.08	7.10	100.00

14.2 GENERAL CHARACTER OF THE VEGETATION

14.2.01 The forests put under this working circle contain degraded soils and are with heavy biotic pressure. They are therefore open (density ranges 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. Stocking of tree species is poor but a few small patches of tree growth are found.

14.2.02 Tree species found are *Teak, Palas, Lendia, Bhirra, Ain, Bor, 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*.

14.2.03 *Rantulasi* and *Tarota* as weeds have extensively invaded these forests. There are other herbs and shrubs also which are spreading fast as weeds in the areas which were used as pasture lands and grass land in the past. Lantana has also invaded in large areas and in some places it has virtually replaced all other bushes, grass and fodder plants. The palatability of the vegetation and availability of the grasses from such areas is drastically reduced, because of regular and repeated fires every year.

14.3 BLOCKS AND COMPARTMENTS

14.3.01 The blocks and compartments allotted to this working circle are shown in **Appendix 14.1**.

14.4 SPECIAL OBJECTS OF MANAGEMENT

- 1) The forests put under this working circle are primarily intended to augment fodder requirements of the villages. Mostly it is grass resources, which are to be supplemented, wherever required, with palatable legumes and tree fodder.

- 2) Introduction of suitable improved varieties of grasses as well as legumes and fodder tree species in selected areas.
- 3) To meet fuel wood and small timber requirement of local people who are dependant to a large extent on these forests, though these tracts are primarily meant to act as grazing grounds and grasslands.

14.5 ANALYSIS AND VALUATION OF THE CROP

14.5.01 **Stock mapping** - The conventional stock mapping has been replaced by the extensive enumeration exercise and crown density have been generated using LISS II data and through NDVI technique. These maps are generated in GIS Cell, CCF (Working Plan) Nagpur.

Age and Density - Areas are mostly open and blank and density ranges between 0.2 to 0.3.

Table 14.2 Area details of G & FRM working circle on the basis of satellite imageries.

Range	Compt. included	Density > 0.6	Density 0.4 to 0.6	Density < 0.4	Blank	Sub-mergence	Total ha
Arvi	12	181.964	274.868	278.055	494.422	0.668	1229.977
Karanja	24	87.353	130.877	131.611	532.413	0.494	882.748
Ashti	58	685.712	1423.018	1568.432	3873.215	121.974	7672.351
Wardha	12	146.207	130.772	92.388	212.218	13.16	594.745
Total	106	1101.236	1959.535	2070.486	5112.268	136.296	10379.821
Percentage		10.61	18.88	19.95	49.25	1.31	100.00

Site Quality: Site quality governs the harvestable girth. The information from the previous plan has been used to delineate and digitise the various site quality classes.

Table 14.3 Site Quality wise area distribution in G&FRM working circle (area in ha.)

Site Quality	Arvi	Ashti	Hingni	Karanja	Wardha	Total
Teak III	0	0	0	0	0	0
Teak IVA	0	0	0	0	0	0
Teak IVB	0	113.08	0	93.8	25.689	232.569
Mixed III	0	0	0	0	0	0
Mixed IVA	0	0	0	0	0	0
Mixed IVB	0	666.949	0	0	45.647	712.596
Total	0	780.029	0	93.8	71.336	945.165

Plantation	88	559.5	0	82.391	7	736.891
Under Stock	984.773	2217.708	0	255.557	230.516	3688.554
Grass Land	99	2	0	197.71	174.16	472.87
Scrub	36.044	3561.362	0	55.466	0	3652.872
Encroachment	22.16	35.245	0	0	103.613	161.018
Blank	0	402.837	0	197.824	1.62	602.281
Submergence	0	113.67	0	0	6.5	120.17
Total	1229.977	7672.351	0	882.748	594.745	10379.821

Enumeration - Enumeration is carried in **284 plots** over an area **102.24 ha**. Enumeration results show species and girth distribution and basal area as well as regeneration status in the area.

Table 14.4: Species and girth distribution in the G&FRM working circle.

Species and girth distribution per ha.											
Species	16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-above	Total	Basal Area sq mt / ha
Ain	2.01	3.33	2.03	0.68	0.55	0.54	0.19	0.09	0.06	9.48	0.23
Aonla	0.00	0.69	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.97	0.01
Behada	0.49	0.76	0.48	0.05	0.21	0.21	0.05	0.10	0.09	2.45	0.08
Bhirra	1.76	4.52	3.51	4.14	1.44	1.03	0.35	0.13	0.16	17.05	0.25
Bel	3.31	1.32	0.64	0.91	0.42	0.38	0.14	0.00	0.00	7.13	0.14
Char	0.36	0.94	0.27	0.23	0.13	0.00	0.08	0.00	0.00	2.00	0.04
Chichwa	0.93	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.46	1.49	0.02
Dhaman	1.57	1.38	1.25	0.42	0.00	0.00	0.00	0.00	0.00	4.62	0.07
Dhawada	2.49	5.83	3.20	1.87	1.08	0.38	0.20	0.15	0.07	15.28	0.36
Garadi	2.39	3.78	0.62	0.93	0.23	0.00	0.00	0.00	0.00	7.95	0.01
kalam	1.10	0.80	0.95	0.45	0.58	0.26	0.34	0.05	0.52	5.07	0.02
Kasai	3.13	3.47	2.08	0.00	0.00	0.00	0.00	0.00	0.00	8.68	0.01
Khair	10.01	25.69	9.32	3.23	1.03	0.31	0.09	0.02	0.02	49.72	0.76
Kullu	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0
Lendia	4.90	8.34	2.66	1.02	0.40	0.06	0.04	0.02	0.00	17.44	0.25
Moha	0.13	0.24	0.18	0.34	0.08	0.13	0.13	0.64	0.58	2.44	0.04
Mokha	0.00	0.13	0.69	0.00	0.69	0.00	0.00	0.00	0.00	1.52	0.02
Mowai	0.55	1.07	1.39	1.74	1.23	0.65	0.18	0.09	0.07	6.97	0.14
Palas	7.53	11.96	3.88	1.80	0.56	0.15	0.14	0.01	0.00	26.04	0.38
Rohan	1.02	0.95	0.94	0.43	0.09	0.19	0.05	0.19	0.04	3.88	0.01
Salai	0.64	0.84	1.61	6.09	2.16	1.39	1.28	0.73	0.35	15.09	0.25
Teak	12.70	17.68	12.16	7.89	4.22	1.98	1.12	0.89	0.49	59.13	1.51
Tendu	5.97	2.47	0.83	0.36	0.09	0.09	0.03	0.00	0.03	9.88	0.11
Other	5.57	4.93	1.60	0.85	0.28	0.14	0.16	0.03	0.14	13.70	0.22
Total	68.79	101.24	50.58	33.43	15.49	7.88	4.58	3.14	3.09	288.23	4.93

- i) Regeneration status of the tree crop in the forests allocated to this working circle is given in table 14.5 below:

Table 14.5: Average seedlings and saplings per ha in GFRM areas

Range	Seedlings (R1)	Saplings (R2)	Saplings (R3)	Total No
	0.3–1.0 meter	1.0–3.0 meter	> 3.0 meter	
Arvi	316	162	67	545
Ashti	348	242	64	654
Karanja	134	64	8	206
Wardha	270	215	33	518
Average	287	190	48	525

14.5.02 Analysis and Valuation of Grass and Fodder Resources

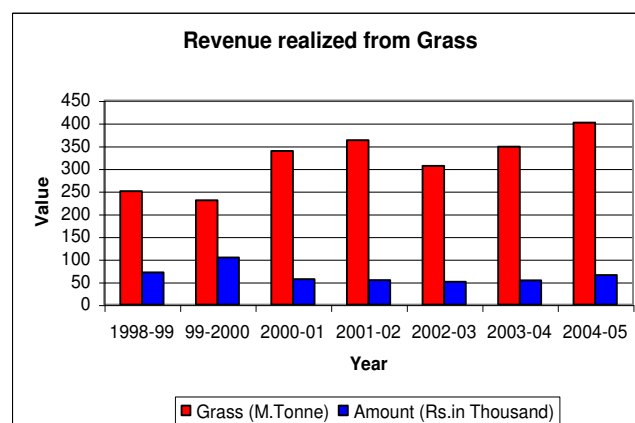
Present enumeration primarily values tree crop and this has been given under table 14.4 above. However, for the proper management of grass and fodder resources and for their further development, different valuation method is required to be used. It should include valuation of soil type suitable for grassland 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.

14.6 SILVICULTURAL SYSTEM

14.6.01 Despite large area under grass land (cut and carry-away from grasslands permanently closed to grazing), grass production is very low. Also these forestlands are burdened with huge grazing pressure and secondly, the demand for grass resources on cut and carry-away basis is very low. Official grass production figures show declining trend. It is due to various reasons. One of these reasons may be that grass availability has gone down so much that it is not economically beneficial to harvest grass resources. Another reason is that fodder resources from agricultural sector are available at cheaper rates and readily. Therefore, a long term strategy and sustained efforts are required to bring back grasslands of the Wardha Forest division to the level of their optimum production.

Table 14.6 Out turn of Grass

Financial Year	Grass (M.Tonne)	Amount (Rs.in Thousand)
1998-99	250	71.23
99-2000	230	103.84
2000-01	338.5	56.24
2001-02	362.5	54.30
2002-03	306	50.10
2003-04	348	53.63
2004-05	401	65.28



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.
3. Improvement felling in dense tree growth patches to cater the needs of local people for small timber, poles and fuel wood.

14.7 METHOD OF TREATMENT

14.7.01 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

Major area under this working circle belong to Ashti and Arvi ranges and they shall be regulated for controlled grazing as per prevailing grazing rules. Pasture lands have been divided in to pasture series and each series will have 4 coupes, namely A, B, C and D. Each coupe shall remain closed to grazing for three years. The coupe will be demarcated one year before the due

date of closure and the period of the closure will be prominently displayed at the convenient places. In the closed coupe, works for facilitating improvement in grass and fodder productivity such as removal of weeds and woody growth will be taken up. All obnoxious weeds and thorny shrubs and bushes shall be uprooted. The non-palatable grasses, such as, Kusal, Bhurbhushi, etc. shall be eradicated in the pre-flowering state only. Soil and moisture conservation works may be taken up extensively for improving the site, such as CCTs, Nalla-bunding and gully plugging etc.

(b) Augmenting Natural Grasses in Grass Land

Major area of the grasslands occurs in Karanja and Wardha ranges. 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.

14.8 TREATMENT CYCLE, SERIES AND ANNUAL COUPE

14.8.01 Treatment cycle is fixed at 4 years.

14.8.02 **Treatment series and annual coupe** - The working circle has been divided into 18 fodder series with **average area of treatment series 576.66 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 144.16 ha. (Appendix 14.2)**

14.9 DEMARCATION AND TREATMENT PRESCRIPTION

14.9.01 **Demarcation** : The coupe due for closure to grazing will be demarcated one year in advance, by cutting 3 metre wide lines and erecting pillars at suitable intervals. The pillars inside the compartment will be different than the boundary pillars to differentiate the compartment boundary and coupe boundary. To demarcate these coupes, permanently trench-cum-mound fencing will be dug with adequate passage at one place for the entry of cattle. If possible, barbed wire fencing be used instead of TCM.

14.9.02 **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.

14.10 OTHER REGULATIONS:

- (i) **Seeding of grasses:** In the closed coupe to allow seeding of fodder grasses, cutting of grass will be prohibited from first June to 30th November, after which the grass will be allowed to be removed by cutting.
- (ii) **Fire Protection:** The areas will be protected from fire with the involvement of local people or JFM Committees.
- (iii) **Frequency Inspection:** The area closed to grazing will be inspected frequently by the Gazetted Officer to see that the closure is adequately enforced.

Chapter XV

MISCELLANEOUS WORKING CIRCLE

15.1 General Constitution

15.1.01 Miscellaneous working circle comprises various forest areas not specifically allotted to other working circle.

It constitutes, 10543.780 ha of Zudupi jungle and 920.43 ha of non-forest land, 202.28 ha acquired private forest, 71.49 ha Reserved Forest and 35.094 ha of Protected Forest. (Appendix 15.3)

Table 15.1 Rangewise compartments and Area allocation to Miscellaneous working circle

Range	Reserved forests (ha)		Protected Forests (ha)		Zudupi Jungle		Acquired Forest		Non Forest Land		Total	
	Comptt (No)	Area (ha)	Comptt (No)	Area (ha)	Village (No)	Area (ha)	Village	Area (ha)	Village (No)	Area (ha)	Compt / village	Area (ha)
Arvi	2*(P)	71.49	0	0	33	817.66	3	117.37	6	127.99	2*P / 44	1134.510
Ashti	0	0	0	0	45	780.2			17	763.79	0 / 62	1543.990
Hingni	0	0	0	0	62	1082.77			2	28.65	0 / 64	1111.420
Karanja	0	0	8	35.094	40	1182.48			0	0		1217.574
Wardha	0	0			317	6680.67	1	84.91	0	0	0 / 318	6765.580
Total	2(P)	71.49	8	35.094	497	10543.78		202.28	25	920.43	8+2*P / 524	11773.074

*(P) = Part

Areas of Zudupi jungle and non forest land have been recently transferred to the division and issuing notification under section 4 of IFA, 1927 is under process.

15.1.02 Following areas are assigned to this working circle:

- 71.49 ha RF is with Assistant Silviculturist, Nagpur for research activities.
- 35.094 ha PF is scattered in small patches which is scrub and understocked.
- 10543.78 ha Zudupi jungle which is neither demarcated nor notified, reserved in land bank.
- 920.43 ha of non forest land received against various projects, reserved in land bank.
- 202.28 ha of private forest acquired by the division.

15.2 Special Objects of Management

- To maintain territorial integrity and comprehensive area accounting of the Reserved, Protected and Unclassified forests in the division.

- To provide provisions and guidelines for management of areas (Non Forest Land) not included in the database prepared for the division.
- To provide guidelines for protection and management of Zudupi jungles transferred to this division from Revenue Department.

15.3 METHOD OF TREATMENT

- **Area with Assistant Silviculturist -**

15.3.01 Assistant Silviculturist, Nagpur, tackles this area for research programme. The works are required to be carried out as per research programme. Protection of the area will be done by territorial staff.

- **Small scattered patches of protected forests -**

15.3.02 Most of the areas occur in small and very scattered patches which are likely to be encroached in future. These patches are prescribed to be demarcated as per guidelines under Miscellaneous regulations. Afforestation may be done on these patches as per suitability of soil condition and in accordance with guidelines of plantation. Protection and afforestation may be carried out through JFM committee.

- **Zudupi Jungle -**

15.3.03 Zudupi jungle over an area 10543.78 has been transferred to Forest department as a land bank. Area is categorised as follows:

I 9179.79 ha is proposed for compensatory afforestation against various irrigation and other projects.

II Compensatory afforestation has already been taken over 607.64 ha; out of 9179.79 ha.

III Remaining 1363.99 ha area is available for compensatory afforestation in future.

15.3.04 The details of Zudupi jungle areas under **Category I**, are given in **Appendix 15.1**. These areas are characterised by blanks and sparse vegetation having few dense patches scattered over entire area. The areas have been proposed for compensatory afforestation under various projects by the division. In the event of approval of projects, these areas will be taken up for plantations under compensatory afforestation scheme, as per prescriptions of the Afforestation and Root Stock Management Working Circle (AFF&RSM). However, till then, these areas should be properly demarcated by erecting boundary pillars.

15.3.05 Areas under **Category II** include plantation areas (**Appendix 15.2**). These areas have been prescribed for scheduled cleaning and thinning operations as per Thinning guidelines under para 20.10 of Chapter XX.

15.3.06 The areas under **Category III** form the part of land bank intended to be used as areas for compensatory afforestation against future projects. However, its demarcation is to be done by erecting boundary pillars. (**Appendix 15.3**)

- **Non Forest land** - Non Forest Land over an area 920.43ha has been taken against various projects in Wardha district. by Forest department. (**Appendix 15.4**)

15.3.07 The plantations have been raised on 164.51 ha of non forest land under compensatory afforestation scheme against the project. Cleaning and thinning is prescribed as per scheduled. Plantations shall be taken on remaining 755.92 ha area gradually against the projects sanction in future. Plantation as per guidelines and soil conservation works are prescribed in the area.

- **Acquired private forest**

Plantations shall be taken on 202.28 ha area of acquired private forest as per plantation guidelines; as well as soil conservation works are prescribed in the area.

Chapter XVI

THE WILDLIFE (OVERLAPPING) WORKING CIRCLE

16.1 GENERAL CONSTITUTION OF THE WORKING CIRCLE

16.101 This is basically an overlapping working circle but a few exclusive areas from the point of wildlife management are proposed for identification. The prescription given in this chapter, applies to the forest area of the division as well as to the issues relating to control of illegal trade in wild animal articles in and around Wardha city.

16.2 GENERAL CONDITION OF FLORA AND FAUNA

16.2.1 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. Hingni, Arvi, and Karanja ranges, adjoining to Bor sanctuary and also west side of Wardha range adjoining to Umred range of Nagpur division, are particularly rich in wildlife. In Ashti range, wild animals although less in number, they are seen in better patches of the forests. Representative central Indian fauna is found in the division and the category wise list of the animals usually found is as shown below:

Carnivora: Tiger, Panther, Hyaena, Wild Dog, Fox etc.

Herbivora: Nilgai, Sambhar, Cheetal, Wild Pig, Sloth bear, Langur etc.

Rodents: Porcupine, Hare etc.

Birds: Common sand grouse, Pea fowl, Pigeon, Cotton teal etc.

16.2.2 Tiger is usually found in Hingni, Arvi, Karanja ranges and Panther in almost all the ranges. As per 2001 and 2005 census, the Tiger and Panther population is as follows;

	Tiger	Panther	Tiger	Panther
	2001 census		2005 census	
Bor Sanctuary	5	8	6	6
Wardha Division	2	13	7	16

In 2004, estimation was carried out at division level - which showed the presence of one Tigress with four cubs in Mahagaon - Tadgaon area of Wardha range. Water hole in

Tadgaon has been managed and watered through tanker. A tigress and four grown up cubs have been sighted during May 2005.



Tadgaon Water hole (Beat – Tadgaon, Range – Wardha)

Hyena, Jackal and Foxes are seen frequenting near the inhabited areas. Packs of wild dogs are seen in the Hingni, Karanja, Arvi.ranges.

Nilgai, Chital and Sambhar are found all over the division. Gaurs are mainly found in Hingni, Karanja, and Arvi ranges. Bears are found usually in the valleys of Arvi, Hingni and Karanja ranges and also in the Typical Central Indian avifauna is also found in the forest tracts of this division and waterfowl are seen in the water bodies within as well as those located outside the forests. In fact, there are many large water bodies, which provide good habitat to many migratory winter visiting water birds.

16.3 HISTORY OF THE WILD LIFE MANAGEMENT IN GENERAL

16.3.1 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.

16.3.02 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.

16.3.03 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 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, primacy of environmental concerns and biodiversity conservation have been dealt in this chapter.

16.3.04 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 in and around Nagpur, which is adjoining to Wardha, special efforts are required to be made by the division to protect the wildlife in the region.

16.4 SPECIAL OBJECTS OF MANAGEMENT

- 1) To ensure wildlife 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 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 wallows, salt licks, natural breeding and nesting sites (caves snags, overhangs, groves of old ficus trees, thick bamboo grooves).
- 4) To check wildlife trade.
- 5) To promote and encourage ecotourism without disturbing and damaging wildlife.
- 6) To disseminate percepts of biodiversity and wildlife conservation and generate awareness among local communities, to seek support for this cause.

16.5 TREATMENTS PRESCRIBED

16.5.01 Bor sanctuary adjoins the division, which is exclusively managed for wildlife protection and conservation. In order to provide effective corridor for free movement of wildlife from area of the division to sanctuary and to reduce impact of biotic pressure on protected areas as well as conserve the special wildlife habitat and sensitive ecological sites in the division. The following prescriptions have been made.

STANDING ORDER (WILDLIFE) NO. 001

The PCCF (WL) MS, Nagpur has issued a standing order (Wildlife) No.001 (**Appendix 16.1**). 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 out side the protected areas. The territorial staff of the Wardha Division shall scrupulously implement these prescriptions.

- 1) Duties of Forest Guard, Forester, RFO and ACF include-
 - Keeping information of waterholes, particularly in summer and watch on the same, that is, special vigilance at all the water holes in the division is prescribed.
 - Keeping a watch on the electric lines passing through forests.
 - Ensuring registration of arms licenses as required under Wildlife (Protection) Act 1972.
 - Cognizance of cases of injury due to wild animals as per govt. orders from time to time.
 - Keeping a track of animals like tiger particularly tigress with cubs and a watch on such vulnerable animals.
 - Proper disposal of carcass of wild animals found dead or killed.
- 2) Local staff shall maintain record of sensitive wildlife areas such as areas with heavy wild animal concentration.
- 3) A network of information system shall be established. A cell under RFO (MS) of the division and also under DFO (Vigilance) in the office of CCF (Territorial) for handling wildlife offence cases, shall be established. There shall be regular short-term training/ workshops in anti-poaching activities and legal requirements in dealing with wildlife offence cases. Forest check posts shall be sensitized for keeping a watch on wildlife offences. Any transit of wildlife articles etc. from these check posts should be scrupulously stopped.
- 4) Nature education programme in the villages adjoining forests and in schools and colleges, shall be arranged.
- 5) Ecological sensitive habitats shall be identified and protected.
- 6) Antler trade is now banned. Hence, no collection of shed antlers is to be allowed.

7) The involvement of honorary wildlife warden be actively taken for nature education programme, as well as in establishing network of informers and in eliciting people's participation.

8) It will be insured that cattle grazing in forests near the important wildlife habitats are inoculated against contagious diseases.

Database creation

It is prescribed that the division will undertake compilation of a floral and faunal resources as well as ecologically sensitive sites in the division and create a comprehensive database for the division.

The division will also carry out survey of *riparian zones, mesic sites, perennial water holes, saltlicks, natural wallows, breeding and nesting sites, etc.* and map them for purpose of their protection and management. The division will also maintain a meticulous record of these sites on a register the "Register of the Special Wildlife Habitat" and update it annually by an officer not below the Range Forest Officer.

The division will undertake census survey for estimation of the wildlife population at the frequency decided by the Chief Conservator of Forests (Territorial); in addition to All India Tiger And Panther Census.

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 I to IV of the Wildlife (Protection) Act, 1972 shall be carried out and marked on the divisional/range maps. For instance, the *Mango and Jamun grooves* 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.

Water hole development measures: Water availability, or the lack of it, is one of the major factors that decides 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 and thereby increases their susceptibility to poaching. Water is a major limiting factor during the summers in these forests. Thus, all the perennial and ephemeral water holes will be identified, recorded and marked on

divisional/range maps. De-silting, if required, shall be carried out during summer to provide adequate drinking water.

The water hole density shall be commensurate with the density of wild animals found in the area. Creation of additional water holes (permanent and temporary) is prescribed so that undisturbed water holes are available within 2 to 3 kilometres of the areas frequented by the large herbivores.

Small nala bunds, underground bunds and other technically sound small water harvesting structures may be constructed across the streams to create water holes and habitat development.

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.

However the staff of Wardha Division has taken great pains to trace the Tigers, Panthers in compartment given below for which special fund to the tune of Rs. 24.61 lakh was sought from Zilla Parishad Wardha to construct borewell, Jalbandhara and small water holes to improve the wild life habitat in the region.

Measures for protection of special wildlife habitat areas

Range	Beat	Location (Comptt No)	Male (M) / Female (F)	Works taken up	Remarks
Tiger					
Wardha	Tadgaon	324RF	Tiger (F), (M)	1BoreWell, 1Jalbandhara	
Wardha	Mohgaon	317RF	Tiger (M)	1BoreWell	
Wardha	Tavi	329RF	Tiger (F)		1BoreWell in adjoining comptt no 330
Arvi	Masod(E)	214RF	Tiger (M)	1BoreWell	
Arvi	Sawangi	93PF	Tiger (F)		
Hingni	Bori	238RF	Tiger (F)	1BoreWell	
Leopard					
Wardha	Wanarchuwa	328RF	Leopard (F)		1BoreWell in adjoining comptt no 330
Wardha	Tavi	330RF	Leopard (M)	1BoreWell	
Wardha	Mohgaon	317RF	Leopard (F)	1BoreWell	

Range	Beat	Location (Comptt No)	Male (M) / Female (F)	Works taken up	Remarks
Arvi	Bramhanwada(S)	139PF	Leopard (F)		1BoreWell in adjoining comptt no 168
Arvi	Lahadevi	157RF	Leopard (F)		1BoreWell in adjoining comptt no 159
Arvi	Hiwara	136PF	Leopard (M)		
Arvi	Bramhanwada(S)	139PF	Leopard (F)		1BoreWell in adjoining comptt no 168
Arvi	Bramhanwada(N)	206RF	Leopard (M)		
Hingni	Hingni	245PF	Leopard (F)		1BoreWell in adjoining comptt no 248
Hingni	Nanbardi	239RF	Leopard (M-cub)		
Karanja	Yenidhodka	49RF	Leopard (F)	1BoreWell	
Karanja	Linga	132PF	Leopard (M)		
Karanja	Umarvihiri	46RF	Leopard (F-cub)		
Karanja	Dhamkund(W)	152RF	Leopard (M)		
Karanja	Rahati	52RF,53RF	Leopard (F)	1BoreWell(57R F)	1BoreWell in adjoining comptt no 57
Ashti	Khanapur	9PF	Leopard (M)		

Construction of new water holes : In the forest area, 5 water holes are to be constructed, for wild animals.

Range	No of Water hole
Hingni	2
Karanja	1
Arvi	1
Ashti	1
Total	5

Sometimes wild animals become dangerous to human population. Keeping such aspect in mind, DCF Wardha has planned to procure animal cage, Vedio Camera and to purchase tranquillising gun to tranquillise the animal to put them in cage for which Rs. 1.5 lakh has been made available from Z.P. fund.

Provision of Rs 75000 has been kept to give it to Forest Protection Committee as well as informers who will give the information of poachers in time, because of this intensive schemes wildlife protection can be done stringently.

Special vigilance shall be kept in all these compartment mentioned above.

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.

16.6 CONSERVATION OF GREAT INDIAN BUSTARD (*ARDEOTIS NIGRICAPS*)

16.6.01 Certain grasslands in Umred ranges, community lands and uncultivated private lands in and around Umred even now offer conditions conducive to existence of GIB; a rarest bird of schedule I. A solitary bird was spotted in one such area on 4.11.1991 in presence of the then CWLW. Deputy Conservator of Forests (WL) Nagpur at that time had accompanied him and thus was part of the team, consisting of a few members of an NGO-VNHSC, Nagpur, CWLW and ex CWLW of MP, which had spotted the bird on that day.

16.6.02 Certain grasslands in Umred range, **community lands and uncultivated private land in and around Umred; adjoining to Wardha range; even now offer conditions conducive to existence of GIB.** Therefore such areas in Wardha division should be protected. Therefore the division shall endeavor to facilitate and encourage non government efforts (NGOs) and be an active partner in this exploration. Sustained Nature Education Programme with an emphasis on discovering and conserving GIB in the region.

The following, prescriptions have been made for implementation along with coupe operations and other treatment prescriptions, in the area-specific coupes.

Marking Reservations and other restrictions:

16.6.03 No felling of trees or harvesting of any sort shall be allowed on these sites and in 50 metre wide buffer strips around them.

16.6.04 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.

16.6.05 While harvesting at least 2 down hollow logs, of low commercial value, per hectare shall be reserved for shelter of wildlife.

16.6.06 **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.**

Development of fodder and browse

16.6.07 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.

16.6.08 Habitat improvement is proposed at places having high density of wildlife and the areas frequented by both domestic animals and wildlife.

16.6.09 **Project authorities of the major and medium irrigation projects may be approached to develop fodder and browse in relatively undisturbed areas in the catchments of water bodies, frequented by wildlife.**

16.6.10 **Plantations prescribed in various working circles shall include at least 10 percent of fodder and fruit species of wildlife importance. *Gular, Umbar, Bor, Anjan, etc.* are recommended for this purpose.**

16.6.11 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.

Protection measures:

16.6.12 Special vigilance is prescribed at water holes during summer season because of vulnerability of wildlife to poaching. Anti-poaching intelligence network of the wildlife wing should be used and supplemented to prevent wildlife offences in the division.

16.6.13 The field staff should be trained in anti-poaching activities and dealing with offence cases related to wildlife. Forest check posts should be made sensitive to the wildlife offences to check its illicit transport.

16.6.14 The areas near sensitive water holes frequented by the wildlife may be excluded from grazing, and specially mention in the grazing license. Inoculation of cattle grazing near sensitive wildlife habitat sites and waterholes frequented by wildlife.

16.6.15 The special wildlife habitat sites shall be effectively protected from fire, grazing and other adverse influences.

16.6.16 **Removal of flower, fruit and other medicinal parts and harvesting of herbs shall not be allowed in ecologically sensitive areas. The NWFP harvesting should be watched and monitored to prevent loss of genetic material from the forest area.**

16.6.17 **Any person possessing a firearm and residing within 10 kms. of the forests will register his name with the Deputy Conservator of Forests.**

16.7 ECO-DEVELOPMENT, AWARENESS GENERATION AND ECO-TOURISM

16.7.01 Effective protection and management of sensitive ecological and special habitat sites/areas is not possible without active involvement and support of village communities in the vicinity. Their help and support can only be ensured if their genuine needs and concern are given due consideration by the department. If the people living around are poor and anguished, the objective in question can not be achieved. Thus, to seek their willing support and goodwill it is proposed to undertake eco-development works by the division in villages around these sites. It is also proposed to promote and encourage eco-tourism in the division by extending and developing camping and nature interpretation facilities at sites/spots, rich and unique in natural and cultural beauty and diversity. It is, in accordance with, the current policy focus of the State and Government of India on eco-tourism.

16.7.02 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. Each **Eco-centre** will have the following components.

- Nature and culture interpretation, awareness and display centre.
- Audio-visual Aids and equipments, including modern optical, communication and fire fighting equipments.
- Eco-Camps to provide camping facilities for visitors.
- Eco-trails; Nature walking trails near and around the Eco-centres.
- Eco-watch towers with binoculars, wireless handsets and fire fighting equipments.
- Water sports facilities, on Eco-centres at water bodies.

16.7.03 A proposal submitted to Govt. in regard to development of eco-tourism by Principal Chief Conservator of Forests (Wildlife), MS, Nagpur has incorporated 26 sites and 8 circuits in Wardha division. It will be endeavoured to develop this programme during the plan period. The details of these eco-sites and eco-circuits are given in **Appendix 16.2**.

16.7.04 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.

16.7.05 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.

16.7.06 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.

16.7.07 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.

16.7.08 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.

16.7.09 Teaching institutions viz. schools, colleges, etc. and NGOs shall be involved through nature camps, wildlife film shows, exhibitions, seminars, competition, etc.

Chapter XVII

NON WOOD FOREST PRODUCE (OVERLAPPING) WORKING CIRCLE

17.1 GENERAL CONSTITUTION OF THE WORKING CIRCLE

17.1.01 The prescriptions of this chapter will be applicable to the entire division.

17.1.02 Non-wood forest produce (NWFP) plays a key role in the life and economy of communities living in and around forest. NWFP 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 tubers, flowers and fruits all year around.

17.2 AVAILABILITY OF NON-WOOD FOREST PRODUCE

17.2.01 A sizeable portion the forests of this division are of mixed forest type, supporting species of great NWFP value, namely, *tendu, mahua, , biba, achar, kulu, dhaora, behada, mowai, khair, salai, aonla etc.* These trees are found scattered in the entire division and well mixed with other species. NWFP collection also generates employment opportunities.

17.2.02 The important NWFPs found and collected in this tract are Moha flowers, Moha seeds, Tendu leaves, Kullu gum, Dhaora gum, Salai gum, Dikemali gum, etc. **There are about 69 species occur in Wardha Division which are used for medicine (Appendix 17.1).**

Table 17.1 Plant parts of NWFP used as a medicine.

Plant parts	No of species
Leaf	21
Flowers	4
Fruit	9
Seed	7
Pods	2
Stem	2
Roots	15
Bark	16
Gum	6

Table 17.2 Distribution of NWFP species in compartment

Species	No of Compartments in which found		Total
	RF	PF	
Behada	52	8	60
Mowai	104	21	125
Salai	30	7	37
Aonla	42	5	47
Kullu	9	2	11
Biba	37	7	44
Tendu	117	26	143
Achar	49	15	64
Moha	26	10	36

Distribution of important NWFP species compartment wise are shown in **Appendix 17.2**.

Table 17.3 Distribution of Medicinal plants in compartment

Species	No of Compartments in which found		Total
	RF	PF	
Behada	52	8	60
Mowai	104	21	125
Salai	30	7	37
Aonla	42	5	47
Kullu	9	2	11
Biba	37	7	44
Tendu	117	26	143
Achar	49	15	64
Moha	26	10	36
Bel	162	59	212
Bija	27	12	39

Species	No of Compartments in which found		Total
	RF	PF	
Dhaman	35	19	54
Dhawada	186	121	307
Ain	163	107	270
Haldu	07	4	11
Hirda	0	1	1
Karam	117	51	168
Semal	17	3	20
Khair	175	111	286
Palas	208	187	395
Rohan	45	34	79
Shiwan	6	3	9

Distribution of medicinal plants compartment wise are shown in **Appendix 17.3**.

Table 17.4 Distribution of usable plant species for various purposes

Purpose	No of Species
Food	9
Fodder	8
Fibre	1
Household articles	2
Medicinal	17
Ornamental	1

The details of species in Table 17.4, are given in **Appendix 17.4**.

17.3 SPECIAL OBJECTS OF MANAGEMENT

17.3.01 To manage the marketable NWFPs on sustained basis in the division and to help ensure reasonable returns to the local villagers especially the tribal communities are the special objectives of management for this working circle.

17.3.02 To improve stocking of various NWFP species in the forest areas and enhance collection of various NWFPs by improved collection techniques.

17.3.03 To get enhanced economic returns by training to local communities on value addition techniques and marketability of various NWFPs found in the division.

17.4 OWNERSHIP AND MONOPOLY PROCUREMENT OF THE NWFP

17.4.01 The statutory provisions have vested ownership rights over certain listed NWFPs species in the village communities in the Scheduled Areas without granting such rights over the trees and the land. Presently, this list does not include Tendu, Apta and Bamboo, the prominent NWFP species in this tract. The rules also affirm that the provisions of the working plan shall be applicable for the NWFP harvesting.

17.4.02 The Seventy-third Amendment of the Constitution of India has brought the NWFPs under the management of the Village Panchayat. Minor forest produce in state, its sale procedure can be categorised into two parts:

A) 33 minor forest produce in scheduled area

B) Other minor forest produce excluding 33 MFP in scheduled area and MFPs in non scheduled areas.

A) 33 minor forest produce in scheduled area

- 1) "Govt of India passed the Provisions of The Panchayat Extension to the scheduled areas at 1996". In pursuance to this, Govt of Maharashtra passed Maharashtra Act No XLV of 1997, "Maharashtra transfer of ownership of minor forest produce in the scheduled areas and the Maharashtra minor forest produce (Regulation of Trade) (Amendment) Act 1997."
- 2) As per 1997 amendment, 33 minor forest produce (list enclosed in **Appendix 17.5**) found in Govt land in scheduled areas; ownership lies with Village panchayat.
- 3) Ownership rights of MFPs in practice have not been handed over to village panchayat because today village panchayat are not technically sound.
- 4) These 33 minor forest produce are sold to Maharashtra State Cooperative, Tribal Development Corporation, authorised, vide RDD & Water Conservation Deptt GR No (Marathi) PRJ-1203/CR 366/PR-2(06) dated 11.05.2004.

- 5) RDD & Water Conservation Deptt GR No PRJ-201/CR 43/06 dated 21.04.2001 vide which royalty for MFPs is required to be paid to village panchayat by Tribal Development Corporation.
- 6) Collection wages for MFPs are paid to labourers by Tribal Development Corporation.

B) Other minor forest produce excluding 33 MFP in scheduled area and MFPs in non scheduled areas

- 1) Other MFPs excluding 33 MFPs in scheduled areas and MFPs in non scheduled areas are auctioned unit wise by DCF in open auction. The amount received in the auction is govt revenue.
- 2) Units are formed for this MFP.
- 3) Yield is not notified for these units.
- 4) The wages for collection of MFPs are paid by concerned contractor.
- 5) Due taxes are levied on the amount received in the auction.
- 6) Collection of MFPs, processing and its auction is done by concerned unit purchase.

17.5 AGENCY FOR THE NWFPs COLLECTION

17.5.01 The Maharashtra Tribals' Economic Condition (Improvement) Act, 1976 empowers the state government to enforce monopoly procurement of certain goods including the NWFPs in the Tribal Sub-plan Areas. Maharashtra Tribal Development Corporation (TDC) serves as the Chief Procurement Agent. This procurement provision is binding and, therefore, prescribed to be carried out, accordingly. **Moha flowers, Moha seeds and gum have been reserved for Tribal Development Corporation.**

17.5.02 In case of the remaining NWFPs, the Deputy Conservator of Forests decides the agency for collection through i) Department, ii) FLCS, iii) Contractors in accordance with the rules and the policies of the department. Collection of grasses are done annually through Village Panchayats, Dairy Societies, FLCS; if not done then it is sold by open auction. In view of the national policy directives, local village communities, however, should have the first charge over the NWFPs collection. Kullu gum collection has been banned in Nagpur circle because of the drastic reduction in the number of mature Kullu trees. Gum unit, which is the whole division, is thus auctioned for Dhawada gum collection only. The information regarding gum collection in the division is given in the table below:

Table 17.5 : Year wise Gum collection and Revenue

Year	Quantity (in quintals)	Revenue (in Rs)
1992-93	28	100,651.00
1993-94	39	142,900.00
1994-95	43	162,300.00
1995-96	29	117,500.00
1996-97	33	140,900.00
1997-98	23	110,300.00
1998-99	16.5	75,000.00
1999-00	21	100,900.00
2000-01	20	61900.00
2001-02	9.08	63600.00
2002-03	24	49000.00

17.5.03 As the figures in the above table indicate, the revenue realised from the gum collection is meagre and further it shows declining trend in gum availability. It will therefore be preferable to stop this auction and earmark gum collection to the FPCs under JFM. In this connection specific rules are to be framed in this regard for which necessary, proposal be moved to government by division.

17.5.04 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 NWFPs should also ideally find their due place in the JFM micro-plan. Proper grading, value addition and exploring new markets for the traditional NWFPs (such as gum) as well as exploring the marketability of new NWFPs hitherto unknown (such as medicinal plants) will form important activity under the JFM programme in the division. The possibility of involvement of NGOs in such an endeavour should be explored.

17.6 METHODS OF TREATMENT

17.6.01 **Modifications according to the legal provisions:** Since legal provisions are not very explicit, it is recommended that treatments prescribed in the following paragraphs be modified according to the legal directives issued by the state government from time to time.

17.6.02 **Fire protection measures:** Collection of NWFPs is often associated with forest fires, because the villagers set fire around the NWFP 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 left unattended, such fires spread into forests as forest fires.

- The Village Panchayats and JFMCs shall be involved in awareness generation programme to help control forest fires.
- In case of forest fire, legal action should be taken against the defaulters. Strict vigilance is necessary during the months of March-April to check the spread of fires in time during tendu season.

17.6.03 **Training for NWFP collection: Training programmes for proper NWFPs collection, value addition and marketing shall be organised in each range to ensure their sustainable harvest and use. The Education Circle should prepare and oversee the training modules.**

17.6.04 **Documentation of NWFP collection:** The Beat Guard will send monthly report to the Range Forest Officer on the quantity of NWFPs collected in their beats. The Range Forest Officer will compile and send the details to the division office. The division office will compile the figures for each species for division with the view to monitor their collection and harvest, to sustainable limit.

17.6.05 **Non-destructive removal of NWFP parts:** The areas in Wardha division capable of producing NWFPs have been identified and marked compartments having promising regeneration areas of NWFP species shall be well demarcated on the ground and on map. Unless detrimental to the wildlife conservation and site conditions, sustainable harvesting and non-destructive removal of flowers, fruits and other parts can be permitted. Species, which are endangered, need to be prohibited from removal. Poor class of the villagers when not engaged on agricultural works collect moha flowers and fruits, charoli, gum, honey, wax, bark, roots, leaves etc and sale them locally to supplement their meagre income. Moha flower, charoli, gum etc are sold in the weekly market at many places.

- **Compartments having promising regeneration areas of Behada, Aonla, Char species identified and tended to remove congestion in the crop.**

Table 17.6

Species	No of comptt	Average regeneration per ha	Species distribution percentage
Behada	13	194	0.22
Aonla	12	215	0.09
Char	24	180	0.25

- Considering site suitability and local needs; NWFPs species shall be given due place (10 to 20 percent) in various plantations schemes.
- Except dead, no NWFP tree shall be marked for felling during the coupe working under various working circles.

17.7 MANAGEMENT OF TENDU

17.7.01 **Collection of Tendu leaves:** Tendu is the prominent revenue generating NWFPs 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 lumpsum basis. The area of Wardha division divided into 20 units. The collection of tendu leaves commences from the last week of April each year and continues up to first week of June. 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 neither too thick or thin are good quality for making Bidi. The leaves are collected at various collection centers called phadies. The leaves (pudas) are dried and then packed in gunny bags. The quantity is measured in standard bags.

Table 17.7 Revenue realized from Tendu

Financial Year	Qty Std.Bag (in Thosand)	Amount (Rs.in lakh)
1992-93	14.85	93.11
1993-94	15.21	86.95
1994-95	14.52	86.91
1995-96	13.97	99.85
1996-97	13.43	95.42
1997-98	11.32	90.57
1998-99	13.58	59.39
99-2000	14.10	94.68
2000-01	14.87	96.81
2001-02	13.39	96.67
2002-03	14.84	76.70
2003-04	8.23	50.16

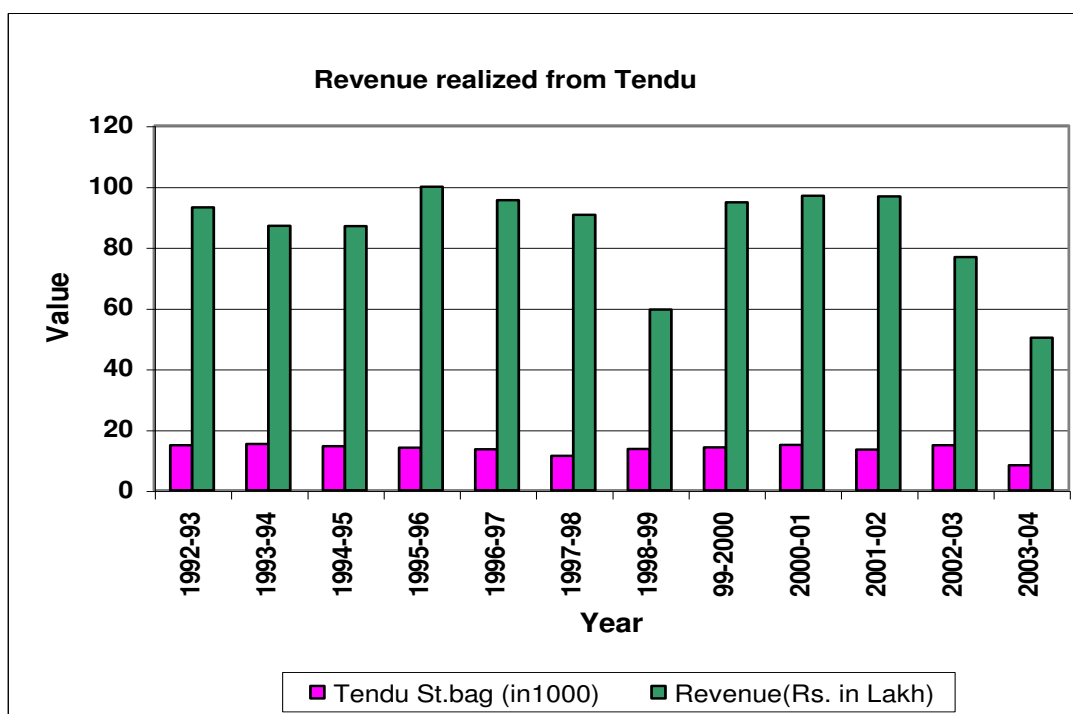


Table 17.8 Year wise details of tendu leaf collection as under:

Year	Total units	Target (Std bags)	Actual collection (Std bags)	Total Revenue (Rs)
2002	<u>20 units</u>	14600	10936.440	80,74,764/-
2003	<u>20 units</u>	14600	14840.335	76,70,379/-
2004	<u>20 units</u>	8500	8233.166	50,16,660/-

- Tendu leaf collection is the monopoly of the state government under the Maharashtra Minor Forest Produce (Regulation of Trade) Act, 1969. The tendu leaf collection shall be carried out in the manner prescribed by the Principal Chief Conservator of Forests from time to time.
- Tendu leaf collection is an income generating activity for most local and tribal villages in the region. The local village communities shall be gainfully engaged in tendu collection in the division to support their livelihood.
- A-1 type areas in working circles should be excluded from tendu units. **Tendu leaves shall not be collected from buffer area i.e. 50 meter surrounding the special habitats of wildlife.**
- Pruning of young tendu plants does help in increasing leaf yield. Saplings having more than 5 centimetres collar diameter shall not be pruned. However, felling of tendu trees or branch lopping for leaf collection should be dealt with firmly.

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

- Maintenance and improvement of tendu in the forest crop composition is prescribed by ensuring regeneration of tendu and its subsequent protection.
- Singling of shoots and soil working around tendu seedlings is prescribed in the plantation and rootstock areas to promote growth of tendu seedlings along with the annual coupes in area-specific working circles.
- It is proposed to ensure to include sufficient proportion of tendu in mix plantations prescribed under various area-specific working circles.

17.8 MANAGEMENT OF MOHA

17.8.01 **Moha collection:** There is substantial number of Moha trees in the crop. Inventory of Moha trees shall be made to have an idea of its production potential and regeneration status. The villagers in the tract have local system for allocation of collection rights of Moha flowers and fruits. In view of the viability of traditional of allocation of collection rights by the local communities no intervention is warranted in the process of Moha collection. **For better protection of Moha trees and to increase its stock, few Moha 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 Moha trees, they should protect them from fire. Range Forest Officer is supposed to monitor this activity of JFM committee regularly and make proper documentation.**

17.8.02 **Moha regeneration:** It is prescribed to provide soil working along with other planted seedlings during coupe operations of area-specific working circles. Moha will be one of the species in mixed plantation.

17.9 MANAGEMENT OF GUM

17.9.01 Gum is an important NWFP and is exuded by plants, partly as a normal phenomena and partly as the result of disease or injury to the bark or 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 colicoprinting, dyeing and as a sizing material for silk and cotton and in the manufacturing of paper. Salai gum is mostly used in the Indian medicines for the treatment of rheumatism and nervous diseases. Salai gum has the potential of becoming mounting media by substituting imported Canada balsam in the preparation of microscopic slides. It has the possibility of becoming an important substitute for imported Canada balsam, used as mounting media in the preparation of microscopic slides. Dhaora gum is used in food industry for making sweets. It may also be suitable in the manufacture of elastic adhesive, lacquers, oilcloth compositions, ink and perfumery.

Table 17.9 The unit wise gum collection is as follow:

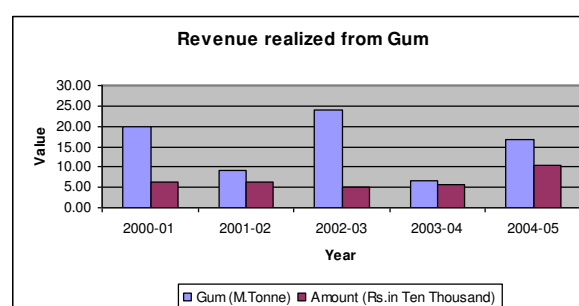
Sr No	Name of unit	Area Sq Km	Yield (Kg)		
			2000-01	2001-02	2002-03
1	Arvi	241.885	2000 kg	9080 kg	24000 kg
2	Ashti	158.155			
3	Karanja	119.039			
4	Wardha	57.35			
5	Hingni	212.367			
	Total	788.796			

17.9.02 **Kullu gum:** Kullu (*Sterculia urens*) is a fairly large sized tree species but has sparse distribution. **Due to sparse distribution of Kullu in the crop, presently, Kullu gum is not extracted in the Nagpur circle. It is therefore prescribed that Kullu gum shall not be collected during this plan period.** Inventory of Kullu has been made and it is found that it is 0.02% of total vegetation. Therefore, their status should be reviewed at the end of the plan period.

17.9.03 **Dhaora and Salai gum:** Dhaora trees are quite common in the forest crop of this tract. Salai trees are also found in a large number of compartments. Hence, collection of Dhaora and Salai gum permitted.

Table 17.10 Revenue realized from Gum

Financial Year	Gum (M.Tonne)	Amount (Rs.in Ten Thousand)
2000-01	20.00	6.19
2001-02	9.08	6.36
2002-03	24.00	4.90
2003-04	6.55	5.64
2004-05	16.70	10.30



17.9.04 No scientific method for tapping has been used so far in this area. For the purpose of scientific extraction of gum the FRI Gum Tapping Rules, have been proposed for tapping of gum.

17.10 THE RULES FOR GUM TAPPING (FRI, DEHRADUN)

17.10.01 Tapping Rules

- The tapping season will commence from November to end of May each year. No tree below 90 cm in girth will be tapped.
- Tapping will be confined to the main bole of trees between 15 cm from ground level to the point from which first branch is given off.
- Each tree shall be tapped continuously for 3 years; and, thereafter, will be given rest for 3 years.
- The initial blaze 20 cm wide and 30 cm in length or height may be made in the month of November on trees at 15 cm above ground level with a sharp axe having 7.5-cm wide blade. The blaze is made 0.6 cm deep in the bark.
- Blaze may be made horizontally leaving approximately equal space between the blazes. The blazes should not have any loose fiber. The lower surface of the blaze should be slightly slopping outwards to avoid lodging of guggul in the blazed pocket, in case, initial blazing is done by axe.
- The guggul starts oozing out soon after blazes are made and may be collected initially after a month, that is, by about December when the blazes may also be freshened. Subsequent collections and freshening may be done fortnightly up to May. Overall, 12 freshening are required to be made, during the year.
- In each freshening, the lower surface is not to be freshened. The edges may be scraped so that only 3.8 cm is increased on either side in width, at the end of 12th freshening. This means that about 0.3 cm should be scraped off from either side in width in each freshening.
- The lowest row of blazes will be at one meter above the ground level. The next row of blazes will be made at the height of 60 cm from the lower that is, at a total height of 1.6 meter from the ground level. The vertical portion of the blaze of upper row will alternate with similar portion of the row and no two blazes of the two rows will be directly one above the other.
- The number of blazes to be made on each tree will depend on its girth at breast height, as given below:

Table 17.11 Maximum blazes allowed on each tree

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

- No fresh blaze will be made on the partially healed up surface or old wounds.
- Each blaze will be in a shape of parabola with a 2.5 cm wide base. The curved side of the parabola will be upwards and of height not more than 7.50 cm and the depth of the blaze will not exceed 0.6 cm in the wood.
- At the end of the season, the height of the blaze shall not be greater than 12.50 cm. Maximum permissible dimension of each blaze shall be 10cm x 12.5cm x 0.6 cm in width, height and depth, respectively.
- Since the tapping is to be done continuously for three years the total height of the blaze at the end of three years of tapping will be 37.50 cm, the width and depth remaining the same.
- In the second cycle that is, in the 7th year (after three-year rest) new blazes will be made in the same way in the un-blazed portion, in between the blazed portions of the first cycle. This blazing will continue for another three years in the manner described above and the operations will be repeated till un-blazed portion is fully covered.
- In addition, tapping of trees below 90 cm GBH shall be prohibited. Collection period will be confined from November to May, to minimise the damage to the trees. The areas around the trees should be cleaned to facilitate gum collection and to prevent fire in the forests. A strict watch is necessary to enforce tapping rules and check unauthorised collection of gum. No gum producing trees should be felled. No tapping of gum should be carried out during the period of rest.
- The agency, the organisation or the individual collecting the Dhaora or Salai gum in violation of the prescribed tapping rules should be treated as a forest offence and dealt with accordingly.

17.10.02 **Formation of gum units:** The gum units for collection of Dhaora and Salai gums are formed and well demarcated, range as a unit, They are coterminous with protection ranges which ensures effective monitoring and control.

Besides, Kullu and Salai saplings are prescribed to be provided soil working along with planted seedlings in various area-specific working circles. Singling and tending of Salai shoots would further help the Salai regeneration. Gum-yield species are prescribed for plantations.

17.11 MANAGEMENT OF HIRADA, BEHEDA, AONLA, CHAR AND OTHER NWFPs

17.11.01 **Collection of Hirada, Beheda, Aonla, Char and other NWFPs:** Fruits of *Hirada*, *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 Hirada, Beheda, Aonla, Char trees and to increase its stock, few of **the above trees be numbered and these trees be allotted to members of JFM committee**. The members of committees who have been assigned with job of protection & nurture of above trees, they should protect them from fire. Range Forest Officer is supposed to monitor this activity of JFM committee regularly and make proper documentation.

If these village bodies are not interested in collection, the collection rights may be auctioned. Collection units shall be co-terminus with the protection ranges.

Removal of NWFPs shall be within the sustainable limits of production. Felling of trees and lopping of branches shall not be permitted for NWFPs 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.

17.11.02 **Regeneration of *Hirada*, *Beheda*, *Aonla* and *Char* :** Compartments having regeneration of *Beheda*, *Aonla*, *Char* are shown in **Appendix 17.6**. Saplings of *Beheda*, *Aonla* and *Char* are prescribed tending to remove congestion and soil working and mulching along with planted seedlings is to be done during coupe operations of various areas in working circles. *Hirada*, *Beheda*, *Aonla* and *Char* are prescribed for plantations.

17.12 MANAGEMENT OF GRASS

17.12.01 The common grasses are Kusal, Bhurbhusi, Ghonad, Sheda and Marvel. Coarse grasses are used for thatching and palatable grasses for stall feeding. The demand for grass is local. For fodder Marvel, Sheda, Paonia and Mushan are preferred.

17.12.02 The demand for grazing is very heavy especially in Arvi, Ashti and Karanja ranges aiming to provide good grazing site to the local cattle without deterioration of the productive capacity of the site. The quantity of fodder can be improved by introducing superior grasses, legumes and fodder tree species.

The management of grasses shall be done as per prescription enshrined in G&FRM working circle.

17.13 DETAILS OF THE AREA AND YEAR WISE YIELD

17.13.01 Area covered under the grasses are 3350 ha. The details of the area is given in table 17.10.

Table 17.12

Sr No	Range	No of coupes	Area (ha)	Yield (m.ton)		
				2001	2002	2003
1	Arvi	21	1100	338.50	362.50	306.00
2	Ashti	08	300			
3	Karanja	46	1600			
4	Wardha	02	100			
5	Hingni	04	225			
	Total	81	3350			

17.14 FUTURE MANAGEMENT PROPOSED

- A. For building the data of NWFPs, it is proposed that weekly markets will be surveyed extensively to find out the types of NWFP coming from forest area, their extent, purpose of utilisation, rate, chain and the agency of marketing and final destination. The local schools, village level functionaries and NGOs are proposed to be associated in building up this database.

The data should be collected in following prescribed format and monitored regularly.

Range	Market (Bazar) place (Name of the Village)	Market (Bazar) date	Name of NWFP Spps.	Source of Spps.	Part of NWFP Pod Seed Fruit Leaves Root Bark Gum	Quantity for sale	Market Rate(Rs.) Per Unit
1	2	3	4	5	6	7	8

It is proposed that the above information should be used to formulate suitable prescriptions for control of NTFP at the time of next revision. Depending upon the pace with which the information is made available and its results, working plan division may be asked to revise this chapter even during the currency of this plan - at the time of mid term review.

- B.** To make a beginning towards NWFP cultivation, each forest (Beat) guard and his vanmajoor will be given target of collecting seed material of most traded NWFP and to propagate it as part of his beat patrolling duties.
- C.** The division will endeavour the following:
- (1) Explore possibility of fixing fees/ royalty for the removal of each and every NWFP from the forests.
 - (2) Each NWFP purchaser to maintain a register, in which the information like the type of NWFP; person/s who collected it; quantity, rate and place of collection (comptt.); rate at which and to whom it has been sold, will be maintained.

Chapter XVIII

JOINT FOREST MANAGEMENT (OVERLAPPING) WORKING CIRCLE

18.1 GENERAL CONSTITUTION OF THE WORKING CIRCLE

18.1.01 The prescriptions of this chapter will be applicable to the entire division.

18.2 BACKGROUND OF THE JOINT FOREST MANAGEMENT

18.2.01 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 department could not effectively protect the forests whose degradation continued.

18.2.02 The National Forest Policy, 1988 emphasized that domestic requirements of the tribals and other poor people living within and near the forest for fuel wood, fodder, NWFP 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, Ministry of Environment and Forests, Govt. of India issued a guidelines in June 1990 for adopting JFM approach for the protection and rehabilitation of degraded forest.

18.2.03 Through the Govt. resolution No.SIF-1091/199/F-11, dt. 16th March 1992. JFM approach was adopted for degraded forest areas of this state and now new guidelines have been issued vide G.R. No. MSC/2000/C.No.143/F-2, dated 25.4.2003.

18.2.04 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 committees 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 problems in protecting forest without the help of local people make the forest department staff

realize the need of JFM. The JFM program succeeds where the initiative comes from the people's side and it usually fails where it is forced from forest department side as a govt. driven and target oriented programmes. Villagers themselves are required to voluntarily participate in the program. Forest Protection Committee (FPC) is to be formed in each village. Each forest protection committee constitutes a executive committee consisting of members elected from general body and ex-officio members representing concern government department at village level with local Forester/Forest Guard as the member secretary. The executive committee is a responsible to implement the decision of general body with regard to the execution of JFM works in partnership with forest department. Memorandum of understanding (MOU) is signed between forest department and JFM committee clearly specifies the duties and responsibilities of both parties. Entitlement of FPC members to the share in forest produce is subject to the fulfilment of conditions of MOU.

18.2.05 The members of the FPC will help in protection and development of forests and they will receive in turn a share in the usufructs at out put from the forest areas assigned to such committee. The JFM areas will be managed & according to the micro plans prepared jointly by the Deputy Conservator of Forests and the member of the FPC. These micro plans shall contain the details of forest and village developments. This has to be sustainable, should cater to needs of local communities and the same time, the silvicultural requirements of the forest are to be made properly.

18.2.06 Later the Govt. of India also so advised the state govt. to take up the JFM in well stocked areas on experimental basis and accordingly guidelines dated 25th April, 2003 mentioned above have authorized the forest department in the state in this respect. Summary of this guidelines is as follows:

- i) Good forests within 2 km from a village are to be covered under the programme on experimental basis and stage by stage other villages containing good forest are to be brought under it.
- ii) JFM activity is to be implemented with the help of Gram Panchayat and forest produce available is to be provided on priority to meet bonafide local needs. (Hence local rights as enshrined in nistar patrak and wazib-ul-arz are not to be curtailed).
- iii) Non forest land available in the village, may be brought under the scheme if villagers and the panchayat agree to do so.

- iv) Help of institution of local self govt., NGO, environmental experts, if any available locally, may be solicited.
- v) The scheme though does not intend to facilitated agriculture based professions but non irrigated horticulture scheme in (private) wastelands may be encouraged if approved in micro plan.
- vi) The programme underlines conservation of forests and wildlife and therefore any activity/agreement etc. that is not consistent with Forest Conservation Act, 1980 should not be incorporated in the micro plan.
- vii) All JFM activities should be consistent with the prescriptions of the working plan.

18.3 OBJECTIVES OF THE JFM (OVERLAPPING) WORKING CIRCLE

- 1) To generate and sustain the participatory forest management approach through JFM programme.
- 2) To develop the degraded forest resources by promoting natural and artificial regeneration (through plantation activity) with active participation of the villagers. It also aims to provide effective protection.
- 3) To empower village communities to play a crucial role in forest resource conservation and enable them to resolve their issues and problems.
- 4) To generate sustainable employment, through JFM activities.

18.4 POTENTIAL AREAS FOR THE JFM

18.4.01 The following areas priority wise selected for JFM programme.

- Areas prescribed under the Afforestation and Root stock Management working circle and Grass & Fodder Resource Management working circle are the potential areas for undertaking JFM programme.
- Areas under miscellaneous management, especially the zudapi jungles suitable for afforestation are prescribed under JFM.
- Areas under Improvement working circle, Selection-cum-Improvement working circle, are included in JFM and to be implemented as per the provision of in Govt of Maharashtra, GR No MSC-2000/CR143/F-2, Mantralaya, Mumbai dated 25.04.2003.

- Regeneration and protection of NWFP areas and collection, grading, value addition and marketability of various NWFPs in the division are given focus for working under JFM programme.

18.5 PRESENT STATUS OF JFM COMMITTEES

18.5.01 JFM concept has been introduced in this division in the year 1998. So far 125 villages over a period of 5 years have been covered.

The present status of the committee formed in this division is as under:

Table 18.1

Sr No	Range	No of villages adjoining to forests	Total forest area in division (ha)	Committees formed			No of villages deleted	Balance villages	Remarks
				Name of scheme	No of JFM committees formed	Area assigned to committee (ha)			
1	Wardha	19	93368.345	World Bank FDA Other Total	01 05 06 12	43262.98	07	00	Villages found unfit due to high population or low forest availability
2	Arvi	59		World Bank ITDP Other Total	11 06 19 36		23	00	
3	Hingni	47		World Bank FDA Other Total	01 12 13 26		21	00	
4	Ashti	79		FDA Other Total	10 15 25		54	00	
5	Karanja	61		FDA Other Total	11 15 26		35	00	
	Total	265	93368.345		125	43262.98	140	00	

18.5.02 Treatment Prescribed:

- JFM microplan will be prepared for each village through the process of participatory rural approach. Microplans are site specific linked with the working plan objectives. Villages & watershed development planning shall be given utmost importance.
- The prescriptions in the microplan shall be consistent with the policies and principles laid down in Working Plans.
- Microplans should contain the prescription that 100% enumeration of growing stock should be carried out at the time of handing over the area to JFM committees. Based on this data, availability of NWFP should be worked out. Further 100% enumeration can be done, when the standing crop is thinned or felled, so that incremental value after 10 years can be worked out for sharing purposes.
- Silvicultural management, maintenance of forest boundary, removal of forest encroachment and control over illicit cutting should receive high priority.
- The microplan shall be prepared in such way that the women as well as Tribals and people from Scheduled Caste/Scheduled Tribe and OBCs shall be encouraged.
- Forest protection can not be viewed in isolation. The forest department may be designated as Nodal agency for all developmental works recommended in the microplans.
- In carrying out the developmental activities, the expertise of NGOs has to be fully utilized.
- For strengthening the FPCs a revolutionary fund at village level shall be developed.
- Fire protection measure should preferably be carried out through JFM committees not only in their assigned areas but other areas also and money meant for fire protection of these areas should be given to the committees, provided, there are no cases of occurrence of fire. Even if fire occurs same will be extinguished within an hour by committee, so that total area burns not more than 2 ha.

18.5.03 There are 660 villages having forest area in Wardha division. Out of which 265 villages are adjoining to forest- Out of this 140 villages are unfit for formation of FPC due to high population and hence deleted. So far 125 FPCs have been formed. At the district level Forest Development Agency (FDA) has been registered under Societies Registration Act, 1860 by the Assistant Registrar of Cooperative Societies, Wardha division vide registration No MAH/38/2002, dated 27 Feb, 2002. This project is proposed to be implemented in 51 villages

of this district. Microplan of each village proposed and approved by competent authorities. It is envisaged to protect and treat the forest area 32,865.38 ha covering 51 villages and to take up 1500 ha area under plantation and different models. **Under Entry Point Activities village developmental works are proposed by the villagers in the Gramsabha.** Rest of the area is assigned for protection to remaining Forest Protection Committees without any monitoring help. **(Appendix 18.1)**

18.6 JFM UNDER ITDP SCHEME

18.6.01 Integrated Tribal Development Project is proposed to be implemented in the tribal areas of Wardha district in 6 villages namely Gaurkheda, Umri, Sukadi, Bodad, Sawangi and Kakaddara through participatory forest management with the involvement of tribal people by adopting JFM approach in the year 2003-04 It covers 3750.9 ha of forest area out of which 871.5 ha assigned to FPC for protection. As well as plantation under different models like medicinal plants, fodder development, bamboo plantation, mixed plantation on 149 ha would be taken. Usufructs sharing will be as per provisions of GR dated 16th March, 1992 and April, 2003. The aim of the project is to enhance the economic and social status of the tribal people by taking various plantation activities, soil moisture and conservation works.

Chapter XIX

FOREST PROTECTION OVERLAPPING WORKING CIRCLE

19.1 INTRODUCTION

19.1.1 Forest protection is a socio-economic problem. Factors causing pressure on forests and their degradation, are mainly increasing population, encroachment by poor farmers and land less people, dependence of poor on forests for day to day needs, illicit felling due to increased value of timber, forest fires and lack of adequate infrastructure of the forest department.

19.2 EXTENT

19.2.1 This working circle comprises the forest areas of whole division. Percentage of teak is around 52% where as the common miscellaneous species found are *Bhera*, *Dhaora*, *Ain*, *Tendu*, *Salai*, *Mowai*, *Khair* etc.

19.3 PAST HISTORY OF ILLICIT CUTTING AND HABITUAL OFFENDER

19.3.01 The illicit cutting of the past years is tabulated below:

Table 19.1

Year	Illicit felled Teak trees (No)	Loss (Rs)	Illicit felled Non Teak trees (No)	Loss (Rs)	Total no of Trees illicitly felled (No)	Loss (Rs)
1993	12140	1701080	2270	166694	14410	1867774
1994	2671	1212144	535	91685	3206	1303829
1995	4197	600385	1046	63757	5243	664142
1996	3461	598241	735	70254	4196	668495
1997	4949	1458373	1463	139962	6412	1598335
1998	4043	2184821	1342	321438	5385	2506259
1999	3472	1888776	1097	130252	4569	2019028
2000	3051	1679074	1100	133981	4151	1813055
2001	2796	1569924	1161	118742	3957	1688666
2002	2222	1488751	1103	110702	3325	1599453
2003	4198	1082941	1841	116629	6039	1199570
2004	2686	634036	826	36276	3512	670312
Total	49886	16098546	14519	1500372	64405	17598918

19.3.02 The illicit cutting in Dhawasa, Heti. Kannamwar, Umri beats of Karanja range and Seldoh, Kelzar, Juwada, Akoli, Nawargaon beats of Hingni range; were high because they were under the influence of notorious wood smuggler "Samsher" is no more now.

19.4 OBJECT OF MANAGEMENT

- To protect forests from illicit felling and poaching of wildlife.
- To control over the unauthorized and illegal transport of forest produce.
- To protect and maintain the forest boundaries.
- To control and prevent the forest area from encroachment and forest fires.

19.5 METHODS OF TREATMENT

19.5.01 Identification of sensitive/hyper sensitive beats :

Wardha forest division comprise of mostly 52% teak forests, being commercially valuable, the beats are classified in accordance to GR (Marathi) Revenue & Forests Deptt, No TRS-06/2001/CR 209/F-6, Mantralaya, Mumbai, dated 08.05.2003. The beats are classified into hyper sensitive, sensitive and normal on the basis of -

- i) Number and value of the illicitly felled trees
- ii) Number of offences
- iii) Fire incidences
- iv) Grazing incidences
- v) The poaching incidences

Accordingly there are 7 hyper sensitive beats, 30 sensitive beats, 105 normal beats (Appendix 19.1).

19.5.02 Identification of Wildlife Poaching Zones/Pockets

Bor Wildlife Sanctuary adjoining the division which is exclusively managed for wildlife protection and conservation. Kelzar, Nawargaon, Borkhedi and Hingni round of the Hingni range and Dhanoli round of Karanja range having the common border with the Bor Wildlife Sanctuary. Therefore, there is a free movement of Tiger/Panther and other herbivores animals from sanctuary to these areas and vice-versa. Therefore, there is every possibility to get wildlife poached in these areas, so these areas can be considered as wildlife poaching zone/pockets.

19.5.03 Protection Measures in Sensitive Wildlife Area

- Local field staff should maintain the list of sensitive wildlife pockets for vigilance and special focus for protection.

- They should keep information of waterholes particularly in summer season and watch on the same.
- Keeping a watch on electric lines passing through forests.
- Taking cognizance of cases of injury due to wild animals.
- Keeping a track of animals like Tiger particularly Tigress with cubs and watch on such vulnerable animals.
- Strengthening network of information system.
- Forest check post shall be sensitized for keeping a watch on wildlife offences to check illegal traffic of wildlife articles.
- To take up nature education programmes in schools and colleges, of villages adjoining forests.
- To ensure cattle grazing in forest near the important wildlife habitats are inoculated against contagious diseases.
- Removal of NWFP flowers, fruits and medicinal plants and similarly harvesting of herbs from wildlife habitat, be banned.
- Tendu collection center and labour camps shall not be established near the waterholes.
- Adequate well distributed waterholes shall be created for wildlife.

Government of Maharashtra vide its GR No WLP-10-2000/case no.10/F-1 dated 1/08/2003, created a "Tiger Cell" at district level as well as regional level. In pursuance to this GR Joint patrolling of police and forest personnels in wildlife sensitive areas shall be undertaken.

19.5.04 **Beat inspection:** As per standing order No 37, every Beat Guard must patrol and inspect his beat thoroughly within every fortnight, Range Officer should inspect beat in his control once in three months. Range Forest Officer should inspect one beat per month.

19.6 CROSS CHECKING OF BEATS

19.6.01 Beat cross checking programme be regularly implemented in the division specifically in hyper sensitive beats, to monitor and check illicit felling of trees.

19.6.02 **Saw Mills Inspection:** There are 73 saw mills which are to be regularly inspected by the Gazetted officer.

- i) **RFO** – Not less than 12 saw mills in a month (where there are less than 12 saw mills in his jurisdiction, then, all such saw mills).

- ii) **ACF** – Not less than 6 saw mills every month.
- iii) **DCF** – Not less than 4 saw mills every month.

Revised norms for forest protection issued vide Revenue and Forest Deptt, GR No TRS-06/CR No 209/F-6, dated 08.05.2003 are to be followed scrupulously (**Appendix 19.2**). Other instructions issued time to time by the Government and Principal Chief Conservator of Forests, Maharashtra State, Nagpur also to be followed.

19.6.03 **Inspection in Transit**

Vehicles carrying forest produce and passing through the forest nakas are to be checked. There are 16 forest checking nakas in Wardha district which are manned around the clock. Forest produce is transported along with legal forest transit permit issued by authorized forest employees/officer by Deputy Conservator of Forests as per Bombay Forest Manual, Vol-II article 202. Transit permits are of three types –

- i) Transit permit for government forest produce
(Forest Form No FOR-190) – Red colour
- ii) Transit permit for government forest produce purchased by contractor
(Forest Form No FOR-192) – White colour
- iii) Transit permit for private forest produce
(Forest Form No FOR-193) – Yellow colour

The forest produce shall be transported along with the specific transit permit mentioned above. But some times due to non availability of specific coloured proforma, white colour proforma is generally used. In such case it is required that each transit permit should bear the details indicating seal of the divisional office, transport year, govt./private produce/purchased by contractor.

19.6.04 **Nakabandi / Night Patrolling**

Nakabandi has to be arranged in a month in each range. It should be kept confidential and instructions to that effect are to be passed on to the staff two to three hours prior to operation. A special vigilance squad is formed for strict vigilance.

19.7 **VIGILANCE CELL/ MOBILE SQUAD**

19.7.01 Two mobile squad RFOs are posted in the division, head quarter at Wardha and Arvi. They are provided with jeep and police constable. These mobile squads should keep strict vigil against offences.

19.7.02 Fortnightly meeting of RFOs mobile squad shall be conducted by DFO, (Vigilance). The Range Forest Officer mobile squad should submit personally following documents during each meeting.

- a) Fortnightly diaries.
- b) Abstract of jeep used during fortnight.
- c) Progress report of the offences detected and recoveries made.
- d) Progress report of the inquiries in respect of all the complaints entrusted to them by territorial DCF and the DFO vigilance.
- e) The copies of the special report, if any.
- f) The copies of the fortnight general report submitted to DCF territorial.

19.7.03 General protection primarily is responsibility of the territorial staff. The vigilance cell is only to reinforce the protection measures. General report submitted by Range Forest Officer mobile squad consists of the major incidence of forest offences, summary of the patrolling duty, protection measures of vulnerable areas, performance of the checking nakas, major shortfalls in transit pass accounts etc.

19.7.04 Patrolling should be with more emphasis to vulnerable areas and must have a relevance to habitual offenders. While inspecting checking nakas maintenance of relevant register, sample of entries should be checked. Transit pass in naka register should be verified with counterfoils.

19.7.05 The second best jeep in the division shall be allotted to RFO mobile squad provided with search light, torch etc. RFO, mobile squad should have a complete kit containing measurement tape, ready-reckoner for "found and sawn timber", all important forms such as search warrant forms, japtinama, supratnama, detention order forms, personal hammer, copy of the basic acts and standing orders, sealing kit, schedule of rates, official rubber stamps, oil paint, ink pad, carbon, identity card, official distinct brass seal.

19.7.06 Detection of offences is the primary duty of the mobile squad and immediately after detection of the offences RFO mobile squad should complete preliminary enquiries upto a stage of safe point such as spot panchanama of seizure, spot panchanama of the origin or source, offenders statement and available witnesses. Further detailed enquiry and final decision should be entrusted to local territorial staff. Papers of preliminary enquiry shall be forwarded to the respective territorial staff. The details of detection and result of preliminary enquiry shall be recorded in forwarding letter. The copy of such forwarding letter shall be endorsed to the DCF territorial and DFO vigilance. RFO mobile squad should avoid advance recovery except in petty offence cases.

19.8 RECORD OF HABITUAL OFFENDERS

19.8.1 A register of a habitual and notorious offenders shall be kept at range and round offices. Details of the offenders with photograph shall be recorded in the register.

19.9 SURVEILLANCE IN CONSUMPTION CENTERS

19.9.1 Building construction works as well as furniture units are mostly found in the towns. Frequent checking to these places shall be done during October to June. RFO territorial and mobile squad and concerned round officers should check regularly these consumption centers.

19.10 INTELLIGENCE NETWORK

19.10.1 Information regarding various forest offence shall be collected from local villagers by the forest staff at various level and a prompt action is taken without loss of time. Private persons (informers) who give information regarding illicit felling and offenders as well as the forest officers/employees doing excellent work in forest protection shall be awarded as per GR dated 24th February 1984.

19.10.2 Wherever there is a exigency and forest protection problem state reserve police force be engaged. Secret fund as in police department be raised as directed by High Court Bombay, Nagpur Bench in writ petition 1277/2000 after sanctioned by govt. So that, this can be given to informers by DCF without waiting for sanction from higher authority to check crimes in illicit felling and wildlife poaching effectively.

19.11 USE OF WIRELESS NETWORK

19.11.1 All the round headquarters except Hinganghat are well connected with the wireless networking with range as well as division headquarter. Wireless hand sets have also been provided to all round officers and to the field staff of sensitive/hyper sensitive beats which shall be used in controlling the illicit cutting, poaching, hunting and fire etc.

19.12 USE OF STATISTIC DATA OF ILLICIT FELLING

19.12.01 Statistical data of Teak/Non Teak trees has been collected and pictorial graph has been drawn. Graph suggest the illicit felling trees is more in U/30 and 31/45 cm girth class. Thus, statistical data of illicit felling helps in controlling the illicit felling and to take further suggestive measures in the field.

19.12.02 125 Joint Forest Protection Committees have been formed in Wardha division and 43262.98 ha area have been assigned to FPCs. This is the new democratic approach through which forest protection is done efficiently and effectively.

19.13 CONSTRUCTION OF BEAT NAKA

19.13.01 Beat guards are staying in remote and inaccessible area of the forest. There are 142 beat guards and only 65 quarters are available for them. Still 77 beat Nakas are required to be constructed for effective controlling of illicit felling.

19.14 SUPPLY OF VEHICLES

19.14.1 Most of the existing vehicles are old. Following steps are proposed for easing out this situation.

- i) Written off vehicles should be replaced immediately.
- ii) The confiscated vehicles with good condition shall be allowed to utilize by the department with, due permission from Govt.
- iii) The vehicles of forest department shall not be requisitioned by district administration/police force for law and order purposes.
- iv) Protection vehicles shall be provided with dome lights.

19.15 VACANT POSTS

19.15.01 The average age of field staff is 45 to 50 years. This is not suitable for tough field duty. Therefore vacant post shall be filled in by direct recruits as per recruitment rules.

19.16 WEAPON SUPPLY

19.16.01 Pistols and Rifles are to be provided to field protection staff.

19.17 FUNDS FOR FOREST PROTECTION

19.17.01 Funds as per the working plan proposals shall be made available for forest protection.

19.18 ESTABLISHMENT OF SPECIAL FOREST COURTS

19.18.01 As on December 2004, 40 cases are pending for disposal in various courts, many of them are pending for the last many years. Hon'ble Supreme Court in one of the writ petition 1128/1986 passed an order on dated 15th May 1996 stating that "(i) when the cases pending in the criminal court under IPC or any other law for the time being in force are punishable with imprisonment up to 1 year, with or without fine and if such pending is for more than 1 year and in such cases trials have still not commenced, the criminal court shall discharge or acquit the accused, as the case may be and close such cases. (ii) when the case pending in criminal court under IPC or any other law for time being in force are punishable with imprisonment up to 3 years, with or without fine and if such pending is for more than 2 years and if such cases trials have still not commenced, the criminal court shall discharge or acquit the accused as the case may be and close such cases." In view of this ruling of the Supreme Court, creation of special courts of JMFC

under section 11 of the CRPC for conducting exclusively, the trial of the forest offences be created.

19.19 ENCROACHMENT

19.19.01 The problem of encroachments on forest lands is assuming serious proportions. Such encroachments are generally done by poor landless people and marginal farmers. Encroachment on forest lands for cultivation or any other purpose is a punishable offence under the provisions of Indian Forest Act 1927 vide sections 26(h) & 33(c).

19.19.02 The state government should be urged to regularize all identified eligible cases of encroachments of prior to 1978 in accordance with the government resolutions issued. **(Appendix 19.3)**

19.19.03 The forest areas under encroachment from 1978 onwards are 328.234 ha. of 911 encroachers. The efforts undertaken by the division lead to eviction of encroachment in 3.109 ha. of 27 encroachers. The Balance area under encroachment after 1978 onwards is 325 105 ha. of 884 encroachers **(Appendix 19.4)**. Renewed and concerted efforts on the part of division staff for eviction of encroachment are proposed on priority basis.

19.19.04 The status of encroachments on forest lands in Wardha division is as under. (All these are post 1978 encroachments)

Table 19.2

Sr No	Range	Forest area (in ha)	Encroachment (in ha)	% of encroached forest area/total forest area
1	Arvi	27644.80	0.600	0.002
2	Ashti	23116.99	16.52	0.071
3	Hingni	16741.72	00	0
4	Karanja	13365.85	00	0
5	Wardha	12498.99	307.985	2.46
Total	5	93368.35	325.105	0.35%

19.19.5 Action for eviction of encroachments:

- ★ ACFs/Sub DFOs/DyCFs have already been delegated the powers exercisable by the Collector under section 53, 54, 54A of Maharashtra Land Revenue Code, 1966 vide GR dated 30th Jan 1997.
- ★ As per Government's Circular dated 15th Sept 2001 all the illegal construction/encroachments/hutment on the forestlands are to be removed immediately.

- ★ Provision of summary trials for trial of forest offences.
- ★ Ministry of Environment and Forest, Govt. of India, New Delhi vide their letter dated 3.5.2002 has issued guidelines for eviction of encroachments from the forestlands. Following steps are suggested-
 1. All encroachments should be summarily evicted in a time bound manner.
 2. Constitution of a cell at PCCF office level to plan and monitor eviction of encroachments. Setting up of monitoring committee at state level under the chairmanship of the Chief Secretary.
 3. Constitution of Committee at circle level under the chairmanship of CCFs / CFs with Collector and Superintendent of Police as members.
 4. Preparation of comprehensive list of encroachments with current status of eviction process.

19.20 CONSTRAINTS:

19.20.01 In the past, several times the Government had suggested a timetable for eviction of the encroachments. But it is felt that the inherent constraints still exist, which make the eviction plans very difficult to implement. Mainly the constraints are as follows:

- ◆ Though there are sufficient provisions in the rules, the matching enforcement machinery is lacking in the forest department.
- ◆ Boundary demarcation on the field is a very neglected activity in the department since long. In many a places, the villagers under presumption of their ownership, occupy the forestlands. Unless the works like proper survey, demarcation, maintenance of boundary etc. are undertaken, such cases can't be detected and active measures can not be taken. In fact, many instances have come to the notice where the Forest Guards/Foresters came to know about their forestlands only at the time of special survey conducted in connection of some special project.
- ◆ Forest boundaries are either not demarcated properly or their maintenance is far from satisfactory for various reasons including availability of surveys, shortage of protection staff and poor fund allocation for the purpose. Fund allocation for demarcation and maintenance of forest boundary are continuously decreasing. Similarly, most areas under the forest settlement need proper demarcation after the RF notification. This work has been neglected since long.

19.20.02 A five year boundary inspection and repairs scheme is in force in the division. The RFO is responsible for the boundaries in his range are inspected and repaired annually according to the

scheme. DCF shall arrange to have 25% of boundary inspection by himself or gazetted assistant each year.

19.20.03 Traditionally, erecting cairns along the boundary is used for demarcation on the ground. In addition, boundary clearance is followed. 12 meter wide strip is cleared along the external boundary.

19.20.04 Wherever, artificial boundaries are defined, stone cairns are used. Boundary cairns must be visible from one another, but they distance should not exceed 200 meters. 1st class cairns have 1.2 – 1.8 m base diameter with a central pole of Khair, Teak or Babul projecting 1.8 m above ground. Long stone piece or earthen structure may replace this design depending upon local conditions. This cairns should be numbered by engraving or marked with coal tar or paint. Each village must have its own series for boundary cairns.

2nd class cairns have 1.06 m height and 1.2 m base diameter and 0.76 m top diameter. 1st class cairns are raised at prominent corners and 2nd class cairns are placed on intermediate points.

19.20.05 Boundary demarcation using cairns are cheaper but required frequent repair and are vulnerable to mischief by encroachers. Therefore, it is suggested that creation of RCC boundary pillars at sensitive places must be adopted as a regular demarcation measures. Regular and sufficient financial allocation for forest demarcation is vital for the forest conservation.

19.20.06 **Suggested Measures For Improvement:**

- The notifications of RF/PF etc. should be available at the Range level so that the Court cases can be handled more effectively.
- Effective use of section 79 of the IFA 1927.
- Proper publicity before the onset of the season when encroachments take place. This would include the publicity of penal provisions under the law, to dissuade the villagers from encroachments.
- Nature of forest offence committed at each of successional stage of encroachment such as (i) attempt to delineate, measure, demarcate forestland with intention to cultivate, (ii) clearance of under growth or girdling of trees, intention of damage or actual damage to forest vegetation with intention to wrongfully acquire land, (iii) offence for having damaged the standing trees, (iv) offence for having felled the standing trees, (v) offence for having illicitly felled, and disposed of the forest produce like timber, fuel, (vi) attempt to break the land by removal of mounds, boulders, bunding operations and actual ploughing, sowing etc.

- If fresh independent POR is issued at every stages enumerated above it shall enable forest officials to fix up the responsibility at various level and ascertain as to what attempts have been made by various officials at various levels to prevent forest encroachments

19.21 GRAZING

19.21.01 Grazing pressure is very heavy on forests. Not only the pressure on forest has increased many fold due to increase of cattle population, but the will to enforce the restrictions on grazing is lacking. National Commission on Agriculture (1976) has advocated that the unrestricted grazing is an impediment to forestry development and should therefore be controlled.

19.21.02 Due to absence of revised grazing settlement for the tract under consideration, the grazing in the division is prescribed to be regulated as per the guidelines of Grazing Policy 1968; and Grazing Rules 1973 of Maharashtra state. The salient features of this policy are:

- 1) All grazing in the forest, whether free or otherwise would be on permit only.
- 2) Each forest division will be divided into grazing units and grazing licences at prescribed rates will be issued to excess cattle of cultivator family. The issue of licence is subject to such definite allotment of villages to particular grazing unit.
- 3) For free grazing of cattle of cultivator family and other, licences are limited to the period June 15 to July 31 only.
- 4) A grazing licence may be refused over a period of one year to any individual, who has been guilty of persistent illicit grazing.
- 5) Computation of cattle units are made as per para 2 of the grazing rules.
- 6) Essential cattle, subject to maximum of two plough units per cultivator family should be allowed free grazing in forests. A plough unit shall mean four cattle units.
- 7) The patwari/Talathi/Gramsevak shall issue a certificate on demand to all cultivator families, entitled to graze their cattle free. On production of such certificate a licence for free grazing at prescribed rates for such animals would be issued.
- 8) Each grazing unit and the village served by it shall constitute a grazing circle. For each such circle the headquarter shall be fixed where licence vendor shall ordinarily reside. Each circle can conveniently be divided into sub circles for issue of licences.

19.21.03 Joint Forest Management Committees can play a significant role by not allowing illegal grazing over the forest area assigned to them.

19.21.04 Heavy cattle pressure adversely affects the forest regeneration and soil condition. The statutory provisions regulating grazing are difficult to apply in the entirety. The present political

economy of domestic animals in the area throws up strong challenge and implementation of the grazing regulations in its current form. The situation may be substantially improved by establishing effective communication with the local people, awareness generation and efficient animal husbandry programme. The forest officers should take up these preventive measures in co-ordination with the Animal Husbandry Officers.

19.21.05 Maximum admissible grazing incidence according to the current policy has been shown for various working circles in Table 19.3 and **Appendix 1.17**.

Table 19.3 Admissible grazing incidence in various working circles

Working Circle	Functional classification	Maximum grazing incidence (hectare per cattle unit)	Closure
Special areas (overlapping)			
1. Protection areas (A1 & A2) & 2. Special habitat areas	Protection forest	Nil	Permanent
3. Annual coupes	Protection forest	Nil	Six years
4. Plantations	Protection forest	Nil	Five years
Other areas (under Working Circles)			
5. Selection-cum-Improvement	Tree forest	1.2	
6. Improvement	Tree forest	1.2	
7. Afforestation & RSM	Open forest	0.4	
8. G&FRM	Open forest	0.4	except grass land
9. Miscellaneous	Minor forest	0.8	
10. Protection	Protection forest	Nil	Permanent

Note: Area required for wildlife population should be calculated accordingly, and deducted from the available for the domestic cattle. If relevant data is not available 20% area should be marked for the wildlife.

19.21.06 The carrying capacity and period of closure is calculated for the forest areas falling in each village as given in appendix 1.16. The grazing passes, free or otherwise, to individual families proposed to be distributed on this basis. These village bodies should also be engaged in the implementation of grazing regulations.

19.21.07 The surplus cattle should be kept under regular watch, and villagers should be encouraged to adopt stall-feeding or other means to address mismatch between cattle-heads and fodder availability.

19.21.08 Fodder development on the community lands and translocation of surplus cattle may be encouraged.

19.21.9 The Animal Husbandry and the Dairy Development agencies shall be motivated and influenced to take up breed improvement programme. Fodder in the plantation areas shall be made available free of cost on cut-and-carry basis.

19.22 FOREST FIRE

19.22.01 Forest fire whether natural or manmade, it plays a significant role in eco-system dynamics. Recurrent fire decrease the green cover through prevention of regeneration and leads the slow death of the forest. It also increases erosion and alters the physical properties of the soil by converting organic ground cover to soluble ash and modifying the micro climate through the removal of overhead foliage. The soluble ash gets washed away in the next rain. The fires can also make trees more susceptible to insect attack. The vegetation gets severally affected because the humus formation process gets stopped with the sweep of fire. In due course the soil gets sterile. As withering of soil increases year by year, a bio-diversity is taken away where the chances for reappearance of specific species do not exist.

19.22.02 The forests of the division are frequently visited by ground fires. The fire season in the division ranges from March to mid June. Highly fire prone areas are burnt more than once during the fire season. Factors causing such fires are mostly anthropogenic in nature. Local inhabitants used fire for the collection of honey and mahua seed, mahua flowers and many other non timber forest produce (NTFP). Tendu contractors burn the tendu areas under presumption to get good flushes of tender tendu leaves. Such fires go uncontrolled and areas larger than required, are burnt. Forest dwellers, forest labourers and graziers leave burning sticks or match sticks or cigarette/bidi ends which caused fire. At times the local people intentionally burn areas to get better grass regeneration for grazing. Despite this, unattended and unsupervised fire tracing works are also to be blamed for forest fire. Fire season is in the period of maximum activity in the forests. During this period operations like harvesting, thinning, felling and collection of dead, dried and wind fallen trees, MFP collection, Gum extraction etc take place. Thus, a large number of labourers are camping in the forests, on one side it provides easy availability of manpower to extinguish any out break of fire, on the other it increases the probability of catching fires. Labourers engaged in collection of timber or bamboo also fire the forest area stealthily to protect them from snakes. Interestingly, the conflict between local groups and forest functionaries, between forest officials and forest labourers or posting of some forest functionaries against the wishes of local population are becoming strong cause for burning the forests.

19.22.03 The fire is mostly a ground fire and hence in almost every reporting, the first offence report (FOR) records that grass and litter were burnt and the value of the damage is negligible.

Thus, a need to sensitize the field functionary through realistic estimation was strongly felt. All fire incidences must be meticulously recorded and investigated to assess the damage caused.

19.22.04 Classification of fire control

Class-I (Complete Fire Protection): The Class-I fire control areas include all felling coupes (six years), thinning coupes (six years), plantations (five years), the A-type areas (permanent), forest depots (permanent), forest nurseries (permanent), Special habitat areas (permanent).

Class-II (General Fire Protection): The Class-II fire control areas include the remaining areas of the Selection-Cum-Improvement and the Improvement Working Circle.

Class-III (General vigilance): The remaining forest areas (that is, areas not included in the above two classes) and pasture areas are identified as the Class-III fire control areas.

19.22.05 Fire control measures

1. A fire protection scheme for the entire division shall be prepared before November 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 including regular staff and fire watchers. The staff should be trained in the application of modern fire-fighting tools. The fire prevention should be treated as a high priority item. The scheme should be implemented sincerely during the fire season.

3. 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-I areas will also have cut and cleared guidelines.

4. 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.

5. 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 fire fighting tools viz cutting tools like Pulaski, Brush hook, Double beat axe and scraping tools like Shovel, Mcleod and Raker shall be used for extinguishing fire. Hand operated pump can also used with a back pack tank for fighting forest and brush land fires. Fire fighting crews are to be formed equipped with these tools. A modern fire fighting project is under implementation in FDCM North Chandrapur

region. So the staff of the forest department can be trained in fire fighting, using the fire fighting equipment's and other methods by FDCM. 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 19.4.

Table 19. 4. Standard width of various types of fire lines

S N	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

11. 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.

19.22.06 Whatever the fires lines, block lines, guide lines are put in the forests they are not going to work in front of the will of person who is determined to set fire for his own needs. Unless there is goodwill of the local people, it is not possible to control such a vast area from the flames of fire and day to day human interference. **Now, the time has come that the local people living around should realize and help in repairing the loss by doing their services to the "nature". Apart from the physical efforts to prevent and check forest fires, there are other effective**

social measures like humanity education, social audit, social and economical sanctions, fines, rewards, incentives etc. which can be adopted to prevent loss of biodiversity from these treasures of nature. In this respect the JFM Committees can play a miracle and grow a forest lush green and live.

Chapter XX

MISCELLANEOUS REGULATIONS

20.1 BOUNDARY DEMARCATION

20.1.01 In order to keep the integrity of forests areas intact, strict vigilance over the forest boundary and periodic verification of the demarcation on the ground for the entire forest area has been prescribed. However, in view of the position of demarcation and boundary pillars on the ground, priority areas for the demarcation work have been identified. For the purpose of boundary demarcation, the following areas have been identified in the order of priority;

- Notified Reserved Forests.
- All the Protected Forests.
- Outer boundary of compartment in which erstwhile forest villages are located.
- All unclassified forests with the division.
- Zudupi Jungles transferred to the division.
- Disforested areas against various projects.
- Forest areas where exact boundaries are not shown on the forest maps.

20.2 SPECIAL OBJECTIVE OF MANAGEMENT

1. To maintain boundaries of forestlands in the division by permanent pillar marks, to act as psychological barriers.
2. To ensure effective protection of the forest resources against adverse influences.

20.3 APPROACH TO THE FOREST DEMARCATION

20.3.01 Well-defined forest boundary is a prerequisite for effective forest protection and its sustainable management. However, in most of PF the forest boundary marks are either missing or in a very poor state. Forest areas vulnerable to boundary obliteration need to be identified for survey and demarcation so that forest encroachment on the forest fringes could be detected, promptly. Presence of boundary marks also serves as psychological barrier against the forest encroachment. Artificial boundaries adjoining private land are proposed to receive the highest priority to ensure protection of these areas.

20.3.02 The forest maps by using GIS software has been developed and the total external boundaries is being calculated, by digitising external boundaries in Geometric software.

20.3.03 The Zudupi 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. Majority of these areas have by now been proposed for notification under section 4 of IFA, 1927. This process shall be completed expeditiously and enquiry will have to be conducted in a time bound manner.

20.3.04 **Fixing Boundary of the Erstwhile Forest villages**

There were Seven forest villages, which were located within the reserve forest compartments. They have been formed into the revenue villages in the year 1977 by disforested the requisite area of the reserve forest of the respective compartments. These details are given in the **Appendix 20.1**. The boundaries between the forest land and the village within these compartments however are not clear on the ground. Therefore, it is necessary that outer boundary of village is surveyed and new pillars are to be erected and accordingly maps may be generated.

20.4 **1/5TH DEMARCATION SCHEME**

20.4.01 It is prescribed to work the entire boundary of Reserved Forest and Protected Forest in 5 years period. Details of the compartment boundaries, for survey and demarcation purposes are included as shown in **Appendix 20.2**. However, the scheme of demarcation has not been prescribed for area of zudupi jungle and non forest land which are not notified under Sec 4 of Indian Forest Act, 1927; till date.

1. **Demarcation of the external forest boundaries:** The 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. Whereas, the boundary line of Protected Forests is 2060.90 km, out of this 17.80 km from permanent natural features. The boundary common with Reserved Forests is 283.80 km. as given in **Appendix 1.15**.
2. The Principal Chief Conservator of Forests has approved in May 2001 a demarcation model using a series of concrete pillars. This model as modified, till date, shall be followed for the external boundary.
3. Cement-concrete pillars at bends and corners of the artificial boundaries should be raised immediately after the boundary survey. This work will require substantial fund allocation, as it will need sizeable manpower and resources.

4. **Demarcation of the internal forest boundaries:** Internal boundaries between compartments or those between the Reserve Forests and the Protected Forests may be demarcated using traditional stone cairn, earthen cairn or standard wooden pillar.
5. **Routine boundary maintenance:** The Beat Guard after his personal inspection of the entire compartment must submit the '*Compartment Inspection Certificates*' every month before disbursement of the monthly salary. The certificate must record condition of forest boundaries including pillar numbers and inter-pillar visibility conditions. Separate certificate should be submitted for each compartment. The Round Officer should submit similar certificates for his inspections.
6. The Range Forest Officer should check accuracy of the '*Compartment Inspection Certificates*' according to the prescribed norms covering each round. He should personally check vulnerable compartments other than those covered by the Beat Guards and the Foresters.
7. **Specification of boundary pillars:** The prescribed design must be followed to carry out the task of fixing the boundary pillars as prescribed. According to provisions contained in the BFM Vol. III, Conservator of Forests is empowered to give sanction to the design of the pillars. However, May 2001 instructions referred to as above have given uniform specification for this purpose. Accordingly 1.40-meter long cement concrete pillars at roughly 50 meters interval on the external forest boundaries will be erected. Wherever the external boundary is shared with other government land, the interval should be increased to 100-150 meters and intermediate pillars may be 0.90 meter long. Both types of pillars should be embedded to 0.40-meter depth in the cement-concrete base. The prescribed tapering cross-section of the 1.40-meter pillar is 0.10 x 0.15 meter at the top and 0.15 x 0.23 meter at the base. The 0.90 - meter pillars are parallel pipe with 0.15-meter width and thickness.
8. **Specification of a boundary cairn:** Artificial boundaries should be marked with a series of boundary Cairns. A Cairn should be made of loose stones upon excavated foundation to a depth of 30 (thirty) centimetres and shaped like a truncated cone. A cairn will be 1.20 meter high, and have 1.20 meter top diameter and 1.80 meter base diameter, as described in the *Central Province and Berar Forest Manual*. A slab stone (0.20 x 0.20 x 0.90 meter) or a timber stake projecting 1/2 (half) meter in the centre will be fixed firmly on the top of the cairn, and marked with cairn serial number. Each boundary marks (cairns) must be visible from its neighbouring ones on both sides. Distance between two

consecutive boundary marks should not exceed 250 meters. **The cairn stone or post should be colour washed white for the open forests and red for the closed forests.**

Such Cairns can be made of earthen mass, where stone boulders are not available.

9. **Recording locations of the boundary pillars or Cairns:** The location of the boundary pillars and Cairns along with their numbers should be shown on the maps. The numbers shown on the topo-sheets will be maintained.
10. **Clearance for the boundary line:** Trees should not be felled for the boundary line, but shrubby undergrowth should be cleared. Norm for the external boundary line is *12 meters*. The internal compartment boundary lines should be *3 meter wide*.
11. **Compartment plates:** Metal plates on the boundary trees at a height of 2.5 to 3.0 meters will be fixed on the corners and roughly at half-kilometre interval on the side away from the compartment. The colour of the plate and lettering should agree with the state-level general guidelines. Till such guidelines are available, red letters on white plates will be used. Size of the plate and letters should not be less than *15 cm and 10 cm*, respectively. Strokes should be at least 2 cm wide.
12. **Colour wash on the boundary marks:** The Beat Guard will be responsible for annual freshening of the pillar numbers, the compartment plates and the colour-wash of the boundary pillars carried out in September-October.

20.5 DEMARCATION, PREPARATION OF TREATMENT MAP AND MARKING OF COUPES

20.5.01 DEMARCATION OF COUPE:

1. The annual coupes for the harvesting and tending operations will be demarcated one year in advance, and each coupe, if so required, is proposed to be subdivided into four sections for effective management and control. The Range Forest Officer will thoroughly inspect the coupe after demarcation and issue 'Coupe Demarcation Certificate' in the prescribed format, given in the following paragraph, which is to be verified by the concerned Assistant Conservator of Forests.
2. Format for the Coupe Demarcation Certificate is prescribed, as follows, in Form No. 20.1

Form No. 20.1

"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. 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. 20.2**.

Form No 20.2

List of trees on the coupe boundary

Sr No	Name of species	GBH (OB)	Remarks
1			

5. No tree, bearing the coupe demarcation bands, is proposed to be marked for felling.
6. **DEMARCATIION OF SECTIONS:** For effective monitoring and control of the harvesting operations, each coupe marked for felling in SCI and Improvement Working Circles will

normally be divided into four approximately equal sections. Sections will be demarcated by 1.5 m. wide cut lines by clearing brushwood, unless the section line runs along a permanent feature.

7. Trees above 45 cm girth, selected at suitable intervals on the inner edge of the 1.5 m wide cleared section line will be given two coal tar bands 15 cm apart, the lower coal tar band being at breast height. Just below the lower coal tar band section number will be given on the side away from the area they would denote.
8. **DEMARCATIION OF PROTECTION AREAS:** Selected trees, on the periphery of the *Protection areas* will be given two geru bands 15 cm apart, lower band being at B.H. In addition, a cross in geru colour between the bands will also be given on the side away from the protection areas. All those trees will be serially numbered. The serial number will be given on the side away from the protection area just below the lower geru band, on the side bearing the cross. All the protection areas will be numbered in Roman numerals and the trees standing on the periphery of each protection area will be numbered in Arabic, adopting separate series for each areas, so that the trees on periphery of Protection Area No.I will bear the Sr. no. I/1, I/2, I/3, etc. and the similar trees on the periphery of Protection Area No. II will bear the Sr. no. II/1, II/2, II/3, etc. The protection area will also include sample plot and presentation plot, shown in Red. These are to be excluded from the marking.
9. **DEMARCATIION 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.

20.6 TREATMENT MAP:

1. Immediately, after completion of demarcation of the coupe, RFO will prepare the *Treatment map* of the coupe by clearly showing the various *Treatment-type* areas. The concerned ACF will verify the treatment map and make corrections, if necessary, before submission to the DCF for approval.

The treatment map will bear the date of preparation by the Range Forest Officer and the date of verification by the Assistant Conservator of Forests.

2. Preparation of treatment map will preferably be done one year, in advance, of the coupe working. Timely preparation would facilitate necessary checking and corrections, if any in time.
3. Immediately after seeking approval of the treatment map, site-specific Work Plan for the entire coupe shall be prepared by RFO, verified by ACF concerned and approved by DCF.

20.7 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 20.3

I, RFO, personally inspected the marking of the coupe No. in compartment No of felling series in Working circle on dt..... 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.
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 Siwan 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. 210

XX (Hammer mark)
2
1
0

7. All trees bearing serial numbers will be individually recorded in marking (recording) book in, the following, *Form No 19.3*. Serial number given in coal tar must be recorded in the marking book.

Table No. 20.2 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.

20.8 SOIL AND MOISTURE CONSERVATION:

20.8.01 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.

20.8.02 The soil and moisture conservation works would start along with the marking of coupe and be completed before the onset of monsoon. Wherever feasible, the local material obtained from climber cutting, and shrub clearance shall be used for brushwood check dams to arrest the soil loss.

20.8.03 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.

20.8.04 **Contour Trenching:** Contour Trenching as soil conservation measure could be taken in suitable places with due precautions.

The contour trenching is prescribed in areas having density less than 0.4 and slope below 25°. The size of the trench is prescribed as 30 cm deep and 45 cm wide. Dug up soil from the trenches will form a ridge on the downhill side, and pebbly material from the trench will be neatly pitched on the lower side. *Agave* bulbils, *khus* tussocks and other suitable soil binding species will be planted on the mound at one-meter interval in two staggered rows set 20 centimetres apart on the downhill side. The mound will also have sowing of seeds of *Khair*, *Babhul* and *Neem*, etc. *Chilati* seeds may be preferred on refractory sites.

Trenches near the nala are prescribed to be discontinued and curved upward at both sides of the nala at 45° to prevent the run off of water stored. Contour trenches will normally be not more than 10 meter in length, and two contour trenches will be spaced at least 5 meter apart (horizontal distance).

The quantum limit of contour trenches is prescribed to be not exceeding 300 running meter per hectare in the B-type areas, 600 running meter per hectare in the E-type areas and 100 running meters per hectare in the C-type and the D-type areas.

20.8.05 **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.

20.8.06 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.

20.8.07 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.

20.8.08 The forest tanks (not more than 1 ha submergence area) are proposed to be taken up in exceptional circumstances without causing damage to the tree crop will prove basically helpful for water conservation and abundance of water for wild animals.

20.9 GUIDELINES FOR REGENERATION

20.9.01 Natural Regeneration

Root Stock Management – Preference will be given to encourage natural regeneration considering the existence of sufficient rootstock in majority of areas and its management. Tending of rootstock in the B₁ type 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 shall be removed. Such coppice shoots should also be close enough to the ground so that it will not topple after gaining volume and weight and would be able to develop root system of its own subsequently.
- 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 *more than 60 centimetre 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 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, species, which are less in number in stocking, shall however be given preference. 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 scrape weeding of one-meter diameter should be carried out in the first week of August around the shoots of seedling coppice within the rootstock management area.
- 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.

20.9.02 Artificial regeneration: It has been observed that the soil depth in areas covered under plantation programme in the division generally is very shallow and therefore the efforts made in the past in raising plantations (particularly the miscellaneous plantations) have resulted in failures. Hence, the plantations should be taken up on selective basis and only in the areas having good soil depth and which are well drained. Also the areas selected should have no or negligible grazing pressure. If the area was already planted and resulted in failure, such sites should be avoided. B2 type areas in the various working circles i.e. the understocked areas with scanty natural regeneration are prescribed to be considered but such areas shall specifically be put to above tests before taking up plantation there. Only the areas neither having sufficient seedlings/ saplings of seed origin nor sufficient root stock but are found to be suitable for plantation of miscellaneous species shall be covered under the plantation programme. Two-stage plantation approach is prescribed in refractory sites of B1 & E type areas. The idea is to give the nature a fair chance to regenerate itself and to intervene by way of artificial plantation only as a last resort, whereas in remaining places; one stage plantation is prescribed to fill the deficit of natural regeneration.

20.9.03 Two-Stage Plantation in Afforestation areas: Two stage plantation, that is, the restorative phase followed by planting phase.

Restorative Phase: Restorative phase is proposed to include the soil and moisture conservation works and fencing in the year of coupe operations. Seed sowing of neem, chandan, maharukh and babul will be done in bushes. Planting of Agave on TCM and *Khus* on earthen soil conservation structures will be carried out in the following year. The restorative phase will be judged in the fourth year of the coupe working. Effectiveness of fencing and success of the soil and moisture conservation measures will mark the completion of the restorative phase. All the areas covered under restorative phase shall not be allowed to be switched over in the fourth year to the planting phase. The areas do not have adequate regeneration (600 seedlings per hectare) from rootstock and seed sowing, such areas only will be switched over to planting phase. It shall be applicable only after its evaluation. The areas failing these tests shall not be covered under plantation programme.

Areas having adequate regeneration from rootstock and seed sowing will be tended as described for the rootstock management. PPO/PYO (pre-planting operations) shall be taken up in the fourth year of coupe working, while the seedling planting and other FYO (first year operations) activities shall be carried out in the following year, that is, the fifth year of coupe working. Other plantation works will follow in the sequence. The cleaning and thinning operations in plantations will be done in the sixth and eleventh year of plantations.

20.9.04 One stage plantation in other working circles: Plantations in the remaining working circles will be taken up in the single stage. The PPO/PYO (pre-planting operations) shall be taken up in the year of coupe working, while the seedling planting and other FYO (first year operations) activities shall be carried out in the following year. Other plantation works will follow in the sequence. The cleaning and thinning operations in plantations will be done in the fifth and eleventh year of plantations. The extent of plantation should not exceed the prescribed staff norms.

20.9.05 Choice of species: Valuable local species suitable for the site and favoured by the local village communities will be preferred in plantations. Teak, Shisham, Khair, Sewan, Siras, Chichwa, Aonla, Chinch, Neem and Sitaphal should be considered among the recommended species. Neem, Khair, Aonla, Chinch, Chichwa, Karanj, Siras and Sitaphal may be preferred in areas close to habitation. *Dabergia sissoo* (Sissoo) and *Euclayptus* are not local species, but may be used on suitable alluvial soil. Seedlings of edible fruit-yielding forest species may

constitute up to 20 percent and seedlings of medicinal plants up to 5 percent of the planting stock. Stakes or tall planting of suitable species, such as, *Ficus*, *Umber*, *Bor*, *Anjan*, etc. useful to wildlife are also proposed in plantations, up to 5 percent of planting stock. An officer not below the rank of namely Assistant Conservator of Forests should approve the final choice of species and source nurseries.

20.9.06 Spacing in plantations: Teak stumps from root-shoot cuttings should be planted on well-drained and suitably open sites at three-meter interval (3x3-meter spacing). Teak seedlings raised in poly-pots or root trainer containers can be used in special cases only duly recording the reasons in the prescribed register. Mixed species plantations should be carried out at three-meter interval (3x3-meter spacing), and bamboo seedlings should be planted at six-meter interval (6x6-meter spacing). Care should be taken to avoid planting of seedlings directly under the canopy of existing trees or established saplings.

20.9.07 Fencing of Plantations: The plantation areas or the rootstock management areas are prescribed to be fenced effectively by TCM (Trench-cum-mound) fencing, Live-hedge fencing or suitable mechanical fencing for effective protection. TCM (Trench-cum-mound) of the standard cross section, one-meter deep and 1.90 and 0.60 meter wide at top and bottom, respectively is prescribed. Across the slope, however, rubble wall is proposed in place of TCM. Boundaries of the plantation areas or the rootstock management areas running across the contour or artificial boundaries inside the compartment are prescribed to have live hedge fencing on 1.20-meter wide ridge of worked up soil. Two rows of *Agave* will be planted at the outer edges along with seed sowing of *Chilati*, *Babul*, *Jatropha*, and other local thorny species immediately after onset of the monsoon. The mechanical fencing, if found financially viable, may be used in areas prone to heavy biotic pressure, if the situation so demands. Justification for use of mechanical fencing should be recorded in the prescribed plantation register.

20.9.08 Pit digging: Pits of size, preferably, 30-cm³ for planting seedlings of non-teak species and 45-cm³ sides for bamboo planting are prescribed. The dug up soil will be kept on the upper side of the slope, and allowed to weather from March to the first week of May. Pit refilling must be completed before the onset of monsoon. Pits for bamboo planting shall be half filled during the refilling using topsoil from the heap.

PLANTING

20.9.09 Planting of teak stumps: Crowbar planting of teak stumps must be carried out within one week after the first monsoon shower.

20.9.10 Poly-pot or root-trainer planting: Seedling planting must be completed within a fortnight after the first monsoon shower.

20.9.11 Bamboo planting: Bamboo planting must be completed within a fortnight after the first monsoon shower. Preferably, two-year-old bamboo seedlings with well-developed rhizomes should be planted. If stone mulching is feasible in the area, the pit should be refilled up to the ground. Otherwise, the ball of the earth and rhizome of the seedling should just be covered with soil and almost half of the pits should be left unfilled for reducing wild boar damage.

20.9.12 In view of significance of bamboos in day-to-day life of local people and suitability of large chunk of forest areas in the division for bamboo propagation; the arial seeding of bamboos may be taken up after exploring its feasibility. Similarly, rhizomes multiplication method is proposed for bamboo propagation. The bamboo plants that are proposed to be undertaken under various working circles has been quantified in **Table 23.3 (a) and (b)**.

Subsequent planting operations

20.9.13 First year operations: All weeding and soil working should be carried out in a circle of one-meter diameter around the seedlings or saplings. The first scrape weeding should be started immediately after completion of the entire plantation and appearance of weed growth. Casualty replacement should be done along with the first weeding in July. The second scrape weeding should be done in the last week of August. The soil working and mulching should be done in the first week of October. In case of, prolonged hot and dry season, it is desirable to carry out one soil working in the month of January.

20.9.14 First year operations in bamboo plantations: The first weeding, casualty replacement and the second weeding should be carried out as described in the preceding paragraph. Stone mulching should also be carried out with the second weeding in bamboo plantations as a safeguard against the wild boar damage. The third weeding and soil working operations are not required in the bamboo plantation.

20.9.15 Second year operations: In the second year of plantation, casualty replacement should be done in the planting season. The first scrape weeding should be carried out in the first week of August, and the soil working and mulching should be done in early October. The first and second weeding should also be carried out around the seedling coppice in the plantation area.

20.9.16 **Second year operations in bamboo plantations:** The first weeding should be done in the first week of August, and it should include maintenance of the stone mulching in the bamboo plantations.

20.9.17 **Third year operations:** One weeding in the third year should be done along with the soil mulching in September. Singling of coppice shoots, management of damaged and malformed saplings, climber cutting and shrub clearance should be repeated as third year operations.

20.10 PERIODIC APPRAISAL OF REGENERATION BY STAFF

20.10.01 The regeneration of the species in the forest area should be monitored in 2 years periodically, by territorial division and their findings be sent to Working Plan Division.

20.11 THINNING GUIDELINES

20.11.01 **Definition:** Thinning is defined as a felling made in an immature stand for the purpose of improving the growth and form of the trees that remain, without permanently breaking the canopy. Thinning is chiefly concerned with promoting good growth in the stems that are retained.

20.11.02 **Special objectives in thinning:** Plantations are made with various objects in view; and thinning methods have to be varied accordingly. The maximum volume production (in a given form) is generally an objective. Plantation work is expensive and it may be desired to get some return as soon as possible; however, in this case, thinning will aim at giving some of the trees the adequate room they can utilize, thus ensuring rapid diameter growth. Plantations are all too often made in an attempt to minimize a foreseeable shortage of timber consequent on the too rapid exploitation of the mature stock of natural forests.

20.11.03 **Observable Factors as the basis for Thinning Procedure**

(a) **Tree classification:** To describe the nature and intensity of a thinning, there is a choice between qualitative and quantitative methods; the former being almost mainly subjective. The older procedures were all of former category, as would be expected from the fact that the latter calls for standards of reference which are still only available for a few species. The individual trees in a crop were classified by height and size of crown, whilst the thinning prescriptions laid down which classes were to be removed. The standard adopted is, as follows:

- I. **DOMINANT TREES (D):** All trees which form the uppermost leaf canopy and have their shoots free. These are usually subdivided as follows:

- (1) Pre-dominant trees comprising all the tallest trees which determine the general top level of the canopy, and
- (2) Co-dominant trees which fall short of this, averaging about $5/6$ of the height of predominant.
 - (a) Trees with normal crown development and good stem form.
 - (b) Trees with defective stems or crowns, e.g. :
 - 1) Trees with crown space cramped by neighbouring trees,
 - 2) Badly shaped old advance growth,
 - 3) Trees with forked leader and similar defects
 - (c) Trees with very defective stems or crowns, i.e. with same defects as (b) to such an extent that they are of little or no present value or promise.
 - (d) Whips -Trees with very thin bole and very constricted crown incapable of existence without the support of the neighbouring tree
- II. DOMINATED TREES (d): These trees do not form part of the upper most leaf canopy, but the leading shoots of which are not definitely overtopped by the neighbouring trees. Their height is about $3/4$ that of the tallest trees.
 - (a) Trees with normal crown development and good stem form.
 - (b) Trees with defective crowns or stems.
- III. SUPPRESSED TREES (s), which reach only about $1/2$ to $5/8$ of the height trees, with their leading shoots definitely over-topped by their neighbours or at least shaded on all sides by them.
- IV. DEAD AND MORIBUND TREES (m). This class also includes bent over and badly leaning trees usually of the whip type.
- V. DISEASED TREES (k): This class includes those trees which are infected with parasites to such an extent that their growth is seriously affected or that they are a danger to their neighbours.
 - (a) Dominant.
 - (b) Dominated and suppressed.

THINNING METHODS

20.11.04 **General considerations:** Thinning is proposed to be carried out in plantations and patches of dense pole crop and, by doing it, average spacing is to be maintained at one-third

of the crop height. The post-thinning crop should have basal area and number as close to the relevant stand or yield table for that site quality as possible.

- It is prescribed to be carried out in the plantations having at least 50% survival at the time of thinning.
- The first mechanical thinning shall be carried out in the 11th year of the coupe working and Subsequent thinnings in 15th, 25th, 35th year and so on till the 65th. Subsequent thinnings will be of silviculture in nature. By this time such areas are expected to merge with the adjacent natural growth.
- All thinnings will be done either at the beginning or at the end of the growing season.

20.11.05 **Mechanical Thinning:** There may accordingly be little objection to provide extra growing space by the mechanical removal of complete lines of plants, or every alternate plant subject to provision to cover cases of local gaps. Where spacing is irregular, the “stick” method used in natural regeneration is a possibility whereby one tree of every pair of adjoining trees is removed if the distance between them is less than a prescribed length.

(i) This method is followed in teak plantations for the first and less commonly for the second thinning. Each operations removing 50% of the original planting lines reducing the number of plants to 1/2 in each operation. For instance, in case of 2 x 2 spacing, number of plants will reduce from 2500 to 1250 and then 625 per hectare and increasing the spacing from 2 m x 2 m to 4 m x 4 m. In case of 3 m x 3 m spacing, as proposed in this plan, number of plants will reduce from 1111 to 556 and then 278 per hectare and increasing the spacing from 3 m x 3 m to 6 m x 6 m.

(ii) It is usually provided that where there is a gap in the retained line, an adjoining plant in the cleared line should be retained.

(iii) This method is only practicable where casualties are very few and growth is both good and even under such conditions but it is out of question in poor or uneven plantations.

(iv) It is not suitable for mixed plantations. However, in rare cases, similar operation may be done in mixed plantations where one species has been introduced essentially to help cover the ground quickly and its removal or cutting back is necessary in the interest of the major species.

(1) Silvicultural Thinning: Alternatively, thinning may be selective, the case for removal or retention being considered for each tree in turn according to a set of rules drawn up for

the purpose. This is the most usual procedure even where additional checks are applied, being often described as a “*silvicultural*” thinning.

A. Technique for silvicultural thinning in Teak Plantation

- 1(A) First off all the teak site quality of the area in respect of the each section shall be determined and recorded in the register maintained for the plantations. The site quality shall be determined from the table showing “Top Height by Site Quality and Age” after calculating average “Top Height” based on the measurements of height of several dominant teak trees per ha in the crop. If difference in site quality is noticed, then the delineation of patches on the ground according to site quality should be done and the same be shown on the map in the manner as it is done while doing stock mapping of any forests.
- 1(B) By the method of point sampling, the existing average of basal area per ha for each section shall, then, be measured by using a wedge prism of suitable Basal Area Factor (BAF). A wedge prism of BAF where least counts 0.5 sq m per ha can be used. If the difference in basal area per ha measured at different points in the section is high (say more than 2 sq mtrs), then the delineation of patches has to be done for giving required treatment to the crop accordingly. Arranging in such cases should be avoided.
- 1(C)(I) Section wise average basal area per ha so measured should then be comprised with the figures contained in the yield table in respect of that site quality and age.
- 1(C)(II) If the actual basal area measured exceeds the basal area as prescribed in yield table for that site quality and age, then it would indicate the need for thinnings in the crop necessitating the removal of basal area to the extent the actual basal area exceeds the basal area prescribed in the yield table. If it equals or falls short, then it would indicate that no thinning is needed in the crop.
- 1(C)(III) After averaging the test as mentioned in sub para II above, if the crop needs thinning, then the thinnings should be carried out keeping in view the distribution of stems per ha in various girth classes as contained in the stand table (main crop) for that particular site quality and age, provided that all past thinning have been done according to the parameters contained in the yield table.

- (2) **Thinning Schedule:** The other possibility is to be guided by thinning schedule which lay down the number of stems that should remain standing after thinning according to various criteria of dimensions, site quality and/or age. Such criteria should ideally be based on a wide range of growth studies to reveal the development to be expected to take place under the conditions concerned.

TYPES OF THINNING

(a) ORDINARY THINNING

(i) The most usual method has been to view each tree in relation to its neighbours, and to remove those which appears already to have shown their inferiority by dropping behind, taking first the suppressed trees, then the dominated ones, and finally some of the dominants with restricted or, otherwise, inferior crowns. As this method begins with the removal of the lowest canopy class and then works upwards, it has been called *Low thinning*, but it is now known, on account of its widespread application, as *Ordinary Thinning*.

(ii) The smaller dominated and suppressed trees are usually removed, they may be retained as soil cover and as insurance against casualties among the larger trees standing over them.

(iii) Most foresters tend, at first, to thin very lightly corresponding to something between B and C grades, after experience however they mark heavily up to a full C-grade and D-grade. The term 'heavy thinning' implies the C-grade thinning.

(b) The standard grade of ordinary thinning:

(1) **Light thinning (A-grade):** This is limited to the removal of dead, dying, diseased and suppressed trees, i.e. classes V, IV and III. Grade A is of no practical use, it serves as the initial stage, especially, in comparative research on the effect of thinning on increment.

(2) **Moderate thinning (B-grade):** This consists in the further removal of defective dominated stems and whips. Branchy advance growth which it is impracticable or not desirable to prune may also be taken, i.e. classes V, IV, III, II(b) and I(d) and an occasional I(c). B-grade is also of little use in practice, due to its having little influence on the increment of the remaining stems.

(3) **Heavy thinning (C-grade):** This consists in the further removal of the remaining dominated stems and some defective dominants without making lasting gaps in the canopy, i.e. classes V, IV, III, II and I(b), (c) and (d).

(4) **Very heavy thinning (D-grade):** It consists further removal of some of the good dominants, subject to the condition of not making any lasting gap in the canopy. The trees for removal are selected in such a way that the remaining crop consists of trees, with good boles and crowns, well and evenly distributed over the area, and with space for further development, i.e. classes V, IV, III, II and I(b), (c), (d) and some I(a). If their removal is of no economic or hygienic value, class V, IV and III trees are not removed, in heavier grades.

(5) **Very very heavy thinning (E-grade):** For research purposes it has been found desirable to make ordinary thinning even heavier than the standard D-grade. It prescribes removal of more of the dominant stems even in class I(a), so that all retained have ample room for further development. It goes as far as possible within the rule for avoiding permanent gaps in the canopy.

(6) It is often inadvisable to make a full C-grade or D-grade thinning in a dense crop in which thinning has been unduly delayed. The first thinning in such cases should be lighter than is ultimately intended.

CROWN THINNING: This method of thinning looks first of all to the dominants, and removes such of them, beginning with the least promising individuals, as are hindering the development of the best individuals. Due regards are paid to obtaining as even a distribution of good dominants over the area as possible. It requires special skill and acumen in carrying it out.

(a) Grades of Crown Thinning: Only two grades of crown thinning have been standardized; they are defined as follows:

(1) **Light Crown Thinning (LC - grade):** This consists in the removal of dead, dying and diseased trees, with such of the defective, after them the better dominants, as are necessary to leave room for the further development of the best available trees evenly distributed over the area, i.e. classes V, IV, I(d), (c), many of I(b) and few of I(a) but not III and II. This is similar to D-grade ordinary thinning, but retains all III and II, and is not quite so heavy on I.

(2) **Heavy Crown Thinning (HC- grade):** This grade pays even more attention to favouring the selected best stems by removing all the remaining I(b) which can be taken without creating permanent gaps, and more of I(a), i.e. classes V, IV, I(d), (c), most of I(b), some of I(a); but not III and II.

(3) Crown thinning is well adapted to moderately shade-tolerant species in which the retention of the lower canopy presents no difficulty.

20.12 ROADS, CART TRACKS AND CULVERTS

20.12.01 The forest areas of the division have a good network of roads and cart tracks. The Public Works Department of the state government or the Zilla Parishad maintains large number of roads passing through the forest area. Some stretches have been permanently transferred to the Department. The division should compile a comprehensive records for all roads passing through the forest area and the roads transferred to the division for maintenance, on priority basis.

20.12.02 The extent of forestry operations and gravity of forest protection concerns should determine the priority for maintenance of the forest roads.

20.12.03 Unwarranted up-gradation of the forest roads should be discouraged, but required culverts may be constructed in stretches useful for the forest protection

20.13 HARVESTING AND DISPOSAL

20.13.01 **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.

20.13.02 **Disposal at timber depots:** Harvested timber and firewood are prescribed to be transported to the established forest depots for sale by auction or allocation according to the prevailing policies and guidelines. The National Forest Policy, 1988 acknowledges the first charge on the forest produce in the local tribal and village community living in and around the forest areas. Hence, decision for the disposal of the forest produce should be guided by the philosophy of the first right of the local village communities, which is also recognised in the nistar patraks. For facilitating *nistar distribution*, temporary depots can be created at the Range Headquarters, in addition to beat and round headquarters.

20.13.03 **Stacking for the nistar supply:** Each established or temporary depots is prescribed to have designated areas for stacking small timber, poles, firewood and bamboo for the nistar supply at the sanctioned rates to local people including agriculturists and artisans. The Deputy Conservator of Forests can approve additional nistar depots at suitable places in the division, so that villagers may not be required to traverse large distance to procure the nistar materials. The Deputy Conservator of Forests in consultation with the District Collector fixes the nistar rate. Supplies of small timber, firewood etc. as well as the forest produce required for occupational nistar will be governed by nistar partak of each village (also refer to para 1.9 of chapter I in this regard). Availability of the nistar material will to be informed to the

Taluka Panchayats and the material left unused for three months will be sold through open auction.

20.14 IRREGULAR HARVESTING

20.14.01 **Restriction on irregular harvesting:** Irregular harvesting of timber, firewood and other NWFPs is prohibited, except in the following cases:

20.14.02 **Harvesting for the fire lines and the transmission line:** The Deputy Conservator of Forests may permit felling of herbs, shrubs, thorny bushes, within the prescribed width of the established fire lines and the approved power transmission line. The prescribed width in the guidelines for the Forest (Conservation) Act, 1980 and rules, there under, will be applicable to the transmission lines.

20.14.03 **Harvesting in forest areas diverted for non-forestry purposes:** Felling of trees on forest land required by the other departments such as Irrigation, PWD, etc., will only be undertaken after the proposals for the use of forest land for non-forest purposes are approved by the Government of India under the provisions of the Forest Conservation Act, 1980. 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 off as regular coupe material.

20.14.04 **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 and mark accordingly. 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.

20.14.05 No irregular harvesting for the purpose of undertaking plantations/afforestation works under schemes outside the scope of this working plan will be taken up in any of the areas under the working plan.

20.15 MAINTENANCE OF THE FOREST LAND RECORDS

20.15.01 **Maintenance of the land records and forest maps:** The forestland records and the forest maps will be brought up to date, and maintained as such. A certificate to this effect will be recorded annually in the Form No 1- Register during the month of June.

20.15.02 **Forest notification:** Unclassified 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 (Protection) Act 1927.

20.15.03 **Reconciliation of the revenue records:** The revenue records will be reconciled on the basis of the forest notifications. The Collector and the Deputy Conservator of Forests will jointly ensure that the Revenue Records are brought up to date according to the forest notifications. Since the Divisional Commissioner issues the forest notifications, there is no apparent need to issue separate orders for the mutation entries. The Revenue Department will provide a certified copy of the Records of Rights to the Wardha Division to mark completion of the process.

20.16 DIGITAL DATABASE :

20.16.01 Working Plan Division, Nagpur has scanned all primary records i.e. toposheets (1:50000, 1:15840) and village maps (1:5000 scale). All these forest maps of different scale have been converted in to digital form to bring uniformity and they are stored in CDs. These CDs are available at Conservator of Forests, Working Plan Division, Nagpur to supply to territorial division subject to procurement of relevant software to open these CDs, at their cost. This will be helpful for division to generate; compartment map, beat map, round and range map.

20.17 Permanent Nursery and Central Depot :

20.17.01 The central nurseries will be used for producing bamboo rhizomes and teak stumps; and non-teak seedlings in poly-pots or root-trainers as required for the plantations. The central depots will be used for sale of timber and bamboo by public auctions. These areas will be strictly protected from fire.

Chapter XXI

THE ESTABLISHMENT AND LABOUR

21.1 THE ESTABLISHMENT

21.1.01 The recent range, round and beat reorganisation during 2000-2001 is based on the policy of separating protection and development functions at the range-level. However, operational details of two functional units are still evolving and the arrangement is under transition phase and hence a new proposal incorporating 8 ranges, 40 rounds and 198 beats has been submitted to the government in the year 2003. It needs to be approved. It has been presumed that the division has adequate staff strength for implementation of provisions of this plan.

21.1.02 The division has a cadre of 150 'Van Majoor's' and 145 temporary labours, whose nature of duties changes quite frequently. Hence, it is recommended that the Deputy Conservator of Forests should identify and assign their services to different schemes for efficient utilisation of their services. A major proportion of the Forest Labourers are engaged in execution of plantation, fire protection.

21.1.03 Adequate education and health facilities are usually not available at the beat and round headquarters in the interior areas, and majority of the field staff keep their families at a different stations. These conditions demand special efforts for the staff welfare programme. Sufficient facilities should be provided for quality education to the minor children of the field staff.

21.1.04 Skill up-gradation training or exposures on various aspects of forest management such as nursery management, plantations management and organising and managing coupe operations like marking, felling, logging, etc. are proposed for the staff to improve their efficiency as well as keep them fully toned and abreast.

21.1.05 Training in GIS is necessary for field staff up to RFO level, so that GIS maps and data which is generated by the working plan office can be properly used by the field staff for preparation of round, beat, coupe maps and even treatment maps. This sort of training can be imparted by working plan office, provided, necessary funds given by territorial division and territorial staff be sent to working plan division regularly for this purpose.

21.1.06 Trainings of field staff and village communities, in collaboration with NGOs, is essential and is proposed for NWFPs collection, grading and value addition mechanisms to upgrade their skill in NWFPs management.

21.2 LABOUR REQUIREMENT

21.2.01 Most of the schemes have provision on labour welfare. As per provision the expenditure shall be incurred on labour welfare programme in concerned villages by involving local communities.

21.2.02 Different forestry operations require 218765 mandays each year. Temporary manpower shortage may be experienced in Wardha division during the paddy transplanting and harvesting seasons. However requirement of labourers can be met from Tahasil office.

21.2.03 Sometimes labours from adjoining districts come to the area for tendu collection and other forestry works. Care should be taken to ensure adequate employment availability to the local people. The Forest Labourer Co-operative Societies (FLCS) often engage large manpower of non-members in coupe working allotted to the Societies.

21.3 BUILDINGS

21.3.01 The problem of accommodation is acute, as the existing buildings are not sufficient to house all the staff, especially the field staff. Many residential quarters for the Forest Guards and the Foresters working in the field are in poor conditions, and many beat and round headquarters do not have residential facilities. The field staffs are forced to occupy private accommodation. Although a number of buildings were constructed under the Maharashtra Forestry Project, 77 residential buildings are required in the field, especially, in the interior locations. Sufficient funds should be made available for the maintenance and construction of buildings in the field. Funds will also be required for developing eco-centres and camping facilities for eco-tourists as prescribed in the chapter of Wildlife Management (Overlapping) Working Circle.

21.4 WATER SUPPLY

21.4.01 The availability of water for drinking as well as for agriculture depends mainly on the pattern of monsoon. Whenever the rainfall is scanty, water scarcity is experienced throughout the division. Adequate arrangements shall be made to supply drinking water to staff, especially,

at the interior places. The existing nursery sites are near the perennial water sources. The new nursery sites, if required, shall be selected near the perennial water sources.

21.5 METEOROLOGICAL OBSERVATIONS

21.5.01 Since meteorological observatories are in existence in all the Talukas and the district headquarters, there is no need for a separate observatory for the department. However, record of the rainy days will be maintained in each plantation register.

Chapter XXII

CONTROL AND RECORDS

22.1 DEVIATION PROPOSALS AND PROCEDURE FOR OBTAINING SANCTION

22.1.01 All the deviation proposals require sanction as per process and guidelines of Government of India. Application for sanction to such deviation shall be submitted sufficiently, in advance, so that it may be obtained as far as possible before the deviation occurs; and without fail before the annual list of deviations is submitted along with the Control Forms.

22.1.02 Provisions of the Forest (Conservation) Act, 1980 and directives of the Central and the State governments, in this regard, including those with respect to deviations from prescriptions of approved working plans, must be strictly followed.

22.1.03 The Deputy conservator of Forests will forward through the Chief Conservator of Forest (Territorial), typed copies of the form given in Table 22.1 in triplicate yearly along with coupe control forms to Addl. Principal Chief Conservator of Forests (Production & Management), MS, Nagpur through Chief Conservator of Forests (Working Plan), Nagpur. No explanatory remarks are required on this form but these should be given in the forwarding letter. One copy of the statement will be returned to the DCF and another to the Chief Conservator of Forest (Territorial), after the deviations have been sanctioned by the PCCF. If the PCCF or the Working plan Conservator's sanction has been obtained in advance, the sanction number and date should be quoted in the last column. (as per National Working Plan Code 2004)

Table 22.1 Statement showing Deviations from Working Plan prescription

Year Division

Serial No of deviation	Control book names, form no, Page no.	Reference to working plan		Nature of deviation requiring PCCF's sanction
		Paragraph	Nature of Prescription	

22.1.04 All deviation, which permanently alter the basis of management laid down in working plan, will require prior sanction of the PCCF but before sanctioning the major deviations, he will obtain prior approval of the Regional CCF of the Ministry of Environment and Forests. All deviations, which do not permanently alter the basis of management and with the necessity of which he agrees, may be approved and sanctioned by the Working Plan Conservator on behalf of

the Principal Chief Conservator of Forests, Maharashtra State, Nagpur. In case where there is difference of opinion between the Working Plan Conservator and the Territorial Conservator, the former will refer them to the PCCF for instructions. The PCCF/CFWP, as the case may be, will countersign the deviation statement.

22.1.05 Minor deviations can be sanctioned at the level of the CF Working Plan or the PCCF as the case may be; but the PCCF, before sanctioning the major deviations of following nature, will necessarily take prior approval of the Regional CCF of the Ministry of Environment and Forests:

- (i) change in Silvicultural System;
- (ii) clear Felling of Natural Forest;
- (iii) formation of new Felling Series; and
- (iv) large scale felling due to natural calamities, which cannot be adjusted against future yield.

22.1.06 **CRITERIA AND INDICATORS OF SUSTAINABLE FOREST MANAGEMENT**

The Govt. of India, the State Govt, and IIFM - Bhopal are in the process of finalizing the criteria and indicators for monitoring and evaluation of Sustainable Forest Management. As and when these are finalized, the monitoring and evaluation of implementation of the *working plan* will be done accordingly.

22.2 CONTROL AND RECORDS

22.2.01 The following records are prescribed to be maintained in the division office:

- **Control Forms**
- **Compartment History Forms**
- **Plantations and Nursery Registers; and**
- **Divisional Note Book**

22.2.02 **Control Forms:** The records of harvesting, subsidiary silvicultural operations, regeneration works and soil and moisture conservation works carried out as per working plan prescriptions, will be maintained in the Control Forms. Details are given in **Appendix 22.1**. The control forms shall be submitted by DCF to the territorial CCF on or before December 1 and latter should send them to Working Plan Conservator of Forests, concerned on or before January each year.

22.2.03 **Compartment History:** The Compartment History Forms are the significant documents, keeping the records of past management practices and their effect on the growing stock. It is, therefore, prescribed that the division office must maintain the updated compartment history in, the following, **standard Forms I to V.**

Form 1 Descriptions of the Compartment - To be filled by WPO

Form 2 Compartment Enumeration - To be filled by WPO

Form 3 Trees Marked Felling - To be filled by DCF

Form 4 Compartment Out-turn - To be filled by DCF

Form 5 Compartment History

Each compartment must have a separate file for its records. File, while one set each will be sent to the Working Plan Division and the concerned Range Forest Office, in the month of August. Format of compartment history Form 1 to 5 are given in **Appendix 22.2.**

- If compartment history with full entries already exists, past entries made by the DCF will be scrutinised by the WPO who may edit them if necessary. Usually no condensation should be necessary.
- The DCF is responsible for recording current events as they occur and will make his entries on the separate sheet of the form and not on that prepared by the WPO. At the next revision of the plan, the WPO will scrutinise these entries and edit them if necessary.
- The principal information, which the DCF should record, is as follows:
Felling, Subsidiary Silvicultural operations, Slash Disposal with costs, Plantations, Control Burning with costs, Fire incidences and damage caused, Damage by other factors like Drought, Storm, Snow, Insect, Fungi, Grazing, etc., Remedial measures taken along with costs, Good seed or seedling years of important species.
- The entries should be brief and concise; whole or part compartment that was involved should be made clear. For event timings - month or months - should be given.

22.2.04 **Plantation Register and Nursery Register: Plantation Register and Nursery Register:** The Plantation Registers are prescribed to be maintained for all the areas regenerated artificially in the Form Nos. 1 to 9 as given in **Appendix 22.3.** Plantation Registers must show dates of the rainy days and survival count. The Nursery Registers are prescribed to be maintained in Form No. 1 to 10 as given in **Appendix 22.4.**

22.2.05 **Divisional Note Book:** The matters of the divisional importance will be recorded in the Divisional Note Book under standard heading for records and ready reference. The standard format of the Divisional Note Book is given in **Appendix 22.5**.

22.3 MAPS

Survey and Digital database

22.3.01 Maps are an essential ingredient of Forest Management. All maps are updated, revised and prepared in digital database. The different categories of maps and their scale are as under:

Divisional maps:

Stock maps: 2 sets 1:50,000 (2 uncut and unmounted) 1 for DCF(T) and 1 for CF(WP)

The *Stock Maps* show the compartment boundaries, density, site quality, and other stocking details, including nature and composition of crop

Management maps: 1:50,000 (2 uncut and unmounted) 1 for DCF(T) and 1 for CF(WP)

7 copies (cut and mounted) can be replicated and sent to territorial circle, division and all ranges of the division.

The *Management Maps* show the coupes, compartments, felling series, working circle, ranges and other management details.

22.3.02 Working Plan Map 1:15,000 scale (cut & mounted). Working plan map shows working circles, felling series, coupes, compartments and management administrative and physiographic features.

22.3.03 **Reference maps:** The reference map is a miniature mix of working plan and management maps. The reference map on 1: 250,000 scale, showing range boundaries, compartments, working circles, felling series, roads, canal, forest rest houses and other prominent reference features is enclosed with the working plan.

Chapter XXIII

FINANCIAL FORECAST

23.1 COST OF THE PLAN

23.1.01 The cost of preparing this plan is worked out by summing the expenditure incurred from 2003-04 to 2004-05 that amounts to 44.67 Lakhs including the cost of enumeration works carried out by SOFR unit, Chandrapur. The cost of plan per hectare worked out is about 47.96 rupees only.

23.2 COST - BENEFIT ANALYSIS:

23.2.01 **Intangible Benefits:** It is an acknowledged fact that forests ecosystems have both the tangible and the intangible benefits to the mankind. They contribute to a great extent in term of intangible benefits. However, it is not easy to assign economic value to the intangible effects of the forests ecosystems. Professor T M Das (1980) has quantified the environmental services, provided by a medium sized tree of 50 tons over a period of 50 years, by assigning notional values by using surrogate market techniques, as given in the **Table 23.1** (Proceedings of the Indian Science Congress, 1980).

Table 23.1 Environmental benefits derived from a medium sized tree of 50 tons during its 50 years life span (excluding the value of Timber, Fruits and Flowers)

Sr No	Environmental benefits	Single tree (Lakhs)	Forest Type	
			Tropical (Lakhs / ha)	Sub-tropical (Lakhs / ha)
1	Oxygen Production	2.50	22.50	20.50
2	Conversion to Animal protein	0.20	1.80	1.64
3	Control of Soil Erosion	2.50	22.50	20.50
4	Recycling of Water & control of humidity	3.00	27.00	24.60
5	Shelter for Birds, Squirrels, Insects, Plants	2.50	22.50	20.50
6	Control of Air Pollution	5.00	45.00	41.00
	Total	15.70	141.30	128.74

23.2.02 Thus, according to Das, one hectare of subtropical forests accrues, environmental benefits of worth Rs.128.74 Lakhs over a period of 50 years i.e. benefits of worth 2.60 Lakhs per hectare per year.

23.2.03 Well stocked forest of average density 0.5 extend over an **area 24221 ha**. Its intangible benefits accrue @ of 2.60 lakh per ha per year for worth of Rs 31487.30 lakh. Dense forest area of Wardha division of average density 0.7 extends over an **area 27740 ha**. Therefore, its intangible benefits are worth Rs 50486.80 lakh. So sum total of intangible benefits of Wardha division is 81974.10 Rs per ha per year.

23.2.04 **Tangible Benefits:** The tangible benefits accruing from forests is, however, computed in economic terms from various goods and services ensuing from forests. The estimation/forecast of timber, poles, fuel wood, bamboos, tendu, gum and other non-wood forest produce accruing from forests is made with reasonable accuracy with the help of yield regulating formulae. In this Plan, major yield of wood will be obtained from the SCI Working Circle. Improvement Working Circle may contribute in form of small timber, fuel and teak beats, to some extent.

23.2.05 The estimated future annual yield and revenue, as part of the tangible benefits derived from the forests, has been given in Table 23.3 (b). The abstract of tangible benefits and costs as a result of this plan is given as follows:

<i>Annual estimated expenditure for the prescribed operations</i>	= 756 Lakhs
<i>Annual estimated revenue from the forest,</i>	= 926 Lakhs
<i>Annual intangible benefits</i>	= 81974 Lakhs
<i>Total benefits accrue from forests of Wardha Division</i>	= 82900. Lakhs per annum
Cost- Benefit Ratio is	756 Lakhs : 82900 Lakhs

Or 1 : 110

Thus, the above Cost-Benefit Ratio favours the scientific management of forests, as prescribed, in this Working Plan.

23.3 REVENUE

23.3.01 Scientific management of forest permits removal of some trees from some of the working circle as per the prescription of the plan. The major yield obtained from Selection-cum-Improvement working circle. Improvement working circle also contributes to yield. The yield from Afforestation and Rootstock Management working circle, Grass and Fodder Resource Management and Protection and Catchment Area Management working circle will be negligible.

Yield from thinning has been included under total yield. Among the MFP Tendu will be major produce.

23.3.02 As there is no natural bamboo found in the area as well as plantations of the bamboo in the past are failed. Hence no revenue is obtained from the bamboo during the operation of the plan. The accurate forecast of revenue is not possible as the prices of timber, fuel wood and other forest produce are increasing day by day.

23.3.03 The comparison between revenue estimated in previous plan, actual receipts in previous plan and expected per annum revenue from the sale of various forest produce in current plan is given in table 23.2.

Table 23.2

Sr No	Forest produce	Average Revenue in lakh per annum		
		Estimated in Dr Nand Kishore's plan	Received during Dr Nand Kishore's plan	Estimated in present plan
1	Timber including poles	438.97	690.95	761.40
2	Fuel wood	48.41	57.88	65.25
3	Fodder grasses	1.00	1.48	1.80
4	Tendu leaves	75.00	88.83	90.15
5	Other MFPs	1.00	1.30	2.45
6	Misc.	5.00	5.70	6.24
	Total	569.38	846.14	927.29

23.4 FINANCIAL FORECAST

23.4.01 The norms used for the financial forecasting are given in **Table 23.3**. Estimated annual work and area to be generated during the plan is given in the **Table 23.4 (a)** and estimated annual expenditure has been given in the **Table 23.4 (b) and 23.4 (c)**. Scheduled operations are prescribed in **Table 23.5**.

Table 23.3 Daily wage rate used for calculations = Rupees 69.65 per day (Rounded to Rs.70)

Sr No	Particulars of work	Unit of work	Mandays/ unit	Labour component (in %)	Amount/ unit (Rupees)
1	Demarcation and marking	Hectare	4.5	90%	346.5
2	Singling of coppice shoots, etc.	Hectare	1	96%	72.8
3	Soil and moisture conservation				
	Continuous Contour Trenches	meter	0.085	96%	6.20
	Gully plugging (nala bunding)	Cubic meter	0.92	96%	66.976
4	Coupe working				
	Timber harvesting	Cubic meter	9.5	75%	831.25
	Firewood extraction	Stacks(2x 1x1.20)	3.5	80%	294
	Long Bamboo	No.	0.06	80%	5.04
	Bamboo bundles	No.	0.12	80%	10.08
5	Removal of wind fallen				
	Timber	Cubic meter	9.5	75%	831.25
	Fuel	Stacks(2x 1x1.20)	4.5	80%	378
6	Thinning	Cubic meter	9.5	75%	831.25
7	Cutback Operations	Hectare	6	96%	436.8
8	Cleaning	Hectare	8	96%	582.4
9	Natural Regeneration				0
	Nursing of seedling and coppice management	Hectare	10	96%	728
10	Mixed Plantation				
	Live hedge fencing	Hectare	43	85%	3461.5
	Planting & sowing on live hedge fencing	Hectare	2	75%	175.14
	PPO/PYO (excluding fencing)	Hectare	88	96%	6406.4
	PPO/PYO (including TCM)	Hectare	129.81	96%	9450.17
	FYO (First year operations)	Hectare	114.47	77%	9855.867
	SYO (Second year operations)	Hectare	55	97%	3965.5
	TYO (Third year operations)	Hectare	41.29	100%	2890.3
	4th Yr (Fourth year operations)	Hectare	15.6	100%	1092
	5th Yr (Fifth year operations)	Hectare	15.6	100%	1092
11	Bamboo Plantation				
	PPO/PYO (including fencing)	Hectare	64.5	90%	4966.5
	FYO (First year operations)	Hectare	34.65	90%	2668.05
	SYO (Second year operations)	Hectare	20.77	93%	1555.673
	TYO (Third year operations)	Hectare	16.53	93%	1272.81

Sr No	Particulars of work	Unit of work	Mandays/ unit	Labour component (in %)	Amount/ unit (Rupees)
12	Plantation (Teak)				
	PPO/PYO (including fencing)	Hectare	77.88	96%	5669.664
	FYO (First year operations)	Hectare	77.17	78%	6590.318
	SYO (Second year operations)	Hectare	42.2	98%	3013.08
	TYO (Third year operations)	Hectare	17.6	100%	1232
	4th Yr (Fourth year operations)	Hectare	15.6	100%	1092
	5th Yr (Fifth year operations)	Hectare	15.6	100%	1092
13	Maintenance				
	Road	Kilometre	38	95%	2793
	1/5th boundary demarcation	Kilometre	7	80%	588
14	Fire protection	Kilometre	6.5	96%	473.2
15	Training for NWFP collection	Round	30	50%	3150
16	Wildlife habitat improvement	Round	20	75%	1750
17	Fixing boundary pillars	Kilometre	70	30%	8330
18	Grass & Fodder				0
19	Weed extraction and woody growth removal	Hectare	20	93%	1498

Chapter XXIV

SUMMARY OF PRESCRIPTION

24.1.01 Wardha Working Plan is the 7th Working Plan for the Wardha division. Previous plan of Dr. Nand kishore was under implementation in the division from 1992-2002 which was further extended till 2003-2004. Wardha working plan is written for 933.368 Sq kms of forest area for the period 2005-2006 to 2014-2015. This forest area comprises of –

- I) 499.267 Sq kms of Reserved Forest (229 compartments)
- II) 317.282 Sq kms of Protected Forest (266 compartments)
- III) 105.438 Sq kms of Zudupi Jungle (497 villages)
- IV) 2.491 Sq kms. of acquired private forest (7 villages)
- V) 9.204 Sq kms of non-forest land (25 villages)

24.1.02 Forests 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. However, aspect plays an important part in determining the character of the vegetation in hilly areas. Generally the western and northern slopes are better stocked than the drier eastern and southern slopes.

24.1.03 The biotic factors such as excessive grazing, unregulated felling and frequent fires caused the degradation of the forest in the division. Seedling stages are particularly exposed to extermination due to excessive grazing and fires.

24.1.04 The 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 Wardha division is coterminous with the boundary of Wardha district except on the South-West side. Forest in the north and the north-west are largely situated on hilly areas extending from the flat tops of the hillocks to the lower plains. Some Protected Forests occur as enclaves in cultivated lands in Sumudrapur taluka. The forest occurs mostly along undulating plains. The area is drained by Wardha river and its tributaries, namely, Dham and Wena river which carry water almost throughout the year. The other rivers get dried in hot months.

24.1.05 The rocks throughout the Wardha forest division are Deccan trap, but the soil varies. Geology, soil type and depth play an important role in determining the composition and quality of the crop. Soil in Wardha division is of alluvial type which is found along the tributaries of Wardha, Dham and Bor rivers, suited to tree growth. The basaltic rock can be distinguished into 2 types.

- (I) Compact, hard, homogenous rock which forms shallow refractory soil, supporting low quality tree growth. This is found in Ashti range.
- (II) Softer basaltic rock which supports good quality forest, both teak and mixed, as in Karanja, Hingani range.

24.1.06 However lower shelter regions of Wardha range have deep black cotton soil formed from softer basaltic rock where drainage is good, which supports good quality teak forest as in Wardha range. The areas where in there is no proper drainage, it remains practically water logged, dose not support good tree crop but supports grass and fodder as in some parts of Arvi range.

24.1.07 Climate of the Wardha district is hot and dry, There are 3 seasons namely, Winter, Summer and Rainy season. The winter season is mild and pleasant, starts by the end of November and continues up to middle of February. The summer season starts in the middle of February till the onset of monsoon in the middle of June. During the month of April and May the temperature goes up to 46° is rather unbearable due to hot winds and the dryness of the atmosphere. Average annual rain fall of Wardha district is 1070.6 mm. The major portion of the total annual rain fall is received during June to September. In the past there have been erratic rains during the monsoon, every alternate years. This affects the natural re-generation and afforestation works undertaken in the division. Drought is a rare incident. Severe droughts have affected the forest crop a specially teak to some extent in the year 1939-40, 1940-41, and 1952-53 in Hingani and Karanja ranges.

The distribution of the forest area in ranges of Wardha division is given in table below.

Table 24.1 RANGE-WISE FOREST AREA STATEMENT OF WARDHA DIVISION

Range	RF		PF		UF		ZJ		APrF		NFL		Total
	Com	Area	Com	Area	Com	Area	Village	Area	Village	Area	Village	Area	Area
Wardha	18	45.509	16	11.825	0	0	317	66.806	1	0849	0	0	124.989
Hingni	46	89.101	47	66.891	0	0	62	10.828	2	0.311	2	0.286	167.417
Karanja	38	84.458	59	37.219	0	0	40	11.825	1	0.158	0	0	133.660
Arvi	80	171.303	63	94.514	0	0	33	8.177	3	1.174	6	1.28	276.448
Ashti	47	108.896	81	106.833	0	0	45	7.802	0	0	17	7.638	231.169
Total	229	499.267	266	317.282	0	0	497	105.438	7	2.492	25	9.204	933.683
Bor- WL	13 (9F, 4P)	27.489	6 (5F, 1P)	7.021	5	5.849	0	0	0	0	0	0	40.359
Grand Total	238	526.756	271	324.303	5	5.849	497	105.438	7	2.492	25	9.204	974.042

24.2 Administrative Units

24.2.01 The entire division has been divided into 5 ranges, 24 rounds and 142 beats.

24.3 Past systems of Management

24.3.01 Prior to 1895 there was no scheme to regulate the felling and purchasers could obtain their requirements from anywhere they liked from forests. This resulted in over harvesting in accessible areas. While the reserved forests are managed under the working plan since 1895, the ex-proprietary forests were brought under scientific management at a much later stage. Early reservation period from 1879 to 1895 was of limited activities. Wardha division was part of the Nagpur division, then, Dobbe's working plan is the first working plan for the Reserved Forest for the period 1895-1912. The authors of the successive four working plans for the combined Nagpur and Wardha division are Dunbar Brander (for 1913-1934), P.Sagriya (for 1935-1946), R.Mishra (for 1947-1964), J J Thosare (for 1965-1991). The last working plan prepared by Dr. Nand Kishore for the period of 1992-2002, extended till March 2004, covered the Reserved Forest, Protected Forest and Unclassified forest in the plan. Dr. Nand Kishore's plan is the first plan for independent Wardha division. During the period of 3rd working plan prepared by Sagriya, the entire forest area was stock mapped on the standard scale 4" = 1 mile and reclassified forest into trees, scrub and miscellaneous categories for the purpose of grazing control.

24.3.02 Extensive forest areas of the present Wardha division were under the ownership and control of the Zamindars (proprietors). They used to sell the forest produce in irregular manner. Before the abolition of proprietary rights, the proprietors used to control the forest lands. Though the historic rights existed in this proprietary forest but the enjoyment of these rights depended mostly on the whims of the individual proprietors. People of the villages, in which there was insufficient grazing land, they used to obtain their requirements from the neighbouring villages with the permission of the landlord or as a right, if it was recognized in the Wazib-ul-arz. Soon after the independence, the Zamindars indulged in unsystematic and extensive felling in their forest accelerating the process of forest degradation and the forest loss. The proprietary rights were abolished in 1951. Most of the areas under forest were transferred to the forest department during the period from 1951 to 1954 to manage its resources. K.H. Chati's working scheme was the first plan for 34217.91 hectares of the Protected Forests, for the period 1968 to 1991.

Brief review of Dr. Nand Kishore's plan under revision (1992 to 2001-2002)

The forests were classified on the functional basis and the following working circles were formed

1. Coppice with reserve working circle.

2. Improvement working circle.
3. Fuel wood, fodder and pasture working circle
4. Miscellaneous working circle
5. Wildlife and nature conservation working circle.

1. Coppice with reserve working circle – though prescriptions were made in Dr. Nand Kishore's plan to suitably afforest the under stocked and blank areas, but no concerted efforts have been taken. Most of the plantations under taken in the past are not successful due to refractory nature of the tract and the lack of concerted efforts and approach. Excessive felling in the main as well as the thinning coupes, insufficient coppice and seedling re-production and damage due to illicit felling, grazing and fires, have resulted in depletion of the growing stock. It was found that trees have lost their coppicing vigor.

2. 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 - Various improvement works as envisaged in Nand Kishore's plan were not undertaken. Grazing closures as envisaged in the scheme have not been followed. As a result percentage of palatable grasses 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 at places, but they have failed due to wrong choice of the site.

4. Miscellaneous working circle – 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 hectare. The aim was to protect and preserve the Wildlife and its habitats till the preparation of wildlife management plan. Soil and moisture conservation works, habitat improvement and maintenance of water holes were proposed.

Following criteria have been developed for the future management.

- I) Plan is to be based on primacy of environmental concerns and bio-diversity conservation.
- II) Forests capable of producing medium to large size timber will be harvested under the selection-cum-improvement management.
- III) For production of small timber, poles and fuel wood to meet the local nistar requirements. Improvement system is proposed to continue in areas of poor quality and stunted growth.
- IV) Plantations have been failed in large scale in the past. After analyzing the reasons for its failure; if they are not suitable for plantation, such areas are proposed for rotational grazing purposes.
- V) Forest areas susceptible to erosion and falling in catchments areas of medium and large irrigation projects and reservoirs; shall be protected and given separate treatment having focus on soil and water conservation, afforestation, eco-restoration and eco-tourism.
- VI) JFM arrangements are proposed to be put in place extensively.
- VII) The working plan prescribed implementation of Wildlife (protection) act 1972 in letter and spirit and efforts to have certain inputs of Wildlife conservation's in managed forest. Riparian zones and mesic sites will receive added protection and treatment.
- VIII) Priority will be given to natural re-generation and root stock management. Sustainable NWFP (Non wood timber forest produce) production will be given high priority in the forest management.

Accordingly following working circles have been proposed

<u>Area specific</u>	<u>Over lapping</u>
1. SCI	Wildlife management
2. IWC	NWFP
3. AFF & RSM	JFM
4. G & FRM	Protection
5.P & CAM	
6. Miscellaneous	

Selection cum improvement working circle

The areas allotted to this working circle are

- ⊗ Compartments having basal area more than 8 sq mt per ha and selection trees (above harvestable girth) more than 10 per hectare and density 0.4. to 0.8.

- ⊙ Good quality forest containing mature crop. Dense teak forest of site quality III, IVa & IVB inextricably mixed in the crop.
- ⊙ Areas of old CWR working circle (not worked under previous plan) having stunted but straight and sound teak crop of site quality IV capable of producing timber and poles.
- ⊙ Part areas of improvement working circle and pasture working circle of previous plan supporting dense and sound crop capable of producing timber and poles.
- ⊙ Silvicultural system is the felling of trees that have attained harvestable girth.

<u>A. Species</u>	<u>SQ</u>	<u>Harvestable girth</u>
Teak	III	120 cm
	IV	105 cm
		75 cm above for hollow trees
Group 2	Ain, Bija	120 cm
Group 3	Surya, Tiwas, Keram, Dhawda, Bhira, Mokha, Palas, Siwan, Chichwa etc.	90 cm
Group 4	Garari, lendia	45 cm

The committee under the Chairmanship of Add. Principal Chief Conservator of Forests (Production and Management) noticed around 50% hollowness in teak trees in CWR working circle. As per instructions received in the state level committee, the issue has been discussed in depth with CCF (T) Nagpur and CCF WP Nagpur and decided that all hollow teak trees above 75 cm girth are to be removed. Its annual volume comes to 6346.89 cumt. which is less than the local incremental volume over the area. Harvesting will be done from higher girth class to lower girth class. Hollow trees will be harvested first on priority and then other sound teak trees subject to their silvicultural availability will be harvested. Harvesting for teak shall be limited to volume i.e. 6346.89 cumt per year. The openings created by harvesting are to be regenerated naturally or artificially through plantation of suitable species.

B. No fellings of those species which are less than 1% in their stocking e.g. kulu, Shisham, Semal, Beheda, Karai, Haldu.

III. No of felling series are 16 and average size of the coupe is 108.85 ha.

IV. Average regeneration status is as follows.

<u>Ht.</u>	<u>Per ha. seedling number</u>
0.3 – 1m	677
1m – 3m	351
> 3 m	169
Total	1197

- V. General treatment type
- A. Protection Areas
- B. Understocked Areas
- B1 (with rootstock) B2 (without rootstock)
- C. Pole crop
- D. Well stocked area
- E. Blank area

Improvement working circle

- i) Majority of CWR areas worked in previous plan are included.
- ii) Compartments having teak and miscellaneous forests of quality IV with more open forest and blanks and some compartments of pasture W.C having mature to over mature trees.
- iii) Areas having basal area upto 8 sq mt per ha .
- iv) Forests are generally good quality and fit in the criteria of SCI but they contain young crop
- v) No. of Treatment series are 11 and average area of the coupe is 93.75 ha.
- vi) Regeneration status in terms of per ha seedlings/ seplings is as follows.

Seedling ha	Seedlings number per ha.
0.3 – 1m	530
1m – 3m	292
> 3m	113
Total	935

- General treatment type
- A – Protection area
- B – Understocked area
- B1(with rootstock) B2 (without rootstock)
- C – Pole crop

D – Well stocked area

E – Blank area

Afforestation & Rootstock Management working circle

- i) 3861.322 ha. of understocked areas are prescribed under Afforestation programme and they are proposed to be covered in 20 yrs. Root stock management will be given priority over plantation.
 - ii) Average basal area of the forests under this W.C. less than 5.
 - iii) Treatment series with an average coupe size of 48.27 ha have been formed.
 - IV) Ecological Index for Wardha division indicates planting of 1500 seedlings per ha.
 - V) Choice of species will be for locally valuable ones & those are fit for the particular soil type.
 - VI) Root stock management for B1 type area.
 - Well distributed 400 established seedlings / saplings per ha will be identified.
 - Healthy promising coppice shoots (one per stump) will also be retained.
 - Mulching, weeding soil working of seedlings & coppice shoots is proposed.
 - VII) Two stage planting technique for poorer areas (B2 & E type areas) consisting of refractory soils have been proposed.
 - A. Restorative phase from 1st to 4th yr.
 - Year 1. SMC & protection measures
 - Year 2. Seed sowing & planting Agave, Khus.
 - B. Planting phase
 - Year 4 PPO/PYO
 - Year 5 Planting
- B2 & E type areas which are not refractory are treated with planting suitable teak or miscellaneous species.
- VIII) Works are to be entrusted to JFMCS.

Protection & Catchment area management working circle

1. Forest areas/compartments having more than half of its areas on the steep slopes or in the stream buffer.
2. Compartments close to and in the catchments of the major & medium dams and water bodies.
3. Generally good quality forests with average basal area 8 sqm per ha.
4. Regeneration status.

Seedling size	Per hector seedling number
0.3 – 1m	433
1m – 3 m	233
> 3 m	113
Total	779

- The areas not in the steep slopes and not directly drained in to water bodies; forming catchments are proposed to be worked on conservative harvesting basis as prescriptions enshrined in SCI W.C.
- Catchment areas are proposed to be given special attention for soil & moisture conservation work and under plantation programme.
Plantation of species suitable for soil & water conservation has been prescribed.
- Water body may be included under eco-tourism programme as well.

Grass & Fodder Resource Management working circle

The total area under this W.C. is 10379.821 ha.

- The areas because of their closeness and convenient location adjoining to villages; incapable of producing timber or fuel & over which the grazing demand is heavy.
- Areas with basal area less than 5.

Treatment –

1. Regulated & rotational grazing in pasture areas. Each pasture series will have 4 coupes & each coupe shall remain closed to grazing for three years. In the closed coupe removal of weeds & woody growth & extensive soil & moisture conservation works may be taken up for improvement of the site.
2. Grass land management & development by regulating seedling and grass cutting and through complete closure to grazing in identified grass lands.

Wildlife (overlapping)

- I) Wildlife (Protection) Act,1972 provides elaborate provisions for wildlife conservation outside the PAS.
- II) Forests in Wardha division occupy an important place in Wildlife management on following counts –

- Organizing special & effective antipoaching measures.
- Providing corridor to Bor WLS.
- Developing eco-tourism in Vidarbha area.
- III) Implementation of standing order 001 from Principal Chief Conservator of Forests (Wildlife) in letter and spirit is suggested, which mandates.
 - Preparing inventory of water holes & special vigilance there.
 - Sensitizing and strengthening antipoaching machinery.
 - Timely & effective dealing of compensation cases of injury due to Wildlife.
- IV) Identification of ecologically sensitive sites which are important from Wildlife management point of view.
- V) Development of eco-tourism in 26 sites & 8 circuits, identified.

NWFP

- Official NWFP collection figures which are mostly for gum (Dhawada) are not very encouraging.
- Kullu trees being sparse in distribution & less in number; its gum need not be extracted.
- NWFP species like Dhawada (even if their % is high) needs reservation against felling.
- Regeneration of NWFPs trees through their inclusion in plantation programme & manipulating NR (Root suckers) .
- There is a need to improve tapping technique for gum. FRI method gum tapping has been proposed.
- Proposed to link it with JFM programme to increase stocking of NWFP trees, methods of collection as well as exploration of non-traditional NWFPs.
- 33 items of NWFPs in scheduled areas are collected through agency of TDC & royalty for these items is given to grampanchayat.
- Other NWFPs in non scheduled areas (excluding 33 items in scheduled areas are auctioned in open unitwise by deptt.

JFM (Overlapping) working circle

- Through the Govt. R. solutions No. SIF-1091/199/F-11, dt- 16 th March 1992 JFM approach was adopted for degraded forest areas & now vide G.R. No. MSC/ 2000/C.No.143/F-2, dt- 25.4.03 it is to be implemented in well stocked areas on experimental basis.

JFM concept has been introduced in each working circle.

- 265 villages are adjoining to forests in Wardha division.
- 140 villages are unfit for formation of FPC due to high population or less forest area.

- 125 FPCs have been formed.
- Microplan is prepared for each village through the process of participatory rural approach
- Microplans have been prepared for 51 villages covering an area 32865.38 ha.
- Microplan is linked with the working plan objective, oriented with site specific planning.
- It is envisaged to protect & treat the forest area under plantation.
- Silvicultural management, maintenance of forest boundaries, removal of forest encroachment & control over illicit cutting should receive high priority.
- For carrying out developmental activities, the expertise of NGOs has to be fully utilized.
- For strengthening the FPCs a revolutionary fund at village level should be developed.
- Under entry point activities village developmental works are proposed by the villagers in the Gramsabha.
- Benefit sharing will be as per provisions contained in 2003 GR.
- Integrated tribal development project is to be implemented in 6 tribal villages of this division by adopting JFM approach.

Protection (overlapping) working circle

- Covers entire division area
- Forest protection is social economic problem
- Factors causing pressure on forests
 - I) Increased population
 - II) Encroachment for agriculture
 - III) Dependence for day to day needs on forests.
 - IV) Illicit felling due to increased value of timber
 - V) Forest fires
 - VI) inadequate infrastructure with Forest Department.

Treatment -

- Identification of sensitive/hypersensitive beats.
- Beat inspection
- Cross checking of beats
- Saw mill inspection
- Checking in transit
- Nakabandi/night patrolling
- Monitoring of vigilance cell/mobile squad
- Record of Habitual offenders to be kept
- Surveillance in consumption centres

- Use of intelligence net work
- Use of wireless net work
- Involvement of forest protection committees
- Weapons supply
- Vehicles to be provided to mobile squad
- Enough funds are to be given for forest protection
- Establishment of special forest courts for conducting exclusively, the trial of the forest offences
- Grazing is to be controlled
- Fires are to be extinguished effectively
- Identification of Wildlife poaching zones.
- Vacant posts of protection staff to be filled in immediately

Miscellaneous working circle

1. Fixation of outer boundaries, Priority areas are
 - Zudupi Jungle
 - NFL
 - Acquired private forest areas taken by division
 - Survey, demarcation & map preparation of area 11773.074 ha has to be done on priority.
 - Thinning regulation, procedure for gum tapping, plantation, soil conservation methods, coupe demarcation procedures etc. are covered under this chapter.
